

Social Networking Prototype for University Students

Hilmar Ingi Rúnarsson

Kongens Lyngby 2007
IMM-PHD-2007-70

Technical University of Denmark
Informatics and Mathematical Modelling
Building 321, DK-2800 Kongens Lyngby, Denmark
Phone +45 45253351, Fax +45 45882673
reception@imm.dtu.dk
www.imm.dtu.dk

Summary

Every university student has some kind of a social network. This network consists for example of family, friends, students and professors. It is important to be able to maintain and expand this social network.

In this thesis the aim is to develop a social networking prototype for a mobile device that supports university students. It should help students to maintain and expand their social networks. It was clear from early on in the design process that a successful prototype should include features from ICT systems, that are already in place at universities.

To establish requirements and needs for this kind of a social networking prototype, university students participated in the development process. The participants came from universities in both Iceland and Denmark. The requirements gathering started with interviews and a workshop. The needs and requirements gathered in the interviews and the workshop were used to produce the first paper prototype. Two iterations were done with the paper prototype.

A Hi-Fi prototype was made after going through the two iterations with the paper prototype. The Hi-Fi prototype was made with Adobe Flash and ActionScript. The prototype is not a fully functional prototype but it has some functionality. Two iterations were done with the Hi-Fi prototype.

Evaluations on the Hi-Fi prototype indicated that it is fulfilling the requirements from the users that participated in this thesis.

Preface

This thesis was prepared at Informatics Mathematical Modelling, the Technical University of Denmark in partial fulfillment of the requirements for acquiring the M.Sc. degree in engineering. The project was carried out over eight month period from March to November 2007 corresponding to 40 ECTS points.

The supervisor for the project was associate professor Nette Schultz at Informatics Mathematical Modelling.

Reykjavík, November 2007

Hilmar Ingi Rúnarsson

Acknowledgements

First of all I would like to thank my supervisor Nette Schultz at the Informatics and Mathematical Modelling who has done a great job motivating and tutoring me throughout the entire course of this master thesis.

Secondly my family, I would like to thank for their support and motivation during my studies.

Finally, I am deeply indebted to my girlfriend, Rakel Pétursdóttir, for her endless love and support during this work and throughout my entire study at the Technical University of Denmark.

Contents

Summary	i
Preface	iii
Acknowledgements	v
1 Introduction	1
1.1 General Thoughts	1
1.2 The Prototype	2
1.3 Objective of the Thesis	2
1.4 Users	3
1.5 Products	5
1.6 Social Network	5
1.7 Thesis Overview	6
2 Theory	7

2.1	Understanding Users	7
2.2	Usability	11
2.3	User Centered Design	15
2.4	Software Design Process	16
2.5	Prototyping	19
2.6	Mobile Design	21
2.7	Participatory Design	24
2.8	Communication	27
2.9	Evaluation Methods	28
2.10	Gestalt Laws	30
3	Gathering of Requirements	33
3.1	Introduction	33
3.2	Interview Preparation	34
3.3	Interviews	37
3.4	Interview Outcome	39
3.5	Workshop Preparation	40
3.6	Workshop	41
3.7	Workshop Outcome	42
4	Low-Fi Prototype Design	45
4.1	The Paper prototype	45
4.2	Iteration 1	46

4.3	Iteration 2	50
5	Requirement specification	55
5.1	Overall Description	55
5.2	Interfaces	56
5.3	Functional Requirements	56
5.4	Non-Functional Requirements	63
6	Hi-Fi Prototype Design	67
6.1	The Hi-Fi Prototype	67
6.2	Test Plan	70
6.3	Iteration 1	70
6.4	Iteration 2	72
7	Conclusion	75
7.1	Summary of Results	75
7.2	Discussion	76
7.3	Future Work	77
A	Interview structure	79
A.1	Demographic Information	79
A.2	Questions	80
B	Interview	81
B.1	Interview 1	82

B.2 Interview 2	83
B.3 Interview 3	84
B.4 Interview 4	86
B.5 Interview 5	87
B.6 Interview 6	89
C Paper Prototype	91
C.1 Workshop - Simple Paper Prototype	91
C.2 Paper Prototype	92
D Workshop	97
D.1 Ethnographic Information	97
D.2 Comments and Design Ideas From the Participants	98
E Paper Prototype Sessions	101
E.1 Iteration 1	101
E.2 Iteration 2	106
F Hi-Fi Prototype Sessions	111
F.1 Iteration 1	111
F.2 Iteration 2	113
G Hi-Fi Prototype Screenshots Version 1	115
H Hi-Fi Prototype Screenshots Version 2	119

CHAPTER 1

Introduction

This chapter discusses general thoughts regarding this project and the objective of the thesis. The users are introduced and finally there is a thesis overview.

1.1 General Thoughts

In the modern world the flow of information and the need to communicate with other people is growing from year to year, and will continue to grow for years to come. The need for people to be able to access this information anywhere is growing, furthermore people are using mobile devices to handle this communication and information retrieval. This is the same for almost everybody in modern society, whether it is a bank manager or a mechanic. People want to access the information and communicate with other people when and where they want.

The university campus is no different then any other place, except for on campus students are on the move all day long. They have to go from one course to another, that can mean the student has to go to another building on campus. That also means the students are probably meeting new people in every course. On campus there are people that need to access their information and communicate with coworkers, students or other people at the campus. The information

referred to earlier could be related to their personal or social life as well as their studies or work.

Every campus has some kind of a product similar to the Campusnet at Technical University of Denmark (DTU) and the Uglu at the University of Iceland (HI). Those products help students to access their information at the university. Some of these products also support the student with communicating with students, teachers or other people. It is different from product to product what they have to offer, but they offer among other things web mail and group communication.

It is very likely that the students will want to have some if not all of these features available to them on their mobile devices in the near future.

1.2 The Prototype

This prototype should support a university student to communicate with students, professors and other campus staff at campus, also with friends and family off campus, using a mobile device. The user should be able to receive and send emails. The user should also be able to schedule meetings and be reminded of those meetings. This prototype should also help the user to find students to work with when starting a new course.

When a student comes for the first time to a university and he is all alone, then he needs help to create a new social network. While the product should help him make his new social network, it should also support him to maintain his old social network.

1.3 Objective of the Thesis

The objective of this thesis is to develop a social networking prototype that supports university students in their daily lives.

The prototype will include features that are being developed for this social networking prototype, it may not be all of the features but should be the features that have much meaning for the use of the product.

Using this prototype a user should have support in maintaining and expanding his social network. The prototype will also support a user in his life on campus as well as his off campus activities.

In the development of this kind of prototype users involvement is important, especially in the beginning. From early on in the development process a user is involved in the design of the prototype. A user contributes by participating in interviews and test sessions.

The prototype is designed for use on a mobile device, which is a Nokia 770 internet tablet.

The final prototype will have limited functionality, but should include features that support the user in their daily activities.

1.4 Users

When exploring and investigating the potential users it is important to realize that they all might expect different things from this prototype. The only thing they have in common is that they are studying at a university.

The age of the users can vary from about 18 years and upwards. From this it is clear for example that an 18 year old user will probably have different needs and requirements, if compared with a user that is 30 years old. Trying to give both individuals what they want might cause problems in the development. So it is important to compromise and try to give both individuals what they feel is most important, this however must be done so that it does not complicate the use or the development of the prototype.

The prototype developed in this thesis is aimed at university students, it can be very different how far along the student is with his studies. Students can be split into three different groups depending where they are in their studies.

Bachelor student is a student that is starting his/hers studies

Master student is a student that has finished his/hers bachelor degree and has continued his studies

Ph.D. student is a student that has finished his master degree and has continued his studies

It can vary a great deal how long each degree takes, but the normal way is to finish the bachelor degree in around three years, the master degree in additional two years and the Ph.D is upwards from additional three years, after finishing the master degree.

A typical university campus has people of all sizes and shapes, students, professors and other campus staff. People are different in many ways, they all have for example different needs and different interests. Those are just two topics of many more that need to be considered when a product is developed for this group of people.

It can be different what the needs are for a student. It is very unlikely that a student that is single has the same needs as a student that is in a relationship. It can also be very different what students do if they have kids or if they don't.

What students do in their spare time can be very different, some like sports or being out in nature, while other like reading books and staying inside. Both types need to get equal attention from the design team.

The users that have tested this prototype are studying in two different countries, Iceland and Denmark. The first phase, that is the interviews and requirement analysis is done in Denmark, with students that are studying in Danish universities. The second phase is done in Iceland, that is the testing of the prototypes, both lo-fi and hi-fi prototypes. One could imagine that the needs for a student in Denmark are somewhat different from the ones that a student in Iceland has.

The students that participate in this development are studying in Denmark and Iceland. They come from two universities in Denmark and two universities in Iceland. If the students came all from the same university then some diversity would be missing. The students come from two universities in two different countries should give some diversity.

The population in Iceland is approximately 300.000 people, compared to approximately 5.5 million people in Denmark. Everything is smaller in Iceland and it is more likely that a student know the person that he needs to communicate with. Whether that changes the way that students in Iceland would like to use this product, will be interesting to see.

Everything stated above is something that needs to be considered in the development. The product should support the student on and off campus. To make that possible it is necessary to look into what people are doing on campus as well as off campus.

1.5 Products

Most universities offer some kind of ICT (Information and Communication Technology) system to their students. Those system are not exactly the same from one university to the next. But what they have in common is that they offer some of the same functions to the students that makes life easier for the students in some way. Here below are examples of things that such systems offer:

- Webmail
- Calendar
- User groups
- Information about courses
- Address book

Google calendar, google mail, Scrype, Microsoft Outlook are products that people use to organize and communicate with each other.

All the things that the ICT systems offer students should support the student in his daily life on campus.

1.6 Social Network

A social network comprises of nodes which are generally individuals or organizations. They all have relations that connect them together, these relations can be more than one from node to node. Relations can be of different types such as:

- Friends
- Kinship
- Dislike
- Web links
- Disease transmission

- Airline routes

Every person has some kind of a social network that he or she has to maintain. Maintaining a social network can be done with the help of product explicitly made for those purposes. Example of such products are:

- MSN messenger
- Skybe
- Email
- PDA/Mobile phone
- Personal computer
- The internet

This list does not contain all products that aid in the maintenance of social networks, far from it. These are just a few examples of products that are well known for helping people maintain and expand their social networks.

1.7 Thesis Overview

Chapter 2 describes the theory used through out the thesis.

Chapter 3 covers the gathering of requirements. The initial interviews and the workshop.

Chapter 4 contains the Low-Fi test sessions. Those were conducted with a paper prototype in two iterations. Also this chapter covers the preparation for each iteration.

Chapter 5 lists the requirement specification. That is interfaces, functional requirements and non-functional requirements.

Chapter 6 describes the Hi-Fi prototype test sessions. This chapter covers also the preparation of those test sessions.

Chapter 7 concludes on the thesis with a summary of results, general discussion and possible future work

CHAPTER 2

Theory

In this chapter the theory used in this project will be introduced and explained, some in more detail than others. The ones that will be used extensively will be explained in more detail.

2.1 Understanding Users

When creating an interactive product, it might be tempting to begin the design at the physical level of the design. The physical level would be the physical interface of the product and what interface styles to use. Whether to use menus, forms, speech, icons and commands. Critical usability goals and user needs may be overlooked if the design is started at this level, this may cause major problems.

It should be avoided to start the design at the physical level because usability can be overlooked. But it is of course necessary at some point to decide on the designs of the physical aspects. However it is better to understand the nature of the problem space before making those kind of design decisions. It is important to conceptualize what you want to create and articulate why you want to do so [12].

It is very important for every designer to understand the user for a program that is being designed. There are a number of different methods to gather relevant information from the user. Among these methods are the following:

Questionnaires series of questions designed to elicit specific information from the user

interviews one-on-one interviews or interviews with more than one at a time

workshops with two or more users where they can possibly interact with simple paper prototypes

Naturalistic observation observe as it happens in its natural setting

Studying documentation Rules and procedures are often written in manuals and are a good source of data. Such documents should not be the only source, as everyday practices may augment them.

2.1.1 Questionnaires

A questionnaire is only as good as the questions it contains. They are a series of questions that are designed to elicit specific information from the users. Questionnaires that are well designed are good at getting specific information from a large number of people. They can help when a group of people is spread across a large geographic area, which would make it nearly impossible to visit them all.

Questionnaires can be structured in different ways. Some might just want users to answer YES or NO questions. While other questionnaires might ask users to select from pre-supplied answers and lastly some might ask for a longer response or comment [12].

It is useful to use questionnaires when it is necessary to protect the privacy of the user. They are also useful when resources and money are limited. It can be useful to use questionnaires when there are a large number of people that need to give feedback regarding a specific product.

2.1.2 Interview

To gather information from the user it is often good to do interviews. This can either be done by face-to-face interviews or by interviewing a couple of user at once. Interviews can be done all through the development process.

It is important to conduct interviews early on in the design process. By doing so, then the user's opinions and comments are considered early on in the design process. This is the industry standard to do these interviews early on in the design process. In some cases interviews are conducted later on in the design process, but that is not very common practise.

It is important for designer to interview users. The way users and designer think can be drastically different. Interviews helps the designer to capture the mental model from the user, that mental model is the internal model that a user has about how he/she should interact with a product and what it does.

Ethnographic interviews can be done through the design and implementation process. It is however subtly different approach to these interviews depending on where in the development process the project is. It is best to do the ethnographic interviews at the start of the design phase, they are normally placed in the early stages of the requirements gathering phase.

Interviews can be grouped in three chronological phases. The interviews are different in structure depending in which phase the project is. Focus tends to be broad at the start, later the interviews zoom in on more task-oriented issues and specific functions. These three groups [4] can be described as follows:

Early-phase interviews are exploratory in nature, and focused on gathering domain knowledge from the point of view of the user.

Broad, open-ended questions are common, with a lesser degree of drill-down into details.

Mid-phase interviews are where designers begin to see patterns of use and ask open-ended and clarifying questions to help connect the dots. Questions in general are more focused on domain specifics, now that the designers have absorbed the basic rules, structures, and vocabulary of the domain.

Late-phase interviews confirm previously observed patterns, further clarifying user roles and behaviors and making fine adjustments to assumptions about task and information needs. Closed-ended questions are used in greater numbers, tying up loose ends in the data.

Interviews can be split up into three main types, structured, unstructured and semi-structured, depending on how rigorously the interviewer sticks to the prepared set of questions.

The following suggestions [4] should help the designer to get a wealth of useful data.

- Interview where the interaction happens
- Avoid a fixed set of questions
- Focus on the goals first, tasks second
- Avoid making the user a designer
- Avoid discussion of technology
- Encourage storytelling
- Ask for a show and tell
- Avoid leading questions

2.1.3 Focus Groups and Workshops

Interviews tend to be face-to-face and elicit only one person's perspective. As an alternative or as corroboration, it can be very revealing to get a group of stakeholders together to discuss issues and requirements. These sessions can be very structured with topics that are suppose to be discussed, they can also be almost totally unstructured.

For the unstructured sessions a facilitator is required to keep the discussion on track and provide necessary focus or redirection when appropriate. A facilitator helps people to understand their common objectives and assists them to plan to achieve them without taking a particular position in the discussion. The facilitator tasks are among other things: remind participants what the objectives are, ask open-ended questions to stimulate thinking, keep the group on track to achieve its goals, and more. What he does not do is: Offer their own opinions, back a particular opinion, and more.

Stakeholders should meet designers and other users. It is best that all parties that have some interest in a project come together to express their views, it does not matter whether those views are expressed in public or in some other way. It is common for one set of stakeholders to be unaware that their views are different from other stakeholders, even though both groups of stakeholders are in the same organization or company.

All participants need to be selected carefully. It is very easy for one or a few people to dominate the discussions. This is especially true if they have control, higher status or influence over the other participants. The facilitator has to make sure that every point of view gets across, but not only the points from the most dominant participants.

2.1.4 Naturalistic Observation

It can be very hard for people to explain how they do a task. So it is very unlikely that the designer is going to get the full and true story from the stakeholder by using any of the techniques mentioned above [12].

Observations involve spending time with the stakeholder as they go about their day, observing work as it happens in its natural environment.

The designer shadows a stakeholder in their natural environment. While shadowing the designer takes notes, asks questions and observes what is being done. It is important not to ask too many questions.

The strength of this method is that allows the designer to observe the behavior in the setting it normally occurs, rather than in the laboratory or a fixed setting.

2.1.5 Study Documentation

Manuals that cover rules and procedures are good source of data about the steps involved in an activity and any regulations governing a task. However, that kind of documentation should not be the only source. Everyday practices may augment those documents and the procedures may have been thought up by those concerned about making them work in a practical sense.

Other documentation that might be studied are diaries and logs that are written by stakeholders during the course of their work [12].

2.2 Usability

Usability is a term used to denote the ease with which people can employ a particular tool or other human-made object in order to achieve a particular

Table 2.1: Table (Usability qualities)

Daily use	Correctness - Does it do what I want? Reliability - Does it work correctly every time? Security - Can it protect my data effectively? Efficiency - Does it carry out my tasks quickly? Accessibility - Can I use it when I want? Usefulness - Can it carry out the tasks I want it to? Convenience - Is it easy to work with?
Maintenance	Fixability - Can I correct bugs in it? Flexibility - Can I change it? Testability - Can I test it?
Change	Portability - Can I use it on other platforms? Reusability - Can I use parts of it for other purposes? Adaptability - Can it work with other systems?

goal. Usability can also refer to the methods of measuring usability and the study of the principles behind an object's perceived efficiency or elegance.

When working with usability is important to have objective goals. It is important that these goals are defined early on in the development process, for example in the requirements specification phase. These usability goals have to be precise and objective, there also have to be some methods to assess these goals. If this is done, then when someone says "the product must be usable" there is no confusion and everybody knows what that means. With objective goals it is possible to agree and check impartial usability requirements [10].

