

Usability and Sociability Oriented Design of a Virtual Meeting Place

**- a user centred approach to web application
design**



**LUNDS TEKNISKA
HÖGSKOLA**
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Printed in Sweden
Media-Tryck
Biblioteksdirektionen
Lund University
Lund 2003

Abstract

Usability and Sociability Oriented Design of a Virtual Meeting Place - a user centred approach to web application design

This 15 credit bachelor thesis is a report on a project carried out as the last element of the Software Engineering programme at Lund Institute of Technology, Campus Helsingborg. The purpose of the project was to design a so called virtual community for Redburst Technologies and deliver a static HTML prototype thereof.

To reach the goal an underlying theoretical base – consisting of for example the definition and history of communities, a description of usability (for efficient and smooth *operation* of an *interface*) and sociability (for efficient and smooth *communication* between *users*) along with guidelines for building virtual meeting places – was first erected. The practical work followed a usability engineering process and consisted of for instance a user analysis based on a questionnaire, requirements elicitation, iterative paper prototyping, usability evaluations – that confirmed the usability of the paper prototypes – and finally implementation in HTML 4 / CSS.

The main finding from the user analysis was the popularity rating of some selected features at Lunarstorm. The ranking was 1) guest book, 2) mail, 3) diary, 4) message board and 5) chat. The functionality rating also revealed that the general structure of the guest book and the mail function is fine, whereas that of the message board is not. Information found in other studies state that the typical user of Lunarstorm logs in regularly and often and is a teenager, and also that the main reasons for frequenting are to 1) meet friends, 2) meet new friends and 3) discuss. Furthermore, the new term *virtual meeting place* has been defined as a more general term than *virtual community* (small, hobby-driven) and *virtual city* (large, business).

Keywords: Virtual community, meeting place, usability, sociability, lunarstorm, user analysis, guidelines.

Sammanfattning

Användbarhetsorienterad design av en virtuell mötesplats - ett användarfokuserat angreppssätt vid design av en webapplikation

Denna 15-poängs högskoleingenjörssavhandling är en redogörelse för ett projekt utfört som sista moment i programvaruteknikutbildningen vid Lunds Tekniska Högskola, Campus Helsingborg. Syftet med projektet var att designa ett så kallat community för Redburst Technologies. Arbetet skulle mynna ut i en realistisk HTML-prototyp.

För att nå målet upprättades först en teoretisk bas bestående av till exempel definitionen av och historien kring communities, en kort genomgång av användbarhet (usability, för effektiv och friktionsfri *användning* av ett *gränssnitt*) och sociability (för effektiv och friktionsfri *kommunikation* mellan *användare*) samt riktlinjer att beakta vid formgivning av virtuella mötesplatser. Det praktiska arbetet följde en usability engineering-process och omfattade exempelvis en användaranalys baserad på en enkätundersökning, att ta fram en kravspecifikation, iterativ pappersprototyputveckling, användbarhets-utvärderingar – som bekräftade pappersprototypernas användbarhet – samt slutligen realisering i HTML 4 / CSS.

Det huvudsakliga resultatet från användaranalysen var värderingen av hur populära valda funktioner på Lunarstorm är. Ordningen blev 1) gästboken, 2) mejlfunktionen, 3) dagboken, 4) anslagstavlan och 5) chatten. Värderingen av funktionaliteten hos valda funktioner visade även att gästbokens och mejlfunktionens generella struktur är god medan den ej är det gällande anslagstavlan. Artikelsökningen visade att den genomsnittliga Lunarstormanvändaren är en tonåring som loggar in regelbundet och ofta, men även att de huvudsakliga anledningarna till besöken är att 1) träffa kompisar, 2) lära känna nya kompisar och 3) att diskutera. Vidare har den nya termen *virtuell mötesplats* definierats som en mer generell term än *virtuell gemenskap* (liten, hobby) och *virtuell stad* (stor, affärsverksamhet).

Nyckelord: Virtuell gemenskap, mötesplats, användbarhet, sociability, lunarstorm, användaranalys, riktlinjer.

Foreword

Redburst Technologies (Redburst) introduced the rough edges of the project, i.e. designing a web community application initially planned to be released in Poland, to me in early March 2003. Joakim Eriksson, PhD, at the Ergonomics and Aerosol Technology division of the Department of Design Sciences of Lund Institute of Technology, Lund University, decided to accept the role as supervisor for the project in late April. At the time I had been told it was not to be released in Poland anymore. The project took off in early May 2003 when I went to Kista to plan it in collaboration with Redburst in more detail; the final pieces of the report were compiled in mid August 2003.

It has been a greatly rewarding experience and so I wish to thank Lukasz Andersson at Redburst for inviting me to do this project. For advice, coffee and support I thank my supervisor. I also want to thank my girlfriend Sara for her understanding and love, my parents for everything they have done for me and my friends for an exciting off-work environment.

It has been very stimulating and interesting to carry out this project and making some kind of contribution to knowledge in the process. I hope You will find it as interesting as I did.