It is hard to make sure that a product is usable for the user. However it is possible to keep that risk low by setting objective goals and try give the user a good user experience when the product is used.

2.2.1 Requirements for Usability

It is possible to think of usability as usefulness and convenience. These two things are both very important qualities for every product Here follow some qualities [10] that need to be considered:

To ensure the quality of a product, goals have to be set for these qualities. Not all equalities are equally important, they have to be prioritized accordingly for each project [10].

The items mentioned in the table above all relate to usability goals in some way, which will be covered next.

A high fidelity product has to have a minimum amount of quality to even begin to talk about usability. A number of qualities are especially important requirements for usability in such a product.

Reliability A product has to be stable. High frequency of errors makes the users loose confidence in the product. This is especially true if the users loses data or have to redo their work

Security The data that the user provides is protected in the way that only authorized people can read and or alter what is submitted.

Accessibility The product has to accessible when the user wants it.

2.2.2 Usability Goals

Usability can be regarded as to make sure that an interactive product is easy to learn, enjoyable and effective to use. Of course this is all from the user's perspective. It is possible to define usability with the following goals:

- Easy to learn
- Easy to remember
- Efficient to use
- Understandable
- Satisfying to use
- effective to use
- safe to use
- have good quality

It is far from trivial to set realistic goals for usability, it is a real challenge for a project group to come up with realistic goals. Couple of things have to be taken into consideration when establishing these goals. Such as technical options, user requirements and sales consideration, so that the product can compete with other products [10].

The items mentioned here above regarding usability goals can all be connected to one or more qualities in table XX. "Security" from table XX can be connected to the usability goal "safe to use". Also, "reliability" can be connected to the usability "goal easy to learn", "satisfying to use" and "have good quality".

It can safely be said that if the qualities from table XX would be implemented, that would then help with accomplishing the usability goals that are set. Even if all the qualities are implemented it is not certain that all the usability goals will be met as well, it should at least help to achieve some of them.

2.2.3 User Experience Goals

User experience is something that designers have to take into consideration. How will the user perceive the system? The aim of the designers should be that the user feels some of the following things [12] when using the product:

- satisfying
- enjoyable
- fun
- entertaining
- helpful
- motivating
- aesthetically pleasing
- supportive of creativity
- rewarding
- emotionally fulfilling

The user's experience of the product is not solely dependant on the screen dialogue. The users judge the product according to the whole user experience [10].

The trade-off between usability and user experience goals is important to recognize and understand. It is obvious that not all usability and user experience goals apply to every interactive product being developed. It is also obvious that

some combinations will never work together on some products. As an example imagine a process control system, such a system can not be fun and safe at the same time. The use context, the task at hand and who the intended user are make up the list of what is important each time when developing a product.

2.3 User Centered Design

In user-centered design the focus is on the work that the users are trying to accomplish and on what the software needs to supply via the user interface to help them accomplish it. One might say that the user is placed at the very heart of the product design process [3].

What this means is that in the design process the user has much to say about how a product is developed. This input comes from a number of things such as interviews, focus groups, questioners, prototype testing and more. But later on the user does not have as much to say about the fundamental aspects of the product.

When designing it is necessary to emphasize on the need to design for the real users and their goals. The technology should not be the only driving force of the development process. This should result in a system or a product that makes the most of human skill and judgement, should be relevant to the work in hand and should support the user, rather than constrain him [12].

User-centered design is centered around the user. Users are involved as much as possible in the design process in creating the product. Involvement from the user can be of different level, examples of user involvement are observing users., expert users designing and evaluating prototypes. The user-centered design process is highly iterative, there are many tests and revisions until the product meets the usability requirements set that product.

These are the activities that make up the user-centered design process, from the ISO 13407:

Requirements gathering - Understanding and specifying the context of user

Requirements specification - Specifying the user and organizational requirements

Design - Producing designs and prototypes

Evaluation - Carrying out user-based assessments of site/product

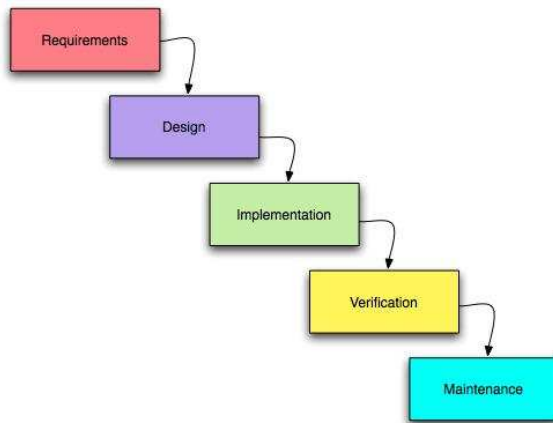


Figure 2.1: Waterfall process

2.4 Software Design Process

Software design process is a process that is used to develop a software product, sometimes called software life cycle or software process. For these processes there are several models, each model describes an approach to a variety of tasks or activities that take place during the process.

In software development there are a couple of design processes, few of them are listed here below.

- Waterfall process
- Iterative process
- Extreme programming process
- Formal methods

2.4.1 Waterfall Process

The water fall process is basically a linear process. Where each step has to be completed before continuing to the next step. These steps [7] are:

1. Requirement Analysis

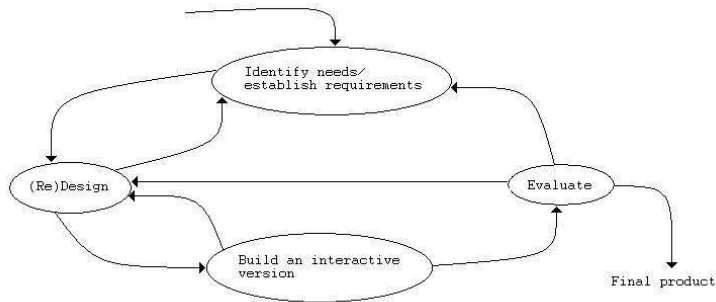


Figure 2.2: Simple Iterative process

2. Design
3. Implementation
4. Verification
5. Maintenance

The name of these steps may vary as may the precise definition of each step. However, what is common with all versions of the waterfall process is that it starts with some kind of requirements analysis, then comes the design, after design comes implementation, verification and at the end there is maintenance [7].

The waterfall process is not flawless, it does not take into consideration that requirements may change over time. When one phase is completed then that phase is done and should not be changed. The idea of iteration was not built in the waterfall process philosophy. As the waterfall process is used today, it has some level of iteration in most versions.

Another concern regarding the waterfall process is that it was never built in a way to give designers the opportunity to evaluate and review with users.

The process has the primary advantages that it is clear and definitively results in a product at the end of process.

2.4.2 Iterative Process

The iterative process assumes that the final product can be made correct the first time. The phases are repeated until the product passes specification:

1. Identify needs, establish requirements
2. (Re)Design
3. Build an interactive prototype
4. Evaluate

The iterative process is more appropriate for the design of product that has a large degree unknown. This phases can also be seen in Figure 2.2.

A variation of the iterative process is the rapid prototyping. Important notion in rapid prototyping is that there are several levels of prototyping, called fidelity. The fidelity of the prototyping can vary from text documents, drawings, mock up, and programs. These levels of prototyping allow rapid iteration of the process. With this understanding rapid prototyping can be modeled:

1. Design
2. Prototype
3. Evaluate

The rapid prototyping has the advantage that the designers and consumers of the product can view or try early versions of the product. This is especially appropriate for a HCI product because a HCI product can not really be evaluated until it is "tried."

2.4.3 Extreme Programming

The core methodologies of extreme programming and other agile methodologies is that adaptability to changing requirements at any time during the project is better and more realistic than trying to define all the requirements at the beginning of the project.

The fundamentals of extreme programming are to name a few [1]:

- Write tests before programming and keep them all running at the same time
- Producing all software in pairs
- Start with something simple and then add to it

2.4.4 Formal Methods

In software development, a formal method is a method that provides a formal language that describes a software artifact like specifications, designs and source code. These artifact are described such that formal proofs are possible [6].

Formal methods support precise and rigorous specifications of those aspects of a computer system capable of being expressed in the language [6].

2.5 Prototyping

If a product is developed incrementally a prototype might be made in some of the intermediate stages in the development process. Prototypes are approximations of what the end product should be like. One idea that is often advocated is rapid prototyping, which mean progressively developing an product hand in hand with an understanding of the requirements.

A software life cycle that is based on prototyping is different from the typical waterfall model described before. There the requirements analysis and specification finished before developing the product. Prototyping is based on more flexible and iterative development model [7].

A Prototypes can be anything from a storyboard made from paper to a software, or a cardboard mockup to a molded or pressed piece of metal. With a prototype the stakeholders can interact with the product and envision it. It helps stakeholders to gain experience in using the product in realistic settings. There is also the possibility of exploring imagined uses of the product [12].

It is possible to thing of the prototype as the communication device for those working on it, both designers and stakeholders. They are also very effective to test out ideas for yourself or test them on others.

When choosing between alternatives in the design it can be good to use a pro-

prototype. It can answer questions and support the designer if there is something that they need to get some feedback on.

There are two types of prototypes, low-fidelity prototypes and high-fidelity prototypes, there are a couple of different low-fidelity prototypes to choose from.

The following table [12] show the advantages and disadvantages of low-fidelity and high-fidelity prototypes:

Type	Advantages	Disadvantages
Low-fidelity prototype	<ul style="list-style-type: none"> Lower development cost Evaluate multiple design concepts Useful communication devices Addresses screen layout issues Useful for identifying market requirements Proof-of-concept 	<ul style="list-style-type: none"> Limited error catching Poor detailed specification to code to Facilitator-driven Limited utility after requirements established Limited usefulness for usability testing Navigational and flow limitations
High-fidelity prototype	<ul style="list-style-type: none"> Complete functionality Fully interactive User-driven Use for exploration and testing Look and feel of final product Serves as a living specification Marketing and sales tool 	<ul style="list-style-type: none"> More expensive to develop Time-consuming to create Inefficient for proof-of-concept designs Not effective for requirements gathering

A low fidelity prototype does not look very much like the final product. The materials used are most often paper and cardboard of different color, post-it notes, and many different color of pens. This means they are simple and cheap, they can also be changed quickly. They support the exploration of alternative design and ideas.

Here are a couple of different low-fidelity prototypes [12]:

Storyboarding contains a series of sketches showing how a user might traverse through a task using the product being developed. It can be used with a scenario to bring more detail to the written scenario, offers the chance to role-play.

Sketching what the user wants to see on the display or how the user wants something to be represented. Some find it difficult to sketch things because they are inhibited about the quality of their drawings.

Prototyping with index cards each card could represent one screen. The

size of the cards should be about 3 x 5 inches. It is possible to step through the cards to perform the task being represented. It is also possible to use the index cards in other ways than the one mentioned

Wizard of Oz a software-based prototype. The user sits in front of a computer screen and interacts with the product, while there is another person at the other end that simulates the product response instead of the product itself.

Two common compromises that often must be traded against each other are breadth of functionality provided versus depth. These two kinds of prototyping are called horizontal prototyping (providing a wide range of functions but with little detail) and vertical prototyping (providing a lot of detail for only a few functions) [12].

Rapid prototypes are prototypes that are developed quickly, in much less time than it would take to develop a working system. By shortening the prototype-evaluation cycle, the design team can evaluate more alternatives and iterate the design several times. This improves the chance that the final product is successful and meets the user's needs [9].

2.6 Mobile Design

When designing a product for a mobile device it is important to take into consideration the size of the device and other aspects regarding the device such as screen size and input methods for that particular device.

Some say that it is important to try and use the knowledge the user already has learned using other devices such as a personal computer or from other devices. In the paper from Gong and Tarasewich [8] they suggest some design guidelines when designing for a mobile device. They suggest that the following guidelines could be used without change from the normal desktop guidelines.

Enable frequent users to use shortcuts As the user comes more familiar with the device, the user will want to keep the interactions with the device to a minimum. Time is of importance, so if repetitive tasks can be minimized, that would help the ease of use for a mobile device.

Offer informative feedback The system should give supportive and informative feedback to the user, such as a beep when a button is pushed and an error message for an invalid input.

Design dialog to yield closure Sequence of actions should be organized into groups with beginning, middle and an end. Users should be given the satisfaction of accomplishment and completion.

Support internal locus of control Actions should be initiated by the user, rather than the system. That way the user feels in control of the system, not the other way around.

Some guidelines [8] need modification from when used on a desktop computer.

- Consistency
 - Across multiple platform the "look and feel" should be the same across multiple platforms
 - Elements that together make up the interface should be kept as similar as their desktop counterpart as possible
 - Methodologies for input/output should be created as platform independent
- Reversal of actions
 - Mobile applications should rely network connectivity as much as possible
- Error prevention and simple error handling
 - A simple operation should never trigger something potentially harmful
- Reduce short-term memory load
 - Rely on recognition of function choices instead of memorization of commands
 - Use modalities such as sound to convey information where appropriate

Additional guidelines for mobile device interface design. Following these can be critical due to the particular characteristics of mobile devices. Mobile device interface design is more restrictive than desktop interface design because of relatively limited computing and communication power, smaller platform sizes, an always-changing context, and smaller amounts of user attention.

Here follow some additional guidelines [8]:

- Design for multiple and dynamic contexts
 - Allow users to configure output to their needs and preferences (e.g., text size, brightness)
 - Allow for single- or no-handed operation
 - Have the application adapt itself automatically to the user's current environment
- Design for small devices
 - Provide word selection instead of requiring text input
- Design for limited and split attention
 - Provide sound and tactile output options
- Design for speed and recovery
 - Allow applications to be stopped, started, and resumed with little or no effort
 - Application should be up and running quickly
- Design for "top-down" interaction
 - Present high levels of information and let users decide whether or not to retrieve details
- Allow for personalization
 - Provide users the ability to change settings to their needs or liking
- Design for enjoyment
- Applications should be visually pleasing and fun as well as usable

The initial design should focus on the main screens. At this point, selection of user interface elements comes into play. However, the exact details of the user interface may not be pinned down and sub- screens, such as alerts, may be ignored until later on [11].

It's important to consider the usage frequency and likelihood of your user scenarios. More frequently used commands and settings should be easier to find and faster to execute. To make your application's important features easily accessible, choose the appropriate user interface element [11].

2.7 Participatory Design

The participatory design process tries to actively involve the end users in the design process. Doing this helps to ensure that the product meets their needs and is usable. There is not just one way to do this, there are different methods to accomplish this. Examples of participatory methods are PICTIVE, CARD, workshops and card sorting, all the methods will be discussed in more detail a little later.

The basic model could be describes as inviting users to move in for the duration of the project to share your office and the work. Participatory design is best used early on the development process.

Participatory design expects a lot from users and developers, it however promises high rewards in terms of superior designs closely fitted to actual usage [3].

2.7.1 PICTIVE

PICTIVE (Plastic Interface for Collaborative Technology Initiatives through Video Exploration) uses low-fidelity office items and a collection of design objects to explore specific screen and window layout for a product [12]. The motives for this technique were:

- empower users to act as full participants in the design process
- improve knowledge acquisition for design

In PICTIVE session, that can be one-on-one or a small group, office supplies, such as pens, pencils, paper, sticky notes, cards, etc., and some design items from the designers, such as dialog boxes, menu bars and icons, are used. Then jointly the users and the designers construct the design. New items can be added using the pens or some of the other items. All this is done on shared design surface where designers and users have equal opportunity to present their ideas, see figure 2.3. What happens on the shared surface is then recorded [12].

2.7.2 CARD

CARD (Collaborative Analysis of Requirements and Design) is a form of storyboarding. CARD takes a more macroscopic view of the task flow, PICTIVE

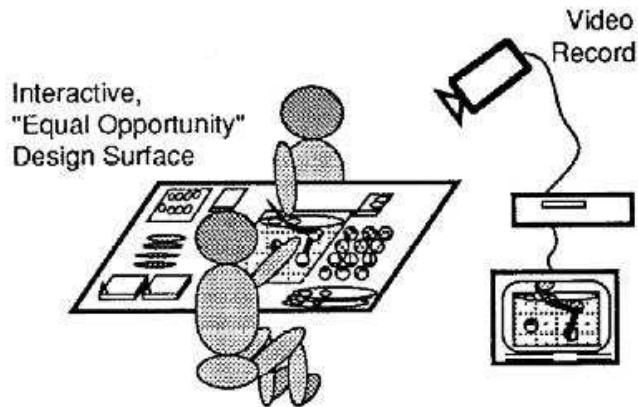


Figure 2.3: PICTIVE session

concentrates on the detailed aspects of the system. CARD emphasizes on higher level of abstraction and work flow, it does not consider detailed screen design. CARD can be used to complement PICTIVE as it provides different granularity of focus [12].

2.7.3 CARD and PICTIVE

CARD and PICTIVE sessions are similar in many ways, especially how they are conducted. The emphasis in each one is not the same. In the PICTIVE the emphasis is mostly three things

- User generated scenarios, preferably on their own
- Developers create design templates
- Working together the users and the designers generate design alternatives

In the CARD sessions the emphasis is on work flow, not screen design and higher level of abstraction. PICTIVE and CARD can be used together, because these methods are not exploring the same things. They are also ideal method in participatory design since they both involve the user in taking the design decisions [12].

2.7.4 Workshop

The participants that should attend a participatory design (PD) workshop [5] are designers, business representatives and users. There they work together to design a product. The benefits of a PD workshops are

- The users voice can be heard in the design process, that increases the probability of a usable design
- Technical and non-technical participants can participate equally
- Developers can meet, work with and understand their users
- Provides a forum for identifying issues
- They are highly productive

PD workshops are most effective early in the design process, when ideas are less constrained by existing code or other things.

2.7.5 Card Sorting

The card sorting [2] technique explores how people group items, from those grouping it is possible to develop structures that maximize the probability of users being able to find them.

- It is easy and cheap to do
- Gives information that should help the designer to understand how people are likely to group items together
- Helps identify items that are likely to be difficult to categorize and find
- Helps identify terminology that is likely to be misunderstood

Card sorting should be used when items have been identified and need to categorize them. It is very good to use this technique to define web site structures.

2.8 Communication

Communication is a process that allows people to exchange information by several methods. People have communicated since the early ages. All this time the way people communicate has evolved as the technology moves forward.

A fundamental aspect of everyday life is talking, it varies among social groups and across cultures what is being circulated. It is possible to divide the social mechanism into three main categories [12]:

- the use of conversational mechanisms to facilitate the flow of talk and help to overcome breakdowns during it
- the use of coordination mechanisms to allow people to work and interact together
- the use of awareness mechanisms to find out what is happening, what others are doing and, conversely, to let others know what is happening

It is easy to fall into the habit of thinking of graphical user interfaces in terms of graphics and miss the fact that software user interfaces support a number of alternative channels or modalities for communicating with users. The designer has text, color, sound available to him, in addition to graphics. The goal is to combine all that, and effectively and economically communicate with the user [3].

Nowadays, people use many things to communicate with each other in their daily lives. Mobile phones, PDA and laptop computers are among many things that people use to communicate with each other.

The products that are most popular with the average user today are the following:

- Messenger
- Phone
 - Calling
 - Text messaging
- email

People are constantly communicating with each other. The demand that a user can communicate with anyone in the way that the user wants and, more importantly, where ever the user wants, is becoming higher.

2.9 Evaluation Methods

The methods listed here below are used in evaluation of products.

2.9.1 Think Aloud Testing

A think aloud test session is done with a test facilitator and a typical user. The users get tasks, from the test facilitator, that they have to solve. While solving the tasks the user has to think aloud, for example say what they are unsure of, what they expect the product to do, how they interpret error messages etc.

A think aloud test has a wide scope. It can be used both to test beginner's first meeting with the product and also experienced users once it has been running for a while and needs to be updated. It can be used on a specific part of a product or an entire product. It may also be used on prototypes and other products that are still in production [10].

2.9.2 Quick and Dirty Evaluation

A "quick and dirty" evaluation is when designer informally get feedback from users or consultants to confirm that their ideas are in line with user's needs and likes. This kind of evaluation can be done at any stage of the development, the focus is on fast input rather than carefully documented findings. In the later stages of the development meetings may occur to decide on a specific think in the design for example an icon or graphics [12].

2.9.3 Usability Testing

Usability testing involves measuring typical users performance on carefully prepared tasks that are typical for those that the system was designed. The performance is measured in number of errors and time to complete a task. While

the users perform these tasks, they observed and recorded on video and their interactions are logged with a software. All this data is then used to calculate performance times, identify errors and help explain why the users did what they did [12].

2.9.4 Field Studies

Field studies are done in their natural settings with the aim of increasing understanding about what users do naturally and how technology impacts them. They can be used to product design to [12]:

- Help identify opportunities for new technology
- Determine requirements for design
- Facilitate the introduction of technology
- Evaluate technology

Qualitative techniques that are used in field studies are for example interviews, observation, participant observation and ethnography. The choice of technique is often influenced by the theory used to analyze the data.

There are two overall approaches to field studies. The first involves observing explicitly and record what is happening, as an outsider looking in. Qualitative techniques are used to gather data, which may then be analyzed qualitatively or quantitatively. The second involves the evaluator to be an insider or even a participant. Ethnography is a particular type of insider evaluation in which the aim is to explore the details of what is happens in a particular social setting [12].

2.9.5 Predictive Evaluation

In this type of evaluation the experts apply their knowledge of typical users, often guided by heuristics, to predict usability problems. Another approach involves theoretically-based models. The key characteristic of predictive evaluation is that users need not be present, that makes the process quick, relatively inexpensive, and thus it is attractive to companies. But it has limitations that need to be considered.

2.10 Gestalt Laws

The Gestalt laws are rules that describe the way we see patterns in visual displays, see Figure 2.4. These are very old rules that have endured for quite some time. Seven Gestalt laws [13] and related design principles are presented here:

Proximity spatial proximity is a powerful perceptual organizing principle, it is very useful in design. Things that are close together are generally grouped together.

Similarity Shapes of individual pattern elements can determine how they are grouped. Those elements that are similar tend to be grouped together.

Continuity (Smoothness) People are more likely to construct visual entities from smooth and continuous elements, rather than elements that have abrupt changes in direction.

Closure People tend to see closed contours as an object. People have the tendency to close contours that have gaps in them.

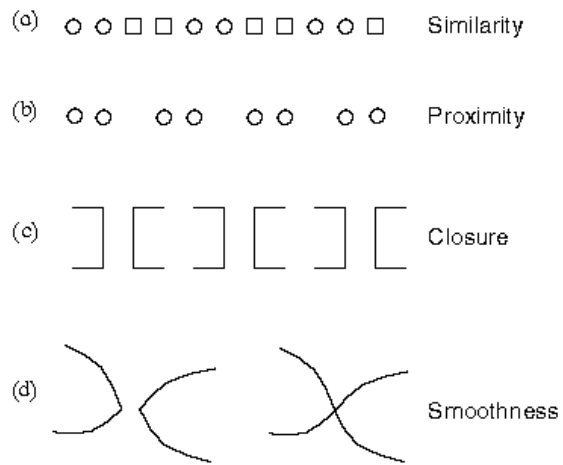


Figure 2.4: Examples of Gestalt laws

CHAPTER 3

Gathering of Requirements

This chapter can be split in two parts. The first part covers the preparation of the interviews, the execution of the interviews and the outcome from those interviews. The second part covers the workshop, which can be split in three parts, that is preparation, execution and outcome.

3.1 Introduction

Gathering requirements is very important. In the life cycle model introduced in the last chapter, in Section 2.3.4, the requirements gathering is done at the start of the development process. Up to this point the only material that has been gathered is the ideas and suggestions from the author of this thesis.

At this stage the users, that is university students, need to get involved in the design to gather information about their requirements for such a prototype. It is very important to involve the users in order for the prototype to be useful and suitable for them. The prototype has to have features that the users will use and/or want to use, so the prototype supports the users in the right way.

To gather information about what users needs are in a prototype like this, it is

important to talk to users face to face and explore ideas and concepts regarding such a prototype. The best way to achieve that is by conducting interviews with users. Those interviews should give information about what users want to do with such a prototype and how it could support them in their daily lives both on and off campus.

After analyzing the information gathered in the interviews, a workshop is set up. During the workshop some design ideas are explored further and possibly new design ideas are created as a result.

Questionnaires are also a tool to gather information from users. However they are better suited for when you need to ask users questions that are mostly YES/NO question. They are not well suited to explore new ideas and new concepts. It is important to get ideas and suggestions from the users. Doing that with questionnaires is very hard.

A paper cut out, similar in size, of the Nokia 770 was handed to the participants. The participants need to get a feel of the device. They were told that the prototype being developed was to be used on a device, similar to that one. Then the participants were asked if they could see anything to be concerned about using a prototype like this on a device like that.

3.2 Interview Preparation

The author performed a couple of brainstorming sessions, asking himself two questions:

- What does a student want to be able to do with such a prototype?
- What features would be useful for a student?

Beside brainstorming in the normal way, some special brainstorming session were done. Because this prototype is for a mobile device some brainstorming sessions were done "on the move". What is meant by that is that you imagine for example you are a student with such a prototype walking outside, on the bus or train on the way to school, at home or walking around campus. What would a student want to be able to do? What information wants he/she to be able to access?

In these brainstorming sessions it is important to realize what are the core functions for a student. Who does the student want to communicate with? Is it

with for example friends, family, professors, university staff or other students on campus? Those are all valid options and need to be considered. Also questions that need to be considered. What does the student do on campus? What does he/she do off campus?

All the questions mentioned here above are important and need to be considered to realize what a typical user needs from a prototype like this. The interview structure, which is created for the interviews, try and capture information from the users that answer these questions.

Two scenarios were written to explore what users would want to be able to do. Some of the questions that are in the interview structure, see appendix A, came after doing these scenarios.

Scenario 1

I am a new student in Electrical engineering at this university. I am a sport fanatic I like all types of sport especially football and handball. I prefer Linux rather than windows. It is hard to find people that have same interest when you know no one. I try and find this information on the message boards that are all over the campus. There are often so many advertisements that I do not really bother with reading all of them, so maybe I am missing out on some activities that might interest me. It also bothers when go to the canteen only to find out that what they are serving is pork and potatoes, which I do not like.

Scenario 2

Me and a couple of my friends are in the same class and are going to be in a group together. However, there is one problem with our group. We are all very busy with other courses and personal stuff, so it is hard for us to set up meetings and organize the group work. We do not all live on the campus, for some of us it takes over an hour to get to the campus.

To establish what kind of people the users are, demographic questions were made to collect that information. Those questions are:

- Birth year?
- Male/Female?

- **Family**
 - **In a relationship?**
 - **Married?**
 - **Children? If yes, how many?**

It is important to know what users do both on and off campus on a daily basis. Equally important is who do they communicate with and what do they want to communicate. The following questions, activity questions, were asked to find that out:

- **What are your activities at campus?**
- **What are your activities off campus?**

These questions are suppose to answer what could our users be doing outside the campus. What other obligations do they have to fulfill? It can also be very different what people are focusing on, it is very likely that users that are over 30 years old have other priorities than users that are 20 years old.

Another set of questions, device/program questions, were made to help realize what users are used to work with and how much computer or technical skill they have. The following questions were asked to collect that information.

- **What devices/programs do you use to communicate with other people?**
 - **Computer**
 - * **MSN (or similar programs)**
 - * **MySpace (or something similar)**
 - * **Blog**
 - * **Podcast**
 - * **Email**
 - * **Skybe(or similar programs)**
 - * **Discussion forums**
 - * **Do you know any similar to communicate with people using your mobile phone?**
 - **Phone**
 - * **Call**
 - * **SMS**

- * Video call
- * MMS
- * Voice mail

A set of questions, exploration questions, were created to explore potential features for the new prototype. The following questions should help collect that information.

- **What do you want to communicate? Why?**
- **How would you like to communicate?**
- **What would you like to be able to do with a social networking program? Why?**
- **How could such a program support you in your daily life?**
- **How could such a program be helpful for a university student?**
- **What would such a program have to feature for you to use it?**
- **What is the difference in activities between what you do at campus and outside campus?**

The interview structure as a whole can be seen in Appendix A.

3.3 Interviews

The interviews were conducted in the environment that the participants found best suited. It is important that the user feels good during the interview and being in an environment that is familiar helps a lot.

Six interviews were conducted with users. There was no bachelor student interviewed, only M.Sc. and Ph.D students.

The students that participated in these interviews can be split in three groups, where the first group consists of two M.Sc. students, the second group consists of three Ph.D students and at last there is student that is in the fourth year of study.

All participants except for one were from DTU. However, all the Ph.D. participants were from DTU. The only student that is not from DTU, goes to the

school of nursing in Hillerød, that student is in the fourth year of study as mentioned above. In this group there are two women and four men.

All the interviews were structured in the same way. These interviews were all split in two sections. The first section is where the user answers some demographic questions about himself, some activity questions and device/program questions. The second part covers the exploration questions.

The first part was very structured, it was literally a question and answer session. A question was asked and the user answered that question.

The second part, is more of a discussion rather than direct questions. The reason for that is that during the first interview these questions (in appendix A) were asked directly as all other questions in the interview structure. That approach did not give good result, there were not that many comments that came from that session. The user commented on that it was hard to answer all those questions. In the next interview after that, it was decided to take a different approach with these questions. This approach was to discuss these questions and cover all the questions in the discussion rather than asking them directly. That way it was very important for the conductor of the interview to be sure all the topics or questions were covered. That gave much better result and the rest of the interviews were conducted in that manner.

To keep the discussion going the interview conductor sometimes had to introduce a design idea and the users were asked to comment on this new design idea. It was different between interviews how often this needed to be done. The users were asked to comment on this new design idea. Sometimes the users came up with new ideas based on the idea presented to them or that idea gave them inspiration for a new idea. With this approach the discussion was kept alive so that all the questions from the interview structure was covered.

In some of the interviews the participants did not come up with new any ideas straight away. It is perhaps too much to ask of the users to come up with something totally new in just a couple of minutes. Since the prototype has just been introduced to them for the first time. A possible solution to this could have been to introduce the prototype to them, very shortly, and after two to three days take the interview. That approach could have given better results, since they could have more time to consider their needs. The users could in that time establish ideas on their own and present them in the interview.

3.4 Interview Outcome

The notes from the interviews and demographic information about all participants can be seen in Appendix B. The main result from the interviews will be presented here below.

After the interview data had been analyzed it was clear that all participants mostly used messenger and email to communicate with others. All participants commented on that would be something useful to them. However, some commented that you are not as fast at typing on your typical mobile phone as you are on your computer. The participants thought it would be useful to be able to send and receive email on your mobile phone, but it is not convenient to write long emails on your typical mobile phone or PDA.

All interview participants used mostly MSN messenger or similar messenger program to communicate with people and for more formal communication they used email.

At least two students expressed their opinion on having some kind of an organizer for them. That would support them in a similar way as a Filofax does.

Four students mentioned that if such a program should be usable for them, or other students they would have to have access relevant information from their university. The DTU students said that it would be useful to have some of the same functions that they have on the Campusnet in this kind of a prototype. The functions they mentioned are for example email, calendar, grades and more.

At least three participants thought, when presented with the idea that they could make a personal profile for themselves, that it could give some interesting possibilities. It should be mentioned that no one of the participants presented the profile idea directly, but there were comments that suggested that it could help. Among the ideas that came up regarding the profile were the following:

- Find a group partner at the start of semester
- Find a suitable partner for a master thesis
- Find people with same interests
- Find people that can play football or other sports at the same time

It is of course important for the users to be able to see information that is relevant to their studies. At least one participant mentioned that for him to use

such a program he would have to be able to see information that he can access through the Campusnet, such as email, messages and groups.

3.5 Workshop Preparation

After reviewing the data collected from the interviews a simple paper prototype was made before the workshop session, the purpose of this prototype was to get the users to comment on it. It is also possible that they want to change something, so things like scissors, pens (in different colors) and paper should be available for the users.

It can be difficult to explain some changes to the prototype verbally, sometimes it is necessary to show by doing some adjustments to the prototype or create a totally new screen to explain. It is important for the users to have the tools to do these changes, if they want to. In Figure 3.1 is one screen from the workshop, the last four things written there were written by the participants in the workshop. It is in icelandic and it means, in this order, interests, home address, phone and academic interests. All three screens for this simple paper prototype can be seen in Appendix C.

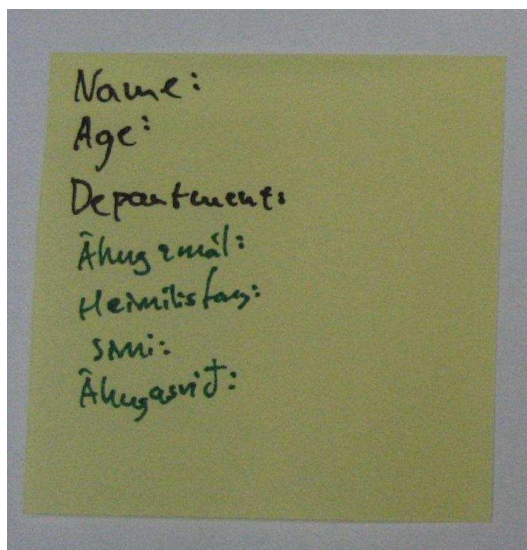


Figure 3.1: Screens for the simple paper prototype

After conducting the interviews it was clear that some changes had to be made

regarding how notes were taken in the workshop and following test sessions. Since there was only one person taking notes as well as conducting the interview itself, there was good chance that some important and good comments could be missed. Due to the fact that there is one person doing what should be done with at least two people. Therefore it was decided to record on a dictaphone all workshops and test sessions, that is if the persons participating allowed it.

The interview structure used in the interviews is used as a guideline for what should be covered in the workshop session.

A simple paper prototype, with three screens, was made for the workshop to present to the participants and get feedback from them on the mockups. Those were:

Screen 1 This is an overview screen for the prototype and had some buttons on it

Screen 2 This screen was the personal profile. Some items were in the profile, however a few items were deliberately left out. To try and get some ideas from the users what should be in the profile.

Screen 3 This was a screen that shows how you would set the priority for the profile. The idea came from Windows®XP.

All these screens from the simple paper prototype can be seen in Appendix C.

3.6 Workshop

The Participants in the workshop are two, one woman and one man. The woman is a bachelor student and the man is a master student.

The structure of the workshop is similar to the interview but without the demographic part being as detailed as before. In addition to that, the participants are asked to comment on simple mockups that were made after the interviews.

It was much easier to keep the participants going in the workshop compared to the interviews. Why? That is hard to say. Maybe that is just the way the participants are or maybe they felt more comfortable knowing that they were not alone and could discuss things with someone in the same situation as they were in. Even though it was better than in the interviews the conductor had

to keep the discussion going in the right direction, but not as much as in the interviews.

These mockups were made after the data from the interviews had been analyzed. These mockups were made just so that the users could get a feeling of what it should contain and what it is suppose to look like. They were made using white paper and post-it notes. To make it easier for user to make changes or add something if needed. The mockups included some of the ideas and/or suggestions that came in the interviews, but also other design ideas. One of these mockups is displayed in Figure 3.1.

The workshop session started with a discussion. Answers to the questions from the interview structure were the aim of that discussion. It was very similar as in the interviews, the users were not coming up with ideas on their own, but when presented with an idea they were quick to comment and form their own ideas based on the ones presented.

When asked to comment on the mockups made for the workshop they commented on them with out much hesitation. It was easier to keep them going with the mockups compared to the discussion in the beginning of the workshop.

3.7 Workshop Outcome

The notes from the workshop and demographic information about both participants can be seen in Appendix D. The main result from the workshop will be presented here below.

It was interesting to see how the workshop was different from the interviews in more than one way. Design ideas were brought up through conversation. The users seemed to be more comfortable with discussing design ideas with someone else than the designer, it seemed more natural than in the interviews. Maybe that gave them the confidence to come forward with their ideas and comment on the mockups presented to them. Comments and discussions about design ideas were much more and better than in the one-on-one interviews.

What was very interesting was to see the difference between when the participant were asked to come up with ideas on their own and when they had a screen from the simple paper prototype in front of them. It was much easier for them to point to the paper mockup in front of them and comment on that, rather than if they had to come up with something on their own. There were a couple of ideas that came from such circumstances with the prototype.

Among the ideas that came up during the workshop session were:

Ideas and Comments from Participants:

- Help a large group to schedule a meeting so that everybody can attend. This should be automated, meaning that you should only have to push on one button and the program should then present an answer
- Would like to read notes from the teacher on the bus or train.
- A calender should be included, with appropriate functions
- On the front page there should be a field that shows you new messages that have been sent to you
- Would like to have timetable in the profile
- "I would like to see on a map where my classes are, maybe by using GPS." (He says)
- Would like to have some notification about messages on the front page.
- She wants to see on the front page how many new emails there are waiting, indicated with a number behind the email name on the front page.
- "I would like to have the agenda for that day on the front page." (He says)
- Four different levels of visibility for the profile depending on how well he/she knows the person. Going from those who see the most to the who see the least
 - Me
 - Friends
 - Groups
 - General
- She likes that the profile has a picture.

Other Ideas and Comments from author:

- Their should be some kind of a privacy control on the personal profile. Would like to be able to set the visibility of the profile for each group

CHAPTER 4

Low-Fi Prototype Design

This chapter covers the paper prototype test sessions. There is an initial version of the paper prototype, that is made by the author. After the first 4 test sessions the prototype is modified according to comments from the users and what has been observed in the test sessions. This is iteration one. Then, for iteration two, the cycle start all over again. The process is the same with four test sessions.

4.1 The Paper prototype

It is clear that the next phase of the development cycle is the design phase and to build an interactive version of the prototype as is shown in Figure 2.2 in Section 2.4.2. A paper prototype was created and users tested the prototype.

The paper prototype is made from paper, as the name indicates. For this prototype a white paper, yellow post-it notes, and four different color pens (red, blue, black and green) were used to make the prototype.

All the buttons on the prototype were made in the same way, to keep consistency throughout the prototype. Furthermore, the name on each button is used as a heading on the next screen that the button leads to. It could cause problems for

the user if he/she pushes a button and goes to a new screen and the name on the button he/she pushed is not anywhere on the new screen. The user could think that he/she is not in the right place or that he pushed the wrong button, when he/she really is in the right place.

It was clear after the first couple of interviews that to make a social networking prototype for a university student it need to have a lot of information and features from the universities ICT systems to be successful.

4.2 Iteration 1

In this iteration the core user tasks are tested. These tasks are something that the user will do often or are very important for the use of this prototype.

These are the following three tasks:

- Create a profile
- Create a group
- Create an event in the calendar

4.2.1 The Paper Prototype

The main purpose of this version of the prototype was to explore user tasks. When designing this paper prototype the main aim was to keep everything simple and try to keep everything within reach. That meaning that you should not have to go a long way for something that is going to be done very often.

In this prototype all button were made in the same way to keep consistency. Also according to the Gestalt laws [13], things that have the same function and have similar appearance are grouped together. Examples of this can be seen on the first screen, where all buttons are together on the left, see Figure 4.1 it is the screen on the upper right in the figure.

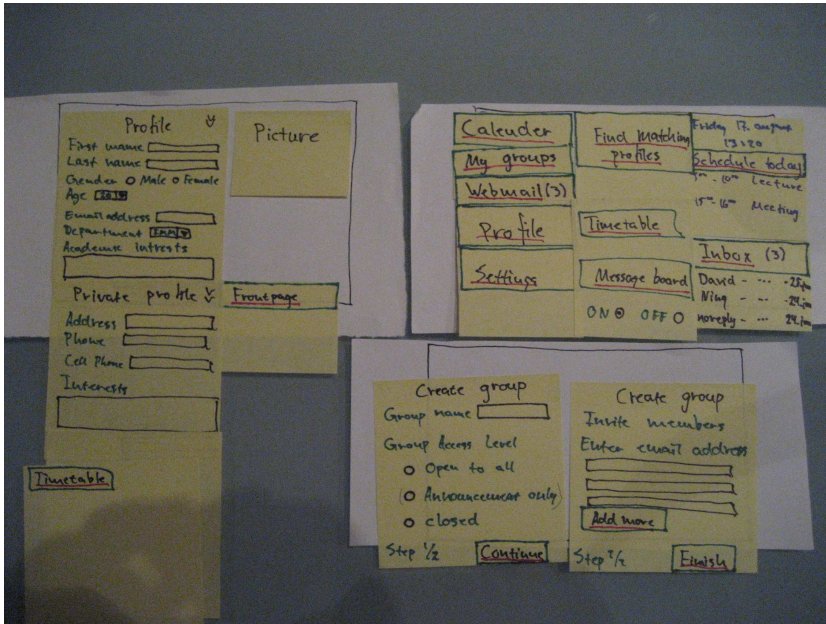


Figure 4.1: Screens from paper prototype

4.2.2 Test Sessions

The paper prototypes that were used in these test sessions can be seen in Appendix C.

Four test sessions were conducted with users. No bachelor student participated, only M.Sc. and Ph.D. students. The M.Sc. students were two and both were women. The Ph.D. students were also two and both were men.

One woman was from the Nursing school in Hillerød, otherwise all participants were students from DTU.

In the test sessions the user used a pen from the Nokia 770 that is used to input data in the device. There were three tasks, those stated above, that the user had to do in the first iteration. The tasks were performed in the order they are stated.

The first task is to create a profile. This profile is something that the user can use to find people to work with in his/hers courses. It also could be possible to use this profile to find matching people for a master thesis. The profile is split

in two parts, that is a general profile and a private profile. All school related information is in the profile such as name, age, department and timetable. In the private profile there is more of personal information like home address, home phone number, mobile phone number and personal interests.

Creating a group is something that a student probably does many times each semester. The only thing that needs to be done to make a group is to give it a name and it is optional to put in some text to describe the group. Then it would be possible to send invitations that the receiver would get in an email. However, there is no need to do that straight away, it is optional and can as well be done later.

The create event task adds an event in the calendar, to create an event you need to put in a date and name. Other things like location, participants, description and repeats is optional and does not have to be filled to finish the create event task.

It is sometimes not enough to get a group of people to participate in testing a prototype. As in this case it is important to put participants in the right circumstances, like the user has to put himself/herself in someone else's shoes.

The circumstances for the users were that he/she is a new student at a new school. The school might be in a foreign country but did not have to be. The user needs use this prototype and do the tasks that are given to him. The user should think of that the profile is going to be used to find matching people based on that profile.

Each task which the user performed was done using the think aloud method [10], that basically mean that the user tried to say everything he/she is thinking while he/she is doing the task. After completing each task it was discussed with the test conductor. Examples of questions that were asked were:

- Was there something missing?
- Did this make sense?
- What would you like to change?

4.2.3 Test Session Result

The result from the test sessions have been split into two groups, suggestions and comments from the users and suggestions and comments from the author.

The comments and suggestions refer to features in prototype or new features that would be nice to have in this prototype. Information about the participants and their comments can be seen in Appendix E.

The first two test sessions were not done exactly the same. The difference was that in the first one the discussion took place after the user had done all the tasks. However, in the latter one the discussion took place after each task. That gave better result, so after that all test session were done in that way. By discussing each task straight away more comments and ideas came from the user, since it was fresh in this memory. If the discussion did not take place until the end there is more chance that the user has forgotten some comments and ideas he/she had thought of earlier.

After the first three test session it was clear that there were some things that were missing and something that needed to be changed. So before the last test session the following things were changed:

- Gender added to the profile screen
- A "Search for group" function was added to the "My groups" screen
- When creating an event in the calender, time was changed from being just time to having a start time and an end time.

Users Suggestions and Comments

Here follow comments that the participants made during the test sessions.

- Gender is missing in profile (more then once)
- The user would like to be able to search for group (more then once)
- When in profile not sure how to get back
- The user would like to see language in the profile, that way you could see what languages other users speaks
- The user would like to be able to control who can access their private profile.
- The user would like have a personal home page in the profile
- The main function should always be in reach on every screen, this button should always be in the same place at all times

- The user would like to have a start time and an end time rather than just time when creating an event.
- Difficult to see the difference with groups when creating them
- What happens when you try to schedule a meeting in a time slot that is already taken
- The user would like to see more text rather than color in the calendar
- It would be useful to have a reminder, to remind you of events in the calendar
- It would be good to be able to select academic interest by marking in check boxes in the private profile, and that should help when trying to match people together
- Need to indicate what is mandatory to fill in and what is not
- The user would like to have nationality in the profile
- Help is needed when inviting people to join groups, should be something that helps you find the email address, not good that you have to remember them all
- The user would like to have a few predefined names in the create event task, so that it would be a possibility to choose something like "Meeting" from it, but also there should be the possibility to write a special name

Author's Suggestions and Comments

- When creating an event there could be a check box that would indicate, if that event will take the whole day
- Would be interesting for the user to see who off his group members are on campus
- The user would like to see the time table in the calendar as well as events and that would happen automatically

4.3 Iteration 2

In the second iteration other tasks in the prototype were explored. These tasks are these:

- Groups
 - Group members
 - Messages
 - File sharing
 - Admin
- Find matching people for a specific course
- Message board

4.3.1 Test Sessions

The paper prototypes that were used in these test sessions can be seen in Appendix C.

Four test sessions were conducted with users. Three bachelor students participated, two women and one man. One participant was a M.Sc. student, which was a woman.

In this iteration all but one student were bachelor students from University of Iceland, the last one was a M.Sc. student from DTU.

The user did the tasks for iteration two listed here above and after each task was completed, it was discussed. Then the next task was performed. The user started the next task at the same point as he ended in the last task.

Messages board idea was more of a discussion rather than a real user task, there was something that the user could do. The user could turn the message board off and also see what messages he/she had and delete them. The user could also label a particular message, either that the message is something that he/she wants to see again or not. That was all done thinking that the prototype could learn what you like and do not like.

4.3.2 Test Session Result

Information about the participants and their comments can be seen in Appendix E.

The users did not have much problems doing the tasks they were asked to do.

All participants mentioned that they did not think it would take them long to use that matching feature and that it was easy to use. The participants liked the result page, because what indicates how much you match with another student is displayed as a percentage number, like 87%. Everybody liked the result page, thought it was clear and displayed exactly the right information

There was some discussion about the message board function. Everybody thought it was a very interesting idea. But not all the participants liked that it should learn with time what they liked, however some thought it would be a good idea. Those that did not like this idea wanted to be able to choose the categories that they wanted to get messages from. It should, however, be very easy to change the settings for the message board so that you could get the messages that you wanted.

Users Suggestions and Comments

- Did not like the word "Admin", thought group leader was more appropriate
- Thought that the group member screen was good but in some situations it could be good to have the department
- Group members show everything that needs to be shown
- The user would like to see on the front page if there are has messages from group members. Would like to see a number indicating how many messages he/she has right next to the "My groups" button on the front page
- The user would like to be able to put in the goals of the group
- "Cancel" button is missing in the following screens "Write new message" in Groups, "Create folder" also in groups and upload file.
- Thinks that there are only two roles user and admin
- Need help to find email address when inviting new members to a group
- Thought that it would be nice to be able to switch the message board on and off when needed
- The result page from the matching function looks good and has the right information (more than one)

Other Ideas and Comments from author:

- Function missing to delete file from group file section
- The user would rather be able to choose categories that he/she wants to get messages from on the message board, rather than having it learn what he/she likes and does not like

Requirement specification

This chapter covers the software requirement specification (SRS) for the prototype being developed.

5.1 Overall Description

The prototype being developed is aimed at university students. This prototype, called UniVersal, should support a university student using a mobile device to communicate with friends, family and coworkers on and off campus. The university student should be able to send and receive emails in this prototype. The user should be able to schedule meetings and be reminded of those meetings in the calendar. The prototype shall offer a feature that helps the user to find suitable students to work with in the courses he/she is enrolled in. The prototype support groups in the way that they can be created and managed in this prototype. Finally the prototype has a message board feature that should help the students to get message for example about school activities or interesting open lectures. Those messages appear on screen whenever they are sent out.

The aim with this prototype is that the student gets everything in one package in a mobile device. This prototype really is an ICT system or possibly an

extension to an ICT system, such as the Campusnet at DTU, for a mobile device. It supports the student in his/hers personal life and university life.

5.2 Interfaces

5.2.1 System Interfaces

System interfaces that need to be considered in the development are the email and verification systems. The application programming interface (API) for both those systems need to be considered.

5.2.2 Interfaces

The general interface is a graphical user interface (GUI). The user should be able to all the actions in the GUI. There is no command line feature implemented.

5.2.3 Hardware Interfaces

The product should work on mobile devices that have a screen that is at least 700X300 pixels in size.

5.2.4 Memory Constraints

There are no memory constraints to be considered for this product.

5.3 Functional Requirements

In this prototype there is only one actor and that is a university student. In this prototype the user can perform the following use cases:

- Login user

- Logout user
- Create profile
- Find matching profile
- Create event and set reminder for event
- Turn message board on and off
- Change settings for message board
- Delete messages in message board
- Create group
- Search for group
- Change user roles in a group
- Send message to group
- Delete group member
- Send invitation to join a group
- Insert file in group file sharing folder
- Send and receive email

Each use case will be described and requirements that need to be fulfilled for that use case to complete successfully will be listed.

All of the use cases need some kind of a user interface in the prototype, so that the user can perform these use cases.

The send and receive emails will not be explained. That is because that in the prototype the email handling should be done in a webmail application that the university provides the student. That application should be accessible in the prototype.

5.3.1 Login User

When the student starts the product he/she needs to log into the system. The user fills in the two text fields and logs into the system.

Requirements:

The prototype shall allow the user to log into the system using a username and a password that he/she already has for logging into other ICT systems on campus.

5.3.2 Logout User

At any given time the user can log himself out of the system with the push of a button.

Requirements:

The user is logged out of the system.

5.3.3 Create Profile

After logging in the student starts by filling out the profile, both the open profile and the personal profile.

Requirements:

The prototype shall allow the user to input the following items in the open profile and private profile:

- Open
 - First name
 - Last name
 - Nationality
 - Year born
 - Email address
 - Department
 - Academic interests
- Private
 - Address

- Phone number
- Mobile phone number
- Interests

In addition the profile should include a picture of the user, either from the university database or the user can provide one.

A timetable should also be included in the profile and that timetable should be constructed based on the courses the user is attending at that moment.

5.3.4 Find Matching Profile

After filling out the profile the student can now use the find matching profile feature. The student selects one course that he/she is enrolled in from a list and should get a list of students that match the profile. In the result from the matching function it is clear what student fits the best.

Requirements:

The open profile must be filled out for this function to work.

The user should be able to select from a list a course to find suitable matches. Those courses should only be courses that the user is enrolled in at that time.

The items listed in the open profile and the timetable should be used to match people together.

The resulting matches should be displayed, and it should clearly indicate what result is the best match.

5.3.5 Create Event and Set Reminder for Event

The student can schedule events and meetings in the calendar. There is an option for the students when the event had been created to set a reminder for that particular event.

Requirements:

The prototype shall allow the user to input the following items when creating an event:

- Subject
- Date
- Start time
- End time
- Participants
- Location
- Description

It should also be an option to select, if that event repeats, how it repeats for example

- Never repeats
- Every week
- Every month

After a user has created an event the prototype should offer to set a reminder for that event. It should be possible for the use to select a date and time for the reminder.

There should be an update to the calendar for each event that is created. Is should be possible to see how many events are going to take place during that day.

5.3.6 Turn Message Board on and off

The user can turn the message board on and off whenever he/she wants to.

Requirements:

It should be easy to turn of the message board, preferably it should be with only a click of a button.

The prototype should only show messages that the student has chosen from the categories that are available.

5.3.7 Change Settings for Message Board

The user should be able to change the settings for the message board. He should be able to choose message categories and only messages that fit into those categories should appear to the user.

Requirements:

All categories should be presented at once so that the user gets a good overview of what is available.

5.3.8 Delete Messages in Message Board

The user goes to the overview of the messages that he has and can delete each message that he/she does not want to have there.

Requirements:

All messages that the user has gotten should be in the list.

They should be listed as the newest messages should be first.

5.3.9 Create Group

The student can create a group for a course he/she is in and invite people to join that group.

Requirements:

A group needs to have a name to be created, it should be an option to but in a description of the group.

It should be possible to send invitations to people that the user wants to invite to the group.

There should not be two groups created by the same user by the same name.

The user that creates the group will automatically have get the admin role.

5.3.10 Search for Group

It is also possible for a student to search for a group if he/she thinks there possibly is a group that meets his/hers needs.

Requirements:

The prototype should allow the user to search based on any of the following items:

- Course name
- Course number
- Group name

5.3.11 Change User Roles in a Group

The user that has admin can change the roles for other people in the group.

Requirements:

The user has to have admin role for that group to be able to change the role of another person in the group

5.3.12 Send Message to Group

The student can send messages to all group members at once.

Requirements:

There has to be at least two members in the group for this functions to work.

The user has have admin role for that group to be able to send a message.

5.3.13 Delete Group Member

It is possible for a user to delete a member from a group.

Requirements:

The user had to have the admin role for that group to be able to delete a member from a group.

5.3.14 Send Invitation to Join a Group

After a group has been created the user can invite other members to join that group.

Requirements:

The user has to have admin role for the group so that he can send an invite to another person.

5.3.15 Insert File in Group File Sharing Folder

The user can upload files to a folder that is only for that group and it is possible to create new folders and put files in that folder. These files are accessible to all members of the group.

Requirements:

The user has to be a member of the group to be able to put a file in the file sharing folder.

It should not be possible to create two folders with the same name.

5.4 Non-Functional Requirements

5.4.1 Look and Feel Requirements

- The prototype should be attractive to university students

- The prototype should not use very bright colors
- Everything the user needs should be within reach

5.4.2 Usability Requirements

- The prototype should be easy to use for a university student
- It should help to avoid the user making a mistake
- The users should want to use it
- It should be easy for a university student to learn to use the prototype
- The prototype shall use symbols and words that are naturally understandable to university students

5.4.3 Performance Requirements

- The response should be fast enough, so that it does not delay that users work on the product
- The prototype shall be available for use 24 hours per day, 365 days per year
- The prototype shall achieve 99
- The prototype shall continue to operate in local mode whenever it loses its link to the central server

5.4.4 Operational Requirements

- The prototype shall be used outside and inside
- It shall be used in crowded places

5.4.5 Maintainability and Portability Requirements

- The prototype is expected to run in a browser on a Nokia 770
- It is designed for use in a university environment, but it could be possible to use elsewhere.

5.4.6 Security Requirements

- The prototype shall prevent incorrect data from being introduced
- The prototype shall reveal private information only in compliance with the organization's information policy
- Only people with correct identity information can access the prototype

CHAPTER 6

Hi-Fi Prototype Design

This chapter covers the Hi-Fi prototype. The initial version is made based on the findings from the paper prototype sessions.

6.1 The Hi-Fi Prototype

The next phase of the development was to make a Hi-Fi prototype and get university students to test it. This prototype was made in Adobe Flash and ActionScript.

The Hi-Fi prototype has limited functionality whereas more emphasis is on designing good screen layout rather than functionality. The aim of this project is to design a prototype that fulfills the user requirements, more emphasis has been put on screen layout design rather than implementation of functionality. Therefore the Hi-Fi prototype with limited functionality was created.

There are many buttons on the screens in the Hi-Fi prototype, but only some of them have functionality. Although some of the buttons have no functionality they are put on the screens to show what more features could, and probably should be implemented, in later versions of the prototype.

The color selection is based on what the author thought would fit together, without using strong colors. The color selection on the screen layouts is not based on anything from the users, mainly because they did not give any comments on what colors they wanted. The objective was to obtain simple and clear screen layouts so it would be easy and comfortable for the users to read and navigate.

From earlier test session on the paper prototype in Chapter 5, the users expressed the need to have the key features and information of the system somewhere on the screen where it was easy to use at any time. To support those requests each screen has the core functions and information on the left and upper border. Those places were chosen since it is where such features are most often placed in programs today, so it is the place where people are most used to having those functions and information. In Figure 6.1 below it can be seen clearly that on the left side there are buttons that lead to a number of functions, for example Calendar and Profile. In the upper section there is a button called Frontpage that leads to the screen shown in Figure 6.1, also in that section is the date and year. All of these buttons and information stay exactly in the same place on every screen. It can be seen in Figure 6.2 that all the things mentioned here above are in the same place.

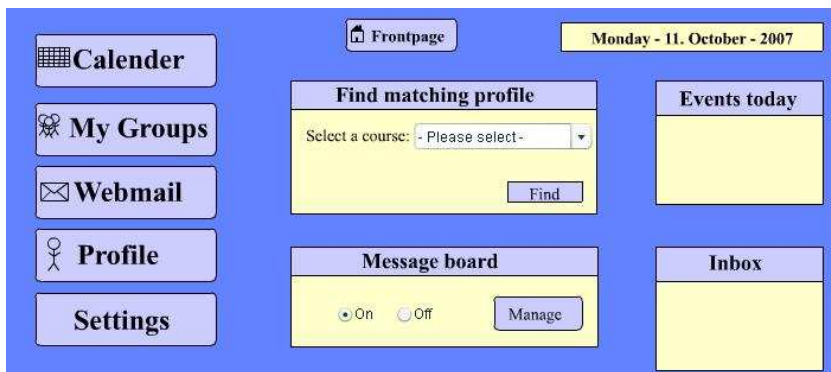


Figure 6.1: The frontpage screen in the Hi-Fi prototype, iteration 1

When designing for a small screen as it is on the Nokia 770 it is important that the users do not have to scroll down to get the information they need. Participants from the paper prototype session mentioned that using scroll bars should be avoided. With that in mind it was avoided to use scroll bars except if it was absolutely necessary. In this version of the prototype there are no scroll bars on any screen.

In earlier test session users mentioned that it would be very convenient to have everything in plain sight, so what you see is what you get. Those comments from

the user were used as a guideline in the implementation of the screen layouts in the Flash prototype. Every screen is built based on those user comments, that is it contains all the information needed. If there was some information that needed to be displayed, a new screen was made to display such information.

An example on the frontpage of this would be if you use the manage button for the message board. It would have been a possibility to open all the information below and in the process put in a scroll bar. But instead, a new screen was made with that information. This can be seen in Figure 6.2 below.

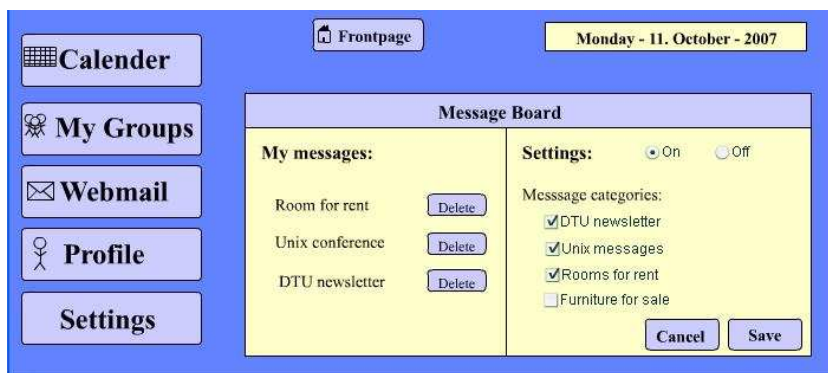


Figure 6.2: The message board screen in the Hi-Fi prototype, iteration 1

One of the goals for the prototype was that it would be easy to find what you needed in a short period of time. The user interface was designed to be as simple as possible to support this. Make it clear what in the interface are buttons. Everything that had some functionality was made so that it looked the same.

The buttons on the screen were all made so they have the same look, that is they are all rectangles with rounded corners and have light blue background with black letters. This was done so that the users could identify the buttons quickly.

Actually some of the buttons on the left side of the screen, in Figure 6.2, have pictures in them in addition to the text. For example the buttons Calendar, My Groups Webmail and Profile all have pictures that relate to the usage of each button. The pictures should help the users to understand the functions of each button more quickly.

6.2 Test Plan

The test plan for the Hi-Fi prototype was split into three phases introduction, performance evaluation and discussion.

In the introduction the participants were given a short verbal explanation of what was going to take place in this test session. The participants were reminded of that this usability test was centered on the prototype and not their particular ability to use technology. The participants were then given instructions to "think-aloud" during the evaluation as well as given a reminder that the test session would be recorded on a dictaphone.

In the performance evaluation the user used a Nokia 770 device to test the Hi-fi prototype. The participants were then asked to complete four tasks. The participants proceeded through the evaluation by completing the assigned tasks without any guidance from the conductor. They could ask for help if they became absolutely confused with the prototype.

After the participants finished the tasks they were given a discussion took place. In the discussion the participants were encouraged to comment on what they thought about the prototype.

6.3 Iteration 1

In this iteration the main focus was on the core user tasks, such as create profile and create an event. Additionally some tasks that were thought to be important to the use of the prototype, such as finding a matching profile and changing some settings for the message board were also tested.

A complete list of the tasks that the participants had to do:

- Create a profile
- Find matching profiles
- Create an event
- Change settings for the message board

6.3.1 Test Sessions

For the Hi-Fi prototype a total of three test sessions were conducted. The participants were two men and one woman. Both the men are bachelor students and also the woman. Two of the participants, one man and one woman, are studying at the University of Iceland whereas the other man is studying at Reykjavik University.

Information about the participants and their comments can be seen in Appendix F and all the screens made in the first version of the prototype can be seen in Appendix G.

Three test sessions with the initial version of the Hi-Fi prototype were conducted. After those sessions the data from the test sessions was analyzed. From those results a new Hi-Fi prototype would be made, that did not introduce any new functions. It only addressed the comments made about the prototype in the earlier test session. Then a final test session was conducted with the last participant.

Not all features were implemented at this stage in the development process, only the key use cases and those thought to be interesting were included. The list above contains what the participants had to do.

For each of these use cases the user can input data in all fields and interact with the prototype. There are some limitations that need to be mentioned. If the user does something that is not permitted he/she does not get an error message as they should. As mentioned above there are buttons that have no function, but represent future features. It was decided to have those buttons in the prototype to give the participants a better idea of what the prototype would eventually be able to do. Also to see if they tried to use those buttons, even though they could finish their tasks without ever having to use them.

6.3.2 Test Sessions Result

All participant finished the tasks their were suppose to do. The time it took to finish those tasks was different from person to person. It seemed like all the participants knew where to look when they started a new task. At least one did not find the message board straight away, but it was not that much of a delay.

Ideas and Comments from Participants:

- It is missing a logout button
- Would be nice to be able to change the colors
- in the screen with the result from the matching profile function it would be nice to be able to access the open profile for each member in the result list
- All the users mentioned that hey liked that some of the core functions had pictures on the button, they said it would probably help them identify them faster
- One participant thought that when he had to input some text the screen was
- Two of them thought that the result page for the matching profile function was clear
- There should be a clock on the screen at all times
- It should be clearer where the user is at any given time, maybe by coloring the buttons.

Ideas and Comments from the author:

- Participant seemed always to pick the right way to finish the task at hand
- All participants understood correctly that some of the profile was open to the public an the other part was for them alone

6.4 Iteration 2

For the second iteration one test session was conducted. This participant was a woman and a M.Sc. student at the Technical University of Denmark. She also did the same tasks as the participants in iteration one.

There were some adjustments made to the Hi-Fi prototype after the first three test sessions. A clock was added to all the screens and a view profile button, with no functionality, was added to the matching result page. These changes can be seen in Figure 6.3. The final change was to color the button in a different color than the other buttons when the user had chosen that particular button, an example of this can be seen in Figure 6.4. This should help the user realize where he/she is at any given time.

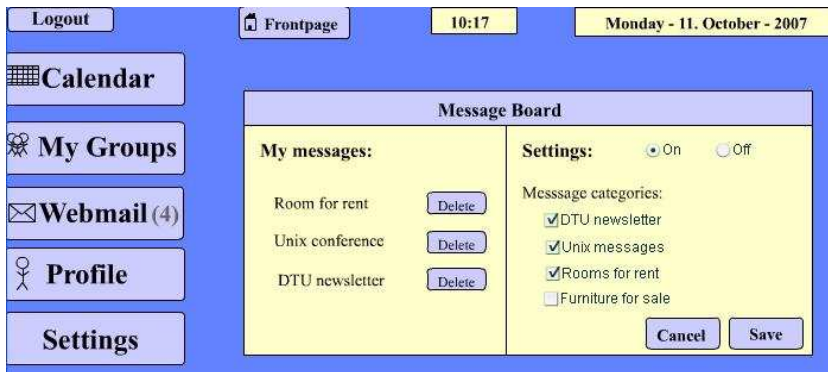


Figure 6.3: The message board screen in the Hi-Fi prototype, iteration 2

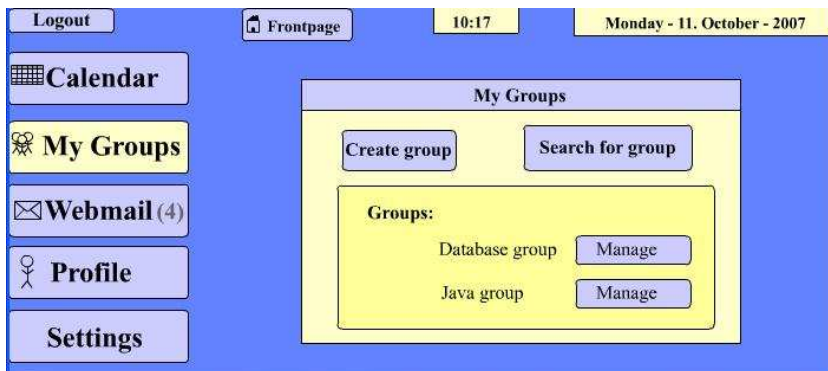


Figure 6.4: My Groups screen, iteration 2

The following three screens show the final version of the prototype, but all the screens made in the second and final version of the prototype can be seen in Appendix H.

There were not many comments from the user in this test session. The participant was quick to finish all the tasks given without much hesitation. It was clear that the participant found what she was looking for since she did not go wrong in any of the tasks that she performed. The participant mentioned that maybe instead of naming right next to the clock, Frontpage, it should maybe have the name Home as is common in Mozilla Firefox and Microsoft Internet Explorer.

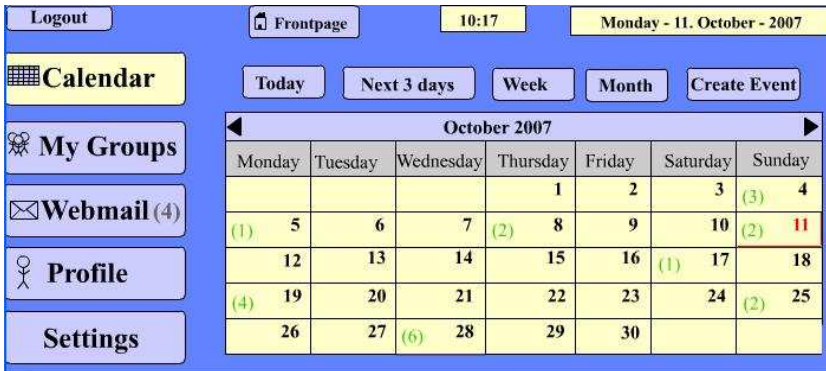


Figure 6.5: The calendar month screen in the Hi-Fi prototype, iteration 2

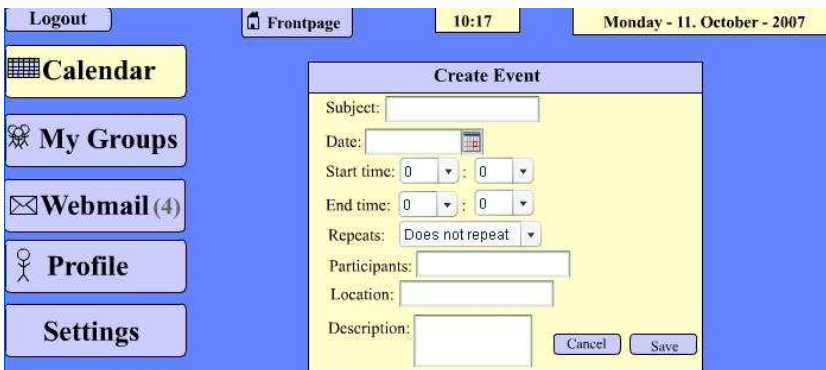


Figure 6.6: The create event screen in the Hi-Fi prototype, iteration 2

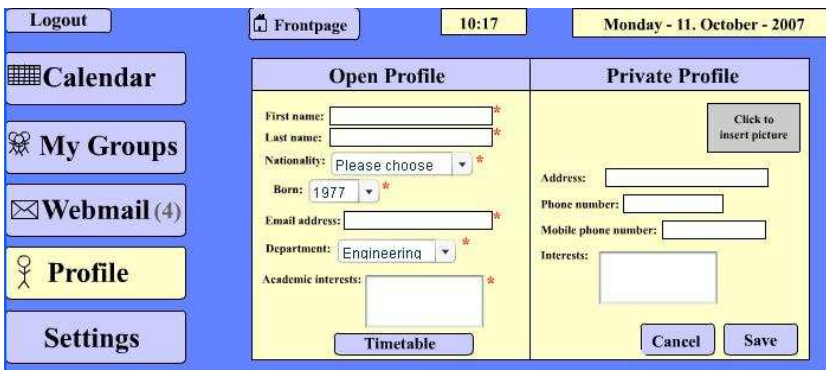


Figure 6.7: The profile screen in the Hi-Fi prototype, iteration 2

Conclusion

This chapter summarizes the results from the thesis and is followed by a discussion about the results and possible future work.

7.1 Summary of Results

The aim of this process was to create a prototype with limited functionality for a mobile device. That was done by going through an iterative development process. The end result is a Hi-Fi prototype with features that were developed together with the participants in the study.

The features in the prototype should support a university student in his/hers daily life, both on and off campus. All of the participants from the early interviews to the very last test sessions have made suggestions on how to support a university student. The main features and functions, such as calendar, email and groups, came from the initial interviews and the early test sessions. Even though all suggestions did not make it all the way, the requirements specification should give clear indication what such a product needs to include to be successful.

Through this development process two new features were developed, that have

not been included in any of the ICT system that the author has seen. The first feature matches profiles together which should help university students to find other students with similar profile. The second feature is a message board which is thought of as an addition to the old cork message boards that are in almost every building on every university campus. This feature helps to organize all messages in one place, those messages are there because the student has selected to see those messages, it is more likely that the student looks at them.

Throughout the Hi-Fi prototype test sessions the participants did not have many problems navigating between screens in the test sessions. A few participants had small problems but recovered very quickly and did not make the same mistake twice. Based on those observation it can be assumed that the navigation is clear and easy to learn.

There were no major complaints about the user interface in general, the participants did have some small comments on where things should be and in which order they should be represented. However, not one participant commented on that the screens were crowded and contained too much information. So according to those participants the user interface fulfilled their requirements.

7.2 Discussion

All the participants in this study were Icelandic. However, it would have been better to obtain students from other countries. Whereas students from different countries have different background which should give a more general perspective. Getting students from other countries would probably have made the prototype more general than it is. It was tried to obtain students from other countries to participate, but unfortunately no one could participate in this study.

Even though all the participants were Icelandic, the students came from four different universities. Two of the universities are in Denmark and two in Iceland. That should help make up for the lack of non-Icelandic participants in this prototype development.

Even if all the participant were Icelandic, it is clear that those who have been studying in Denmark probably have other ideas than those who have only studied in Iceland. They should probably have a wider perspective.

If some of the participant studying in Iceland had been in the initial requirements gathering, then the result from the interviews and the workshop might have been

different.

It could limit the usefulness of the prototype having people from different universities, since the emphasis is to make a prototype that fits all students. Maybe by doing this the prototype being developed ends up being something that does not fit very well for anyone. Instead if all the participant were from the same university then all of them should have similar needs and requirements. So it is possible that the outcome from such a development would give a more general result than if the participants come from many different universities.

Regarding the interviews, they could have been conducted in a better manner. The conductor did not have much experience conducting such interviews. One flaw was that the author had to take notes and discuss questions at the same time. It is possible that not all the comments were noted in the interviews. This was changed after the interviews. To try and keep that a loss to a minimum in next test sessions, all test sessions were done recorded with a dictaphone. The conductor also took notes during those sessions.

The outcome from the initial interviews could have been better. It was hard for people to try to come up with totally new things and features in only a few minutes. Looking back on this phase, it would probably have given better results to introduce the idea to the participants a couple of days before they were interviewed. That would have given them a little time to think about what such a device could do to help them in their professional and personal lives.

7.3 Future Work

From the results there are a few interesting topics that could be investigated further. One suggestion would be to make a fully functional prototype and test it with a big user group from one university. In that process make a prototype which only fulfills the needs of the students for that particular university.

Another interesting thing to take a closer look at is the message board. It could be interesting to fully implement the message board within the prototype, it could also be done as a new application. Having the same functionality, that is selecting categories that the user finds interesting and getting those messages. Another different implementation could be to make the message board smart, that is to implement some kind of artificial intelligence in it so it would gradually learn what kind of messages the user likes and does not like.

The matching profile function could be expanded in more ways than one. One

idea is that a student could possibly use it to find people who have the same interest as he/she does, another possibility would be to use it as a dating service.

It would be very useful to let the calendar synchronize with other calendar products for example with the Google calendar, Microsoft Outlook or some other similar products.

APPENDIX A

Interview structure

This appendix contains the interview structure. It is in two parts first is the ethnographic information and the second part are questions that the people interviewed were suppose to answer.

A.1 Demographic Information

- Birth year?
- Male/Female?
- Study?
- How far along in study?
- Computer skills?
- Family
 - In a relationship?
 - Married?
 - Children? If yes, how many?

- What are your activities at campus?
- What are your activities off campus?

A.2 Questions

- What devices/programs do you use to communicate with other people?
 - Computer
 - * MSN (or similar programs)
 - * MySpace (or something similar)
 - * Blog
 - * Podcast
 - * Email
 - * Skybe(or similar programs)
 - * Discussion forums
 - * Do you know any similar to communicate with people using your mobile phone?
 - Phone
 - * Call
 - * SMS
 - * Video call
 - * MMS
 - * Voice mail
- What do you want to communicate? Why?
- How would you like to communicate?
- What would you like to be able to do with a social networking program? Why?
- How could such a program support you in your daily life?
- How could such a program be helpful for a university student?
- What would such a program have to feature for you to use it?
- What is the difference in activities between what you do at campus and at outside of campus?

APPENDIX B

Interview

Here is an overview of each interview taken in the requirements analysis. There were six interviews conducted.

B.1 Interview 1

B.1.1 Ethnographic Information

- **Birth year?** 1980
- **Male/Female?** Male
- **Study?** Computer science
- **How far along in study?** Master student
- **Computer skills?** Very good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One boy.
- **What are your activities at campus?**
Go to classes, work with group members on group projects. Talking to teachers and friends.
- **What are your activities off campus?** Spend time with family and friend. Like to go out on the town with friends. Plays soccer with other guys from Iceland.

B.1.2 Answers and Comments

- Communicates with students that are in her group, friends, family and teachers.
- Uses almost all functions that his phone has, that is make calls regular as well as video calls, sends SMS and MMS and finally he has a voice mail.
- Mainly communicating with friends, coworkers and family.
- Thinks that a profile is a concept that can be used to do many things. "Having a user profile offers a lot of possibilities"
- He does not think that he would use a match making function to find suitable group members if he did not no anyone. Does however think that it is something that would work for other people.
- This program should be somehow connected to the campusnet and you should be able to edit on your personal computer

B.2 Interview 2

B.2.1 Ethnographic Information

- **Birth year?** 1982
- **Male/Female?** Male
- **Study?** Civil Engineering
- **How far along in study?** Ph.D. student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** Yes
 - **Children? If yes, how many?** No
- **What are your activities at campus?**
Schedule meetings with coworkers. Communicate with coworkers, students and friends. Teach classes. Grade homework. friends.
- **What are your activities off campus?** Spend time with his wife and friends. Play soccer with some buddies.

B.2.2 Answers and Comments

- Uses email daily. Uses MSN regularly, but does not use other products
- When using the mobile phone he calls almost everybody, he only sends SMS if they are very short and straight to the point
- Mainly communicating with friends, coworkers and family
- Would want to be easy to put information in the device, that is typing should be easy. He wanted to have the device to have a laser keyboard that could then be used to type as on a normal keyboard
- He would want a calender in the program. It should also be connected with Microsoft Outlook
- "Everything that is important should be in reach". That is you should not have to do many action to get to where you want to go in the program
- Wants to be able to book a meeting room and see his schedule for the day.

B.3 Interview 3

B.3.1 Ethnographic Information

- **Birth year?** 1978
- **Male/Female?** Male
- **Study?** Electric engineering
- **How far along in study?** Ph. D. student
- **Computer skills?** Very good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One girl.
- **What are your activities at campus?**
Schedule meetings with coworkers. Communicate with coworkers and friends.
- **What are your activities off campus?** Most of his time is spent with family and friends. Goes diving from time to time.

B.3.2 Answers and Comments

- Uses MSN very little. He sends emails quite a bit, specially when it needs to be formal. Skybe is used to some extend. Others are not used are very little.
- Calls rather than send SMS. Finds that calling is the best way to communicate quickly.
- Mainly communicating with friends, coworkers and family.
- Would want to have a good user interface for handling emails
- "Things that are important should always be on the screen, I should newer have to search a long time for those things"
- A profile could be used for students to find suitable partners for group work in a course or for partner for master thesis

- Would like to see some kind of a shared calender, which you could see if your coworkers are busy or not.
- Wants to be able to manage the profile in his personal computer
 - Feels the icebreaker scenario [?] can be useful, it is very important that you can manage the privacy on your profile

B.4 Interview 4

B.4.1 Ethnographic Information

- **Birth year?** 1980
- **Male/Female?** Male
- **Study?**
- **How far along in study?** Ph. D. student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. Three boys.
- **What are your activities at campus?**
Meetings with coworkers and teachers.
- **What are your activities off campus?** Spend time with family and friends.

B.4.2 Answers and Comments

- Communicates mostly with coworkers, family and friends. Using phone and email.
- Uses only email, none of the other computer based programs
- He primarily calls when using his mobile phone, but sometimes he sends SMS. Other functions he does not use
- Would like to have features that you usually have in a filofax in the program. Such as calender and phone book
- "I like the Blackberry and the features it has"
- He would want to be able to see news from his department

B.5 Interview 5

B.5.1 Ethnographic Information

- **Birth year?** 1978
- **Male/Female?** Female
- **Study?** Nurse
- **How far along in study?** Bc. student
- **Computer skills?** Ok
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One girl.
- **What are your activities at campus?**
Go to classes, work with group members on group projects. Talking to teachers and friends.
- **What are your activities off campus?** Meet friends and family. "I go running and like to swim".

B.5.2 Answers and Comments

- Communicates with students that are in her group, friends, family and teachers.
- Uses MSN, MySpace, Skype and email very much. Other programs she uses but not nearly as often.
- Prefers sending SMS then calling.
- "I want something that helps me write, I feel it takes to long to write on my mobile phone"
- Wants to easily exchange files with other people she is working with
- Would like to get a message if a group member has finished something that she needs to use to continue her work, whether it is by email, SMS or some other way

- She does not find it appropriate to be able to see where other group members are if the device and program would support GPS

B.6 Interview 6

B.6.1 Ethnographic Information

- **Birth year?** 1981
- **Male/Female?** Female
- **Study?**
- **How far along in study?** Master student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No.
- **What are your activities at campus?**
Go to classes, work with group members on group projects. Talking to teachers and friends.
- **What are your activities of campus?** Spend time with her boyfriend. Likes to be outdoors , goes for walks and runs. She also like to meet friends

B.6.2 Answers and Comments

- Uses MSN and email daily. Uses MySpace, blog and skype regularly
- Uses SMS more then calling when using the mobile phone
- Communicates with friends, family and teachers
- Would like to with out much trouble read and send emails
- Would not use a match making function to find someone to to a master thesis with, could be interesting for some classes
- The profile should show information that are important, such as study, age, department, year of study, interests and more
- Would like to get a message if someone added a file to a folder on campusnet

APPENDIX C

Paper Prototype

This appendix contain the paper prototypes that were used in the development process. First there is a simple paper prototype that was use in the workshop early in the design process. After that there are the paper prototypes that were used in the test sessions.

C.1 Workshop - Simple Paper Prototype

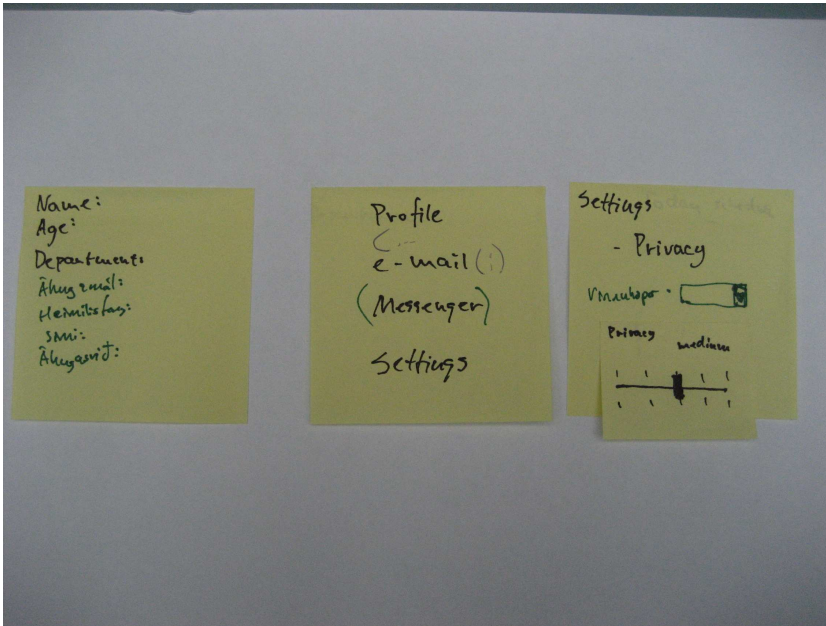


Figure C.1: Screens for the simple paper prototype

C.2 Paper Prototype

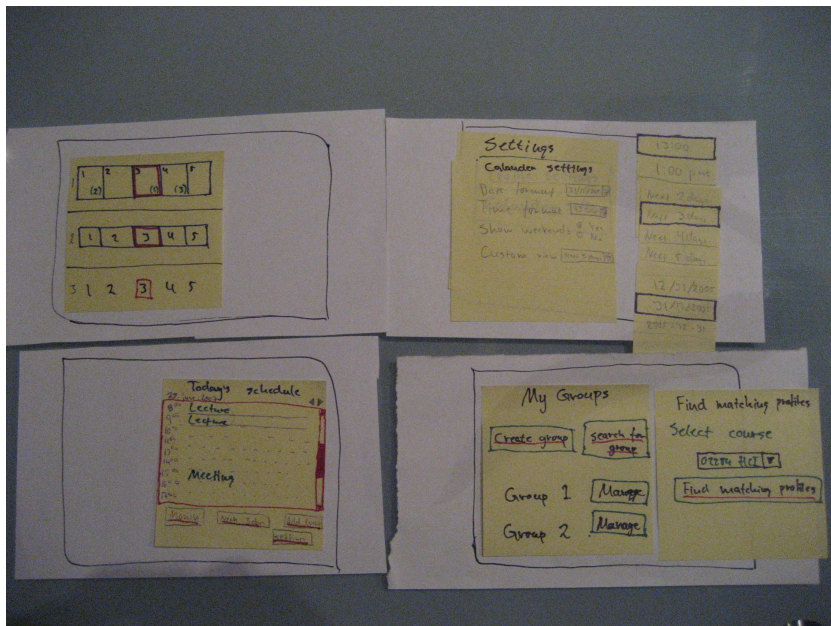


Figure C.2: Screens from paper prototype

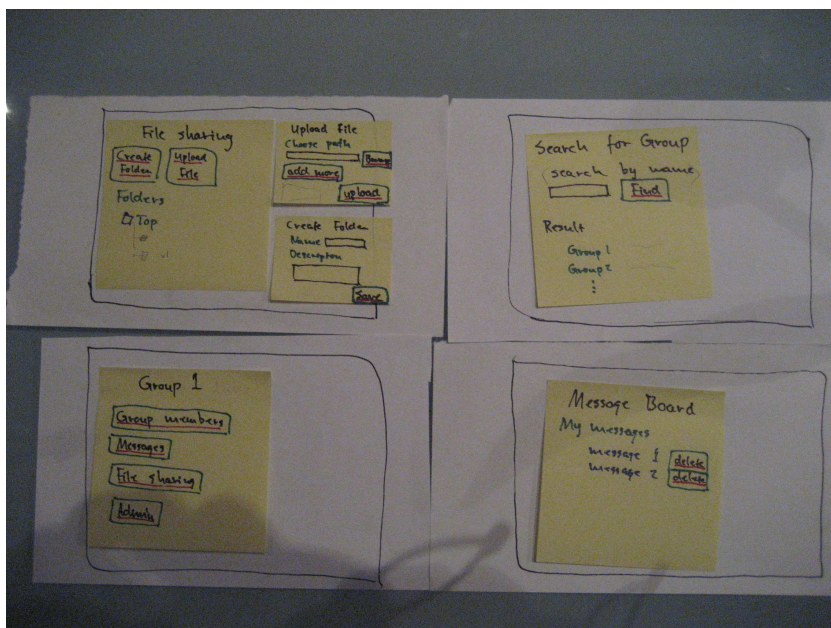


Figure C.3: Screens from paper prototype

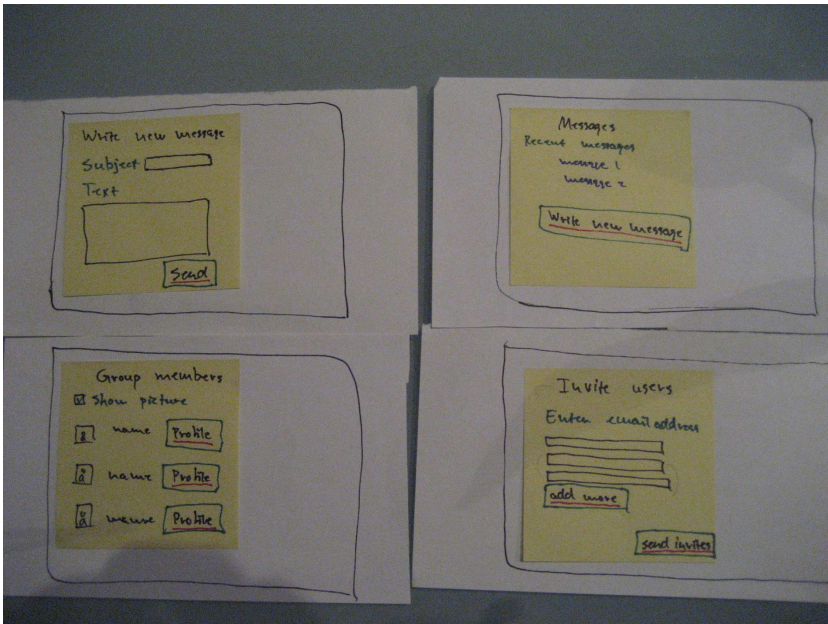


Figure C.4: Screens from paper prototype



Figure C.5: Screens from paper prototype

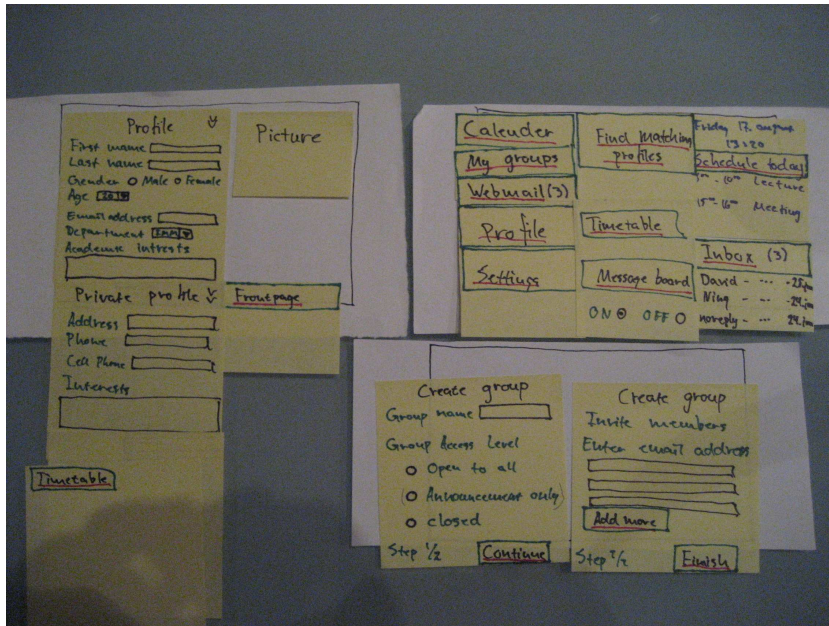


Figure C.6: Screens from paper prototype

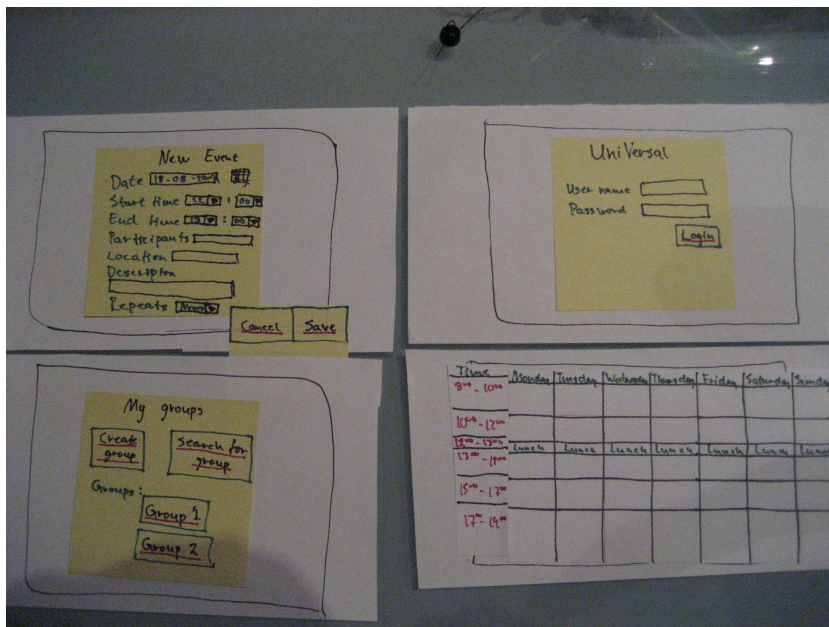


Figure C.7: Screens from paper prototype

APPENDIX D

Workshop

Here is information about the two participants in the workshop, one man and one woman. Also included here is the main things that came up in the workshop.

D.1 Ethnographic Information

- **Birth year?** 1981
- **Male/Female?** Male
- **Study?** Computer science
- **How far along in study?** Master student
- **Computer skills?** Very good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One boy.

- **What are your activities at campus?**
Go to classes, work with group members on group projects. Talking to teachers and friends.

- **Birth year?** 1980
- **Male/Female?** Male
- **Study?** Computer science
- **How far along in study?** Master student
- **Computer skills?** Very good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One boy.

- **What are your activities at campus?**
Go to classes, work with group members on group projects. Talking to teachers and friends.

D.2 Comments and Design Ideas From the Participants

These comments are from the general discussion about this program. What they would like to have in such a program and what they want to be able to do.

- Would like to have MSN, or something similar
- Notes and timetable should be easily accessible
- Would like to read notes from the teacher on the bus
- He does not use his phone to check emails, because the user interface is very bad
- They both use SMS, especially if they want to communicate something very short
- Users should be matched together using the timetable.

- Think that the matching function is something that they would try, especially if they were alone
- Want to use the profile to make a group for class
- "Maybe it would be nice to be able to make the profile similar to a MySpace homepage" (She says)
- They would like to choose a project and make a group depending on which project you have chosen, this would be best to do in the beginning of the semester or in the first days of class
- "I would like to see on a map where my classes are, maybe by using GPS." (He says)
- They like the groups on campusnet and would like to have the main function available. You should be able to send emails and messages to group members
- It would be nice if you are in a large group that you could push one button and then the program would suggest meeting time that all or almost all group members could attend, within a few seconds
- If you could send your group members messages, then there shouldn't be the case that you get too many of them within a short time period, that would be very annoying
- Icebreaker is something that is interesting, she mentions that she would probably try it. But he is not that interested in it

These following comments are from the discussion about the mockups made for the workshop.

- Would like to have some notification about messages on the front page
- She wants to see on the front page how many new emails there are waiting, indicated with a number behind the email name on the front page
- A calender is something that has to be in such a program.
- I would like to have the agenda for that day on the front page (He says)
- New messages should be on the front page
- It should be able to upload contacts to use in the program.
- Synchronization with a computer should be a possibility, referring to contacts and calender

- It should be possible to change and work on the profile online in a personal computer
- Would like to be able to declare deadlines, which should be displayed on the front page
- Did not have any additional comments on what should be in the profile
- Like that the profile has a picture
- She mentions that she would like to have the time table in the profile
- He says that especially important that other group members should be able to see the time table in the profile
- Think that it should be possible to declare of much of the profile should be open to all
- They think that when you make a group you should be able to declare how much of the profile that group can see. Maybe all groups should get, as a default, should get the same rights but those rights could be changed
- Four different levels of visibility depending going from those who see the most to the who see the least
 - Me
 - Friends
 - Groups
 - General
- They comment on that they like how email programs UI are structured, such a Gmail, Campusnet webmail and Outlook.

APPENDIX E

Paper Prototype Sessions

Here is information about the participants in the paper prototype sessions. A total of 8 test sessions were conducted. Here follows some information and comments from each of those test sessions. It should be noted that there were two iterations in the paper prototype phase.

E.1 Iteration 1

Here is information about the users and their comments in the first iteration of the paper prototype.

E.1.0.1 Test Session 1

- **Birth year?** 1980
- **Male/Female?** Male
- **Study?** Mathematical statistics
- **How far along in study?** Ph. D. student

- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. Three boys.
- Thinks that the login page is okay
- Wants it to be optional to have a picture in the profile
- Gender should be in the profile
- Academic interests should be dependant in which department you are in
- The three different types of groups are confusing
- It should be possible to search for group
- Should be optional to put in some text that goes to those who get invites, when the group is created
- In add event it should be possible to select start time and end time for that event
- I you have the agenda for today it would be cool if you could select a time and the add event would start with that time and the date today already filled.
- Should be a possibility to let an event take all day
- There should be more emphasis on information in the calendar rather then having it in colors
- What happens when there are conflicts in the calendar
- There should be buttons with functions that you have to do all the time, it should be on every screen
- It should be possible to have two things at the same time in the calendar
- repeats in add event is unclear

E.1.0.2 Test Session 2

- **Birth year?** 1978
- **Male/Female?** Female
- **Study?** Studying to be a nurse
- **How far along in study?** Bc. student
- **Computer skills?** Ok
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One girl.

- It would be nice if the prototype could remember me, instead of having to write username and password each time
- The timetable should be on the frontpage
- It should be possible to search for groups
- It should be kept to a minimum what the user has to write into the prototype
- A text description is missing when a group is created
- It should be possible to select in which departments the group being created should be visible
- End time is missing in add event
- Name is missing when event is added
- It is clear what repeats in add event means
- Personal homepage should be included in the profile
- Good access to main categories should be available at any time
- It should be possible to put in your own picture in the profile
- Unclear why department is in the profile
- It is a good idea to split the profile in two parts
- "I would always start by searching for a group before I create one"
- Would be very good if the item from the timetable would show up in the calendar and vice versa

E.1.0.3 Test Session 3

- **Birth year?** 1978
- **Male/Female?** Male
- **Study?** Electric engineering
- **How far along in study?** Ph. D. student
- **Computer skills?** Very good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. One girl.

- Some help is needed on the login page
- Gender is missing in the profile
- It would be nice if the profile would be half filled beforehand
- There should be campus location in the profile
- The matchmaking function should be on the frontpage
- There should be some privacy control in the profile
- Frontpage maybe not the best word, home is better
- It should be possible to search for groups
- A text description should be an option when creating a group
- It should be some kind of help to find the emails that need to be sent for the invitations to the group
- The calendar should include week numbers
- "Private and public calendars is something that interests me"
- It should be possible to input a date and then that month would show up on the screen
- Time to is missing in add event
- It should remind you of an event

- It should be possible to synchronize the calendar with other calendars
- Maybe there should be information about language in the profile
- Would be nice to see if other group members were online
- Representing steps with 1/2 is not clear, this means half to me, better would be step 1 of 2

E.1.0.4 Test Session 4

This test session was done after some minor changes had been done to the paper prototype.

- **Birth year?** 1981
- **Male/Female?** Female
- **Study?** Mathematical statistics
- **How far along in study?** Master student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No.
- The arrows in the profile are not clear
- The profile should be prefilled by DTU
- Should be possible to change the picture
- Thinks interests should be in the open profile
- Nationality should be included in the profile
- It should be indicated what is mandatory to fill out
- It would be nice to see who in your groups are online
- It would also be good to see if they are on campus or not

- Should be possible to search for group based on a course
- Should also be possible to search with course number
- It should be possible to see if groups are full, then how many are missing, who are in the group
- Help is missing when filling out the email addresses for the invitations
- Thinks repeats is not a good word in new event
- It should be possible to select how many days are displayed at once in the calendar view
- It should be possible to see one week

E.2 Iteration 2

Here is information about the users and their comments in the second iteration of the paper prototype.

E.2.0.5 Test Session 1

- **Birth year?** 1980
- **Male/Female?** Male
- **Study?** Mathematical statistics
- **How far along in study?** Ph. D. student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes. Three boys.
- The group members screen show what needs to be presented
- Should be able to go into the profile for each group member

- It could also be show profiles as it is with show picture in the group members screen
- It is important not to have too much information on screen at once
- There should be a button that would show all messages for that group
- Change folder and delete file functions are missing in the file sharing screen
- Should be an option to send text with an invitation to the group
- There should be only two roles a user and an admin
- It is nice to be able to select courses from a dropdown box and only the courses that the user is in.
- The result from matching function is presented in a good way, like that it is presented with a percentage symbol
- It is nice that it is very easy to turn the message board on and off

E.2.0.6 Test Session 2

- **Birth year?** 1982
- **Male/Female?** Female
- **Study?**Physiotherapy student
- **How far along in study?** second year
- **Computer skills?** okay
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No
- It would be very convenient if the product could remember me so that I do not have to put in my username and password every time. This is important if I use this product very much
- Admin is not a good word, group leader is better
- Good to have the possibility to show picture of group members in group members

- It should be possible to see who sent a message
- "There is nothing missing if I want to send a message"
- It should be some kind of support to find email, when sending invitations
- Screen with user roles was not very clear
- It is very easy to delete a person from the group
- It is very good that it is very easy and fast to find a matching profile
-
- It should be possible to see the profiles of those that come up in the results
- It should be possible to delete many messages at once
- Having categories is a good feature, easy to change if it is implemented like that

E.2.0.7 Test Session 3

- **Birth year?** 1981
- **Male/Female?** Male
- **Study?** Physiotherapy student
- **How far along in study?** second year
- **Computer skills?** okay
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No
- Login screen is good
- Interesting to be able to find a student that has similar profile to work with
- The result page is very good and simple
- Should be able to view the profile in the result page

- Not something that he would use in his current university
- Should help people brake the ice
- It is very good to be able to choose message categories
- The message board is an interesting feature, especially if it works well
- It should be possible to have the product remind of event
- Thinks that group members show exactly what is needed
- It should be possible to see if you have a message from one of your groups on the frontpage
- Would be nice to be able to send a message to selected individuals in the group
- It is very important that it is very easy to put in many files at once
- When you put in a file you should have the option to put some text description with that file.
- It should be possible to put in a description of the group you have created
- There should be a date that indicates when a file was uploaded

E.2.0.8 Test Session 4

- **Birth year?** 1981
- **Male/Female?** Female
- **Study?**Psychology
- **How far along in study?** Bachelor student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** Yes, one boy
- Feels the layout of the login window and main screen are good
- I would like to have a Home button like in Firefox

- The layout and the information is good for the group members. Would be nice to have access to the profile of other members.
- Would be nice to be able to send messages to a few selected ones in the groups, in addition to being able to send messages to all members
- The matching profile result is simple and easy to understand
- Should be possible to view profiles for those that show up in the result
- Thinks that is should be possible to select categories and get messages based on her selection

APPENDIX F

Hi-Fi Prototype Sessions

Here is information about the participants in the Hi-Fi prototype sessions. A total of 4 test sessions were conducted. Here follows some information and comments from each of those test sessions. It should be noted that there were two iterations in the Hi-Fi prototype phase.

F.1 Iteration 1

F.1.1 Test Session 1

- **Birth year?** 1981
- **Male/Female?** Male
- **Study?**
- **How far along in study?** second year physiotherapy student
- **Computer skills?** okay
- **Family**
 - **In a relationship?** Yes

- **Married?** No
- **Children? If yes, how many?** No

- Would like to rename the frontpage button to Home
- There should be a clock on the frontpage
- It should be possible to change the colors of the prototype
- A logout button is missing
- It would be very nice if my name was listed in the upper left corner so that I know that I am logged into my own account

F.1.2 Test Session 2

- **Birth year?** 1982
- **Male/Female?** Female
- **Study?**
- **How far along in study?** second year physiotherapy student
- **Computer skills?** okay
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No

- Thinks that the screen and the items in it are too small when she has to input some text
- The representation of the matching profile result is very good
- The settings button does not work
- Adjusting the color should be a possibility
- The colors are fine as they are

F.1.3 Test Session 3

- **Birth year?** 1985
- **Male/Female?** Male
- **Study?**
- **How far along in study?** First year law student
- **Computer skills?** okay
- **Family**
 - **In a relationship?** Yes
 - **Married?** No
 - **Children? If yes, how many?** No

- There should be a profile button in the matching profile result so that you can look at the profile for those people in the result
- Changing the colors is something that the user should be able to do
- A logout button is missing
- Does not like the colors very much in this version

F.2 Iteration 2

F.2.1 Test Session 1

- **Birth year?** 1981
- **Male/Female?** Female
- **Study?**
- **How far along in study?** Master student
- **Computer skills?** Good
- **Family**
 - **In a relationship?** Yes
 - **Married?** No

– **Children? If yes, how many?** No.

- Thinks that is should rather be check boxes in academic interest, rather than having people write some text
- The presentation of the matching result is very good
- dropdown boxes are rather hard to use in the prototype
- The overall view is simple and it clear where located in the prototype.

APPENDIX G

Hi-Fi Prototype Screenshots Version 1

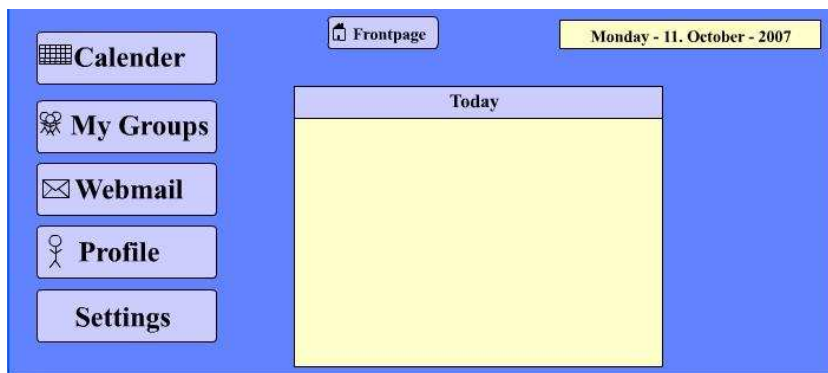


Figure G.1: The calendar day screen in the Hi-Fi prototype, iteration 1

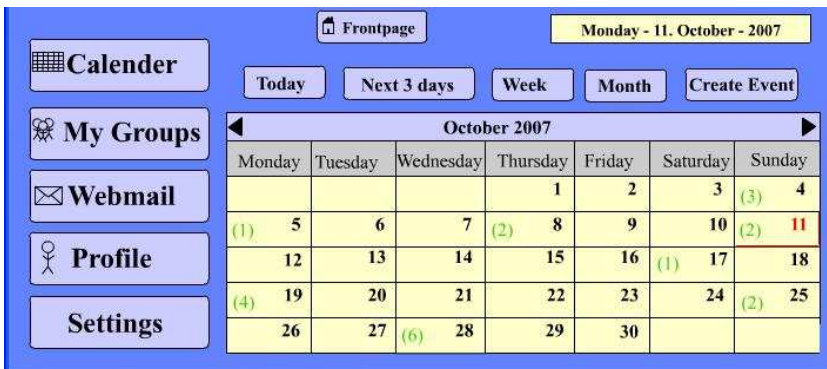


Figure G.2: The calendar month screen in the Hi-Fi prototype, iteration 1

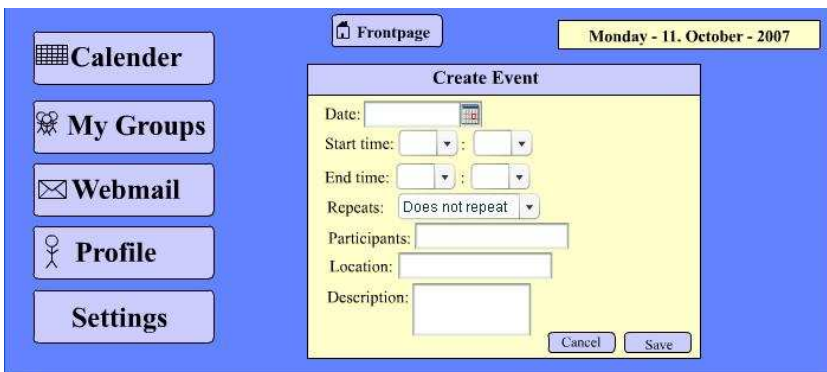


Figure G.3: The create event screen in the Hi-Fi prototype, iteration 1

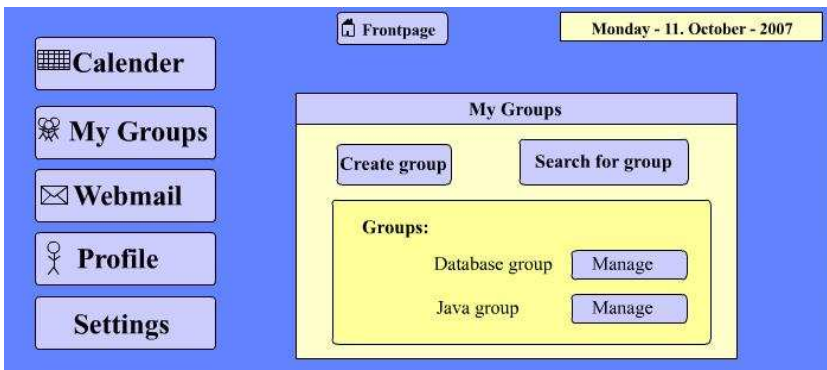


Figure G.4: The My Groups screen in the Hi-Fi prototype, iteration 1

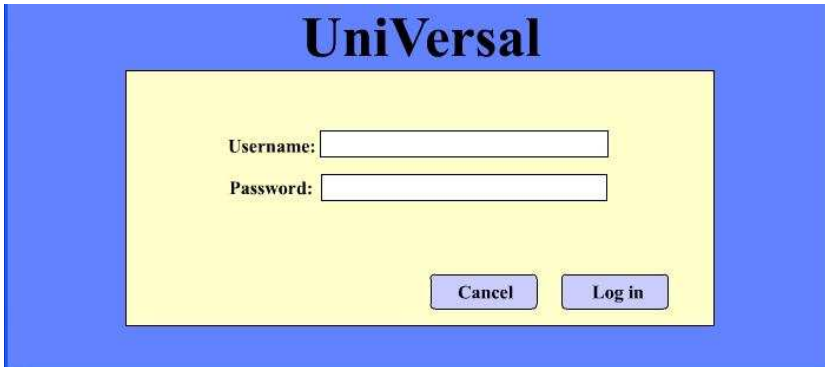


Figure G.5: The login screen in the Hi-Fi prototype, iteration 1

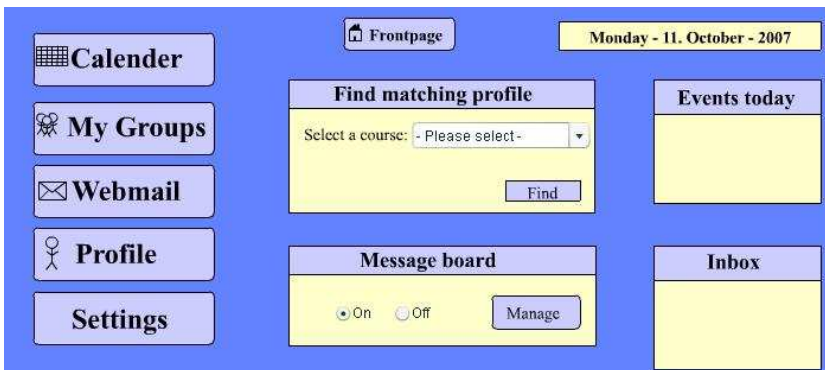


Figure G.6: The frontpage screen in the Hi-Fi prototype, iteration 1

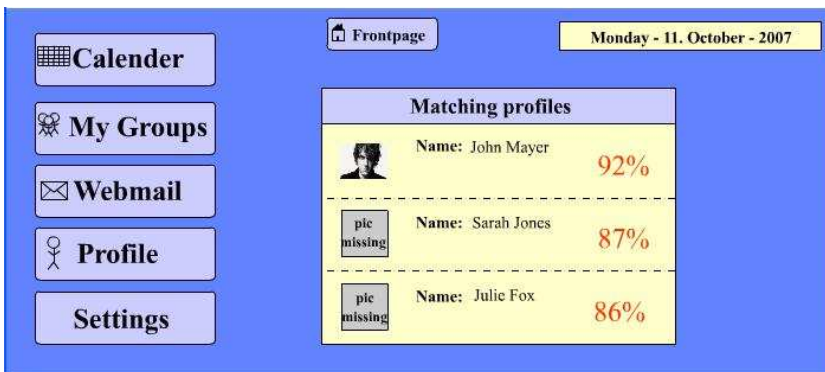


Figure G.7: The matching result screen in the Hi-Fi prototype, iteration 1

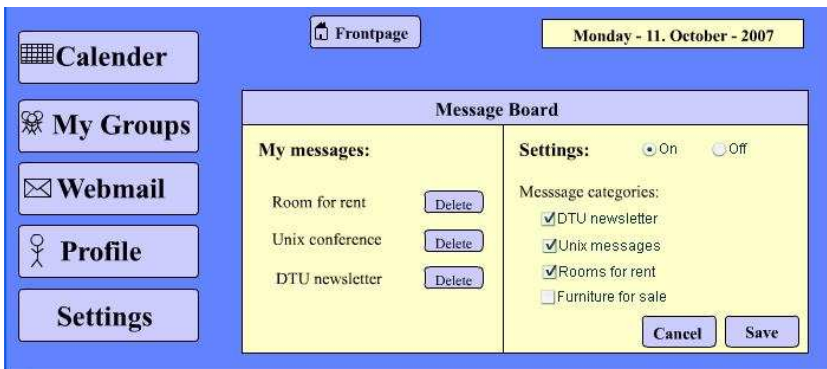


Figure G.8: The message board screen in the Hi-Fi prototype, iteration 1

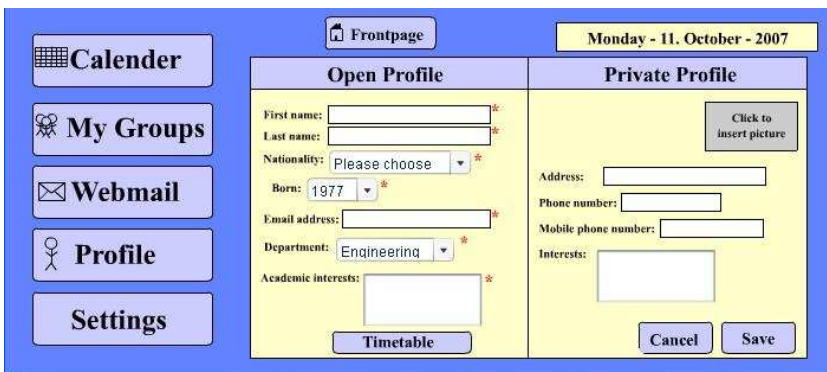


Figure G.9: The profile screen in the Hi-Fi prototype, iteration 1



Figure G.10: The webmail result screen in the Hi-Fi prototype, iteration 1

APPENDIX H

Hi-Fi Prototype Screenshots Version 2

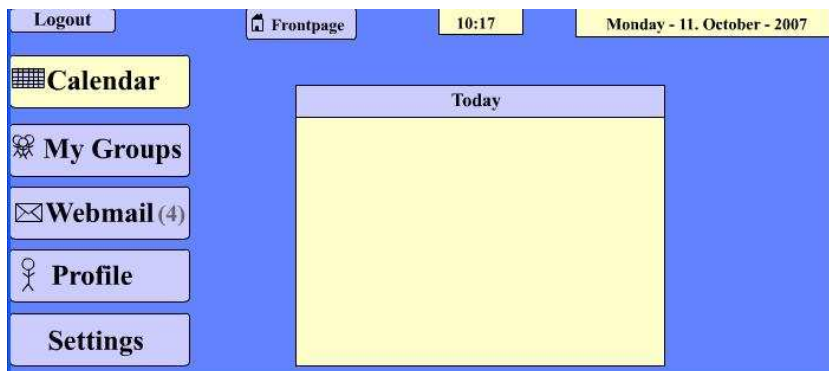


Figure H.1: The calendar day screen in the Hi-Fi prototype, iteration 2



Figure H.2: The calendar month screen in the Hi-Fi prototype, iteration 2

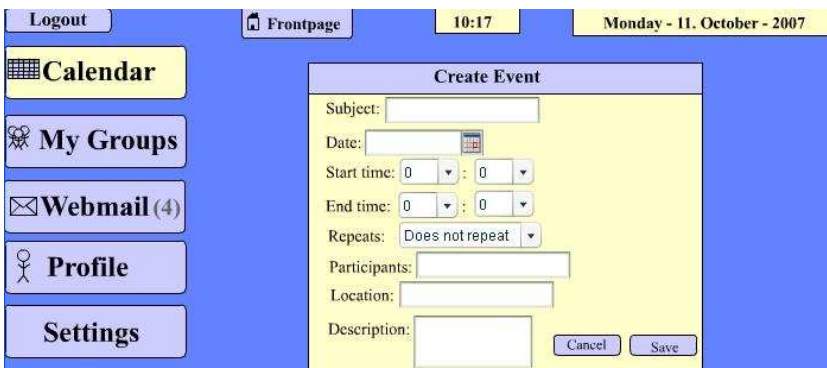


Figure H.3: The create event screen in the Hi-Fi prototype, iteration 2

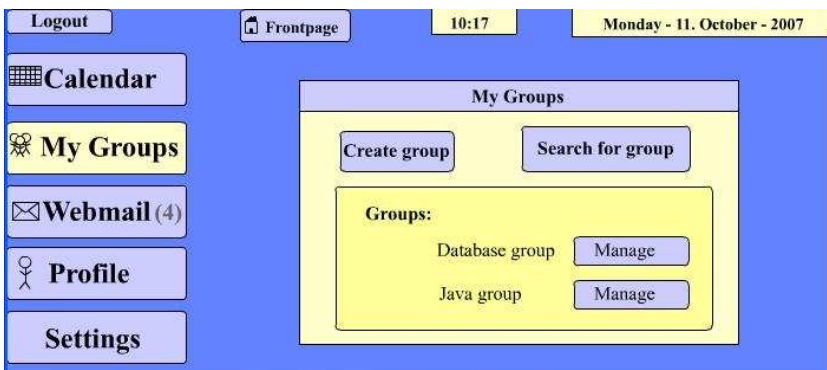
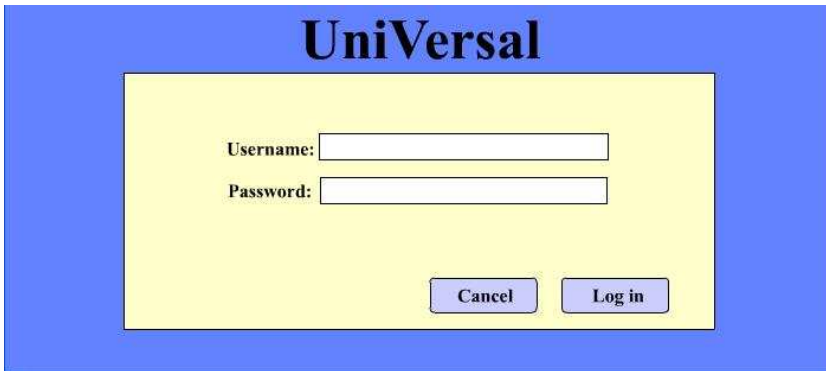


Figure H.4: The My Groups screen in the Hi-Fi prototype, iteration 2

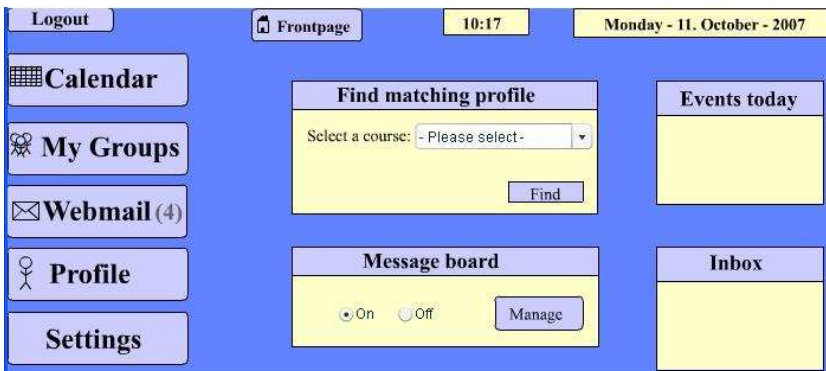


UniVersal

Username:

Password:

Figure H.5: The login screen in the Hi-Fi prototype, iteration 2



Logout Frontpage 10:17 Monday - 11. October - 2007

Calendar

My Groups

Webmail (4)

Profile

Settings

Find matching profile

Select a course:

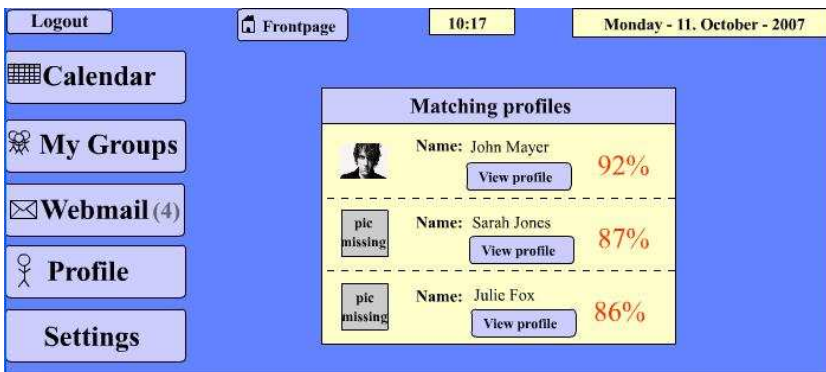
Events today

Message board

On Off

Inbox

Figure H.6: The frontpage screen in the Hi-Fi prototype, iteration 2



Logout Frontpage 10:17 Monday - 11. October - 2007

Calendar

My Groups

Webmail (4)

Profile

Settings

Matching profiles




	Name: John Mayer	92%
<input type="button" value="View profile"/>		
	Name: Sarah Jones	87%
<input type="button" value="View profile"/>		
	Name: Julie Fox	86%
<input type="button" value="View profile"/>		

Figure H.7: The matching result screen in the Hi-Fi prototype, iteration 2

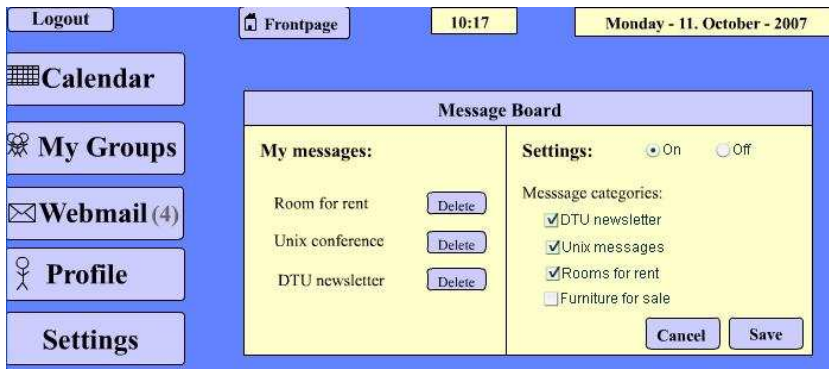


Figure H.8: The message board screen in the Hi-Fi prototype, iteration 2

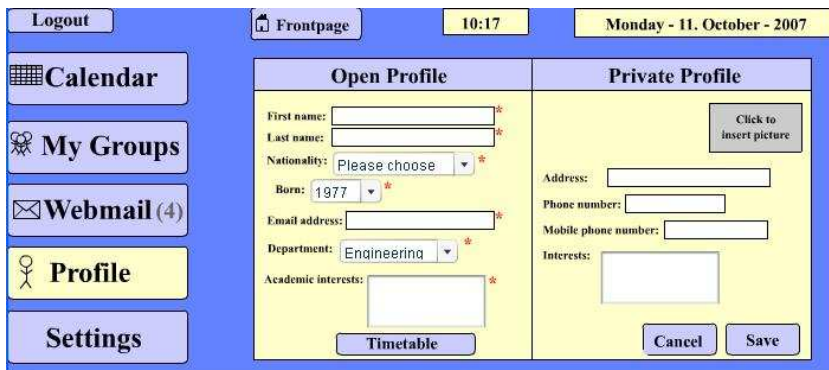


Figure H.9: The profile screen in the Hi-Fi prototype, iteration 2



Figure H.10: The webmail result screen in the Hi-Fi prototype, iteration 2

Bibliography

- [1] K. Beck. *Extreme Programming Explained: Embrace Change*. Addison-Wesley Professional, USA, 1st edition, 1999.
- [2] J. Berndtsson. Designing an intranet from scratch to sketch: Experiences from techniques used in the idenet project. Proceedings of the 32nd Hawaii International Conference on System Sciences - 1999, 1999.
- [3] L. L. Constantine and L. A. D. Lockwood. *Software For Use*. Addison Wesley, USA, 1st edition, 1999.
- [4] A. Cooper and R. Reimann. *About Face 2.0 The Essentials of Interaction Design*. Wiley Publishing, Inc., USA, 2nd edition, 2003.
- [5] D. Dinka and J. Lundberg. Identity and role - a qualitative case study of cooperative scenario building. Author's homepage, 2006.
- [6] M. Dorfman and Richard H. Thayer. Software engineerings. The internet, 1996.
- [7] C. Ghezzi, M. Jazayeri, and D. Mandrioli. *Fundamentals of Software Engineering*. Prentice Hall, USA, 2nd edition, 2003.
- [8] J. Gong and P. Tarasewich. Guidelines for handheld mobile device inteface design. Author's homepage, 2004.
- [9] S. Heilesen and S. Jensen. *Designing for Networked Communications Strategies and Development*. Idea Group Publishing, UK, 1st edition, 2007.
- [10] R. Molich. *Usable Web Design*. Nyt Teknisk Forlag, Denmark, preliminary edition, 2006.

- [11] J. Ostrem. Palm os user interface guidelines. The internet, 2003.
- [12] J. Preece, Y. Rogers, and D. H. Sharp. *Interaction Design*. John Wiley and Sons, Inc., USA, 2nd edition, 2002.
- [13] C. Ware. *Information Visualization*. Morgan Kaufmann Publishers, USA, 1st edition, 2000.