Helsingborg, August 2003

Mikael Folkesson

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“The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed.”

– Albert Einstein

1 Introduction

1.1 Background

While modern society is becoming ever more computerized the Internet has already become a natural means of communication to many people. Modern society is also in some people's opinion becoming ever more alienating and impersonal. As a reaction against the perceived artificiality of contemporary society and the relations therein, the fruits of it – in the shape of computers and the Internet – are paradoxically used to promote a more genuine contact between people. One type of these increasingly popular virtual phenomena for meeting people are commonly called “virtual communities”. As we will see in section 2.1 *virtual meeting place* is a more general term that will be preferred in this thesis. Exceptions will be made – primarily in this chapter and chapter 2 when trying to come to terms with the concepts, and when actually meaning a virtual community.

When designing a virtual meeting place you do not only have to consider traditional *usability*, i.e. focusing on the user and trying to make the product as usable as possible. You also have to consider *sociability* since you will want to support the interaction between people. These terms and concepts will also be examined more thoroughly in chapter 2, as will for instance the history of virtual meeting places, but now for the purpose of the project.

1.2 Purpose

The purpose of the project was to design a Lunarstorm-inspired “web community application” that should be usable and meet the expectations of Redburst's target users, which was a broad group of users since the application now was to be sold on as a stand-alone product. The end-user group was specified simply as “youths”. An explicit wish of Redburst was that the final structure of the “community” should be made with the ability to easily change skins, i.e. changing the graphical appearance of it, in mind. It should also be scaled down and include only the most valuable features.

A technical platform for the virtual meeting place already existed prior to the launch of this project, but it is to be reimplemented based on the new

requirements and design solutions found as a result of my work. The technical platform is outside the scope of this thesis and project.

1.2.1 Project deliverables

Redburst wanted to be continually informed of the progress. The project was divided into four main phases – excluding the project planning phase – and a concluding report was to be delivered after each phase. These deliverables were i) a Subject Study Report, ii) a Usability Specification, iii) a Design Report and iv) a realistic HTML prototype.

1.3 Presentation of the Task

In order to accomplish the purpose of the project several activities had to be performed. These are on an abstract level:

- Information gathering
 - Find information to build a theoretical base
 - Find domain-specific information for practical work
- Usability Engineering
 - A user analysis to comprehend the needs and wishes of the users
 - Elicit requirements
 - Build paper prototypes
 - Conduct usability evaluations on the paper prototypes
 - Implement the site based on the previous steps

1.4 Delimitations

For the theoretical base I chose to limit the quest for knowledge to i) what a virtual community is, ii) the history of virtual communities, iii) what Lunarstorm is and is about, iv) what usability is, v) finding guidelines for virtual community design and vi) during the pursuit for information it became obvious that sociability also needed to be considered.

Domain specific knowledge was limited to i) usability processes, ii) general design, iii) how to code and what can be done in HTML 4, iv) how to use digital imaging programs and v) who the users of Lunarstorm are and what they like most about Lunarstorm.

The usability engineering process was limited only by the resources at hand; a virtual meeting place application was to be designed within a certain time-frame.

2 Theory

This chapter will give an overview of the central terms and concepts used in this thesis. It is largely the result of the initial preparations to get an understanding of the community- and usability-domain helpful when making decisions later in the project.

When designing a virtual community it is important to understand the underlying theory and how people interact on the internet (Schröder, 2002). Furthermore there are no simple rules to follow. As Pargman (Pargman, 2000) put it:

“Our understanding of on-line or virtual communities [is] recent and at best partial. The ‘science’ of engineering virtual communities has yet to be developed, if it ever will. There is no body of work on how to engineer and build a virtual community, let alone what the building blocks are and how they should be combined to reach the desired effect ...”

Three years have passed since Pargman wrote his Ph.D. thesis, during these years there have indeed been attempts at least at developing guidelines and some kind of process for the purpose. The following sub-chapters will go into the definition and history of virtual communities, what Lunarstorm is, explanations of usability and sociability and finally the guidelines that were kept in mind when designing this virtual meeting place.

2.1 Defining Virtual Community and Virtual Meeting Place

To define what a *virtual community* is you must first define what *community* is since *virtual* – in the computer world – merely implies that it exists in cyberspace. According to Pargman (2000) sociologists have struggled to define the term for a very long time. To some it is the most fundamental and far-reaching of sociology’s unit-ideas, while others consider it one of the vaguest terms in sociology and that it has lost its meaning. Pargman mentions an inventory that found 94 different meanings of the word.

Additionally he suggests that the concept of “community” is only intelligible when there is some “anti-community” with which to oppose it. The term “community” was originally used to describe rural communities, who traditionally have been placed in opposition to modern urban societies. German sociologist Ferdinand Tönnies wrote the classical text on the

antagonism between pre-modern and modern society in 1887 (Tönnies, 1887) where he described the shift from rural community, *Gemeinschaft*, to modern urban society, *Gesellschaft*. Words that have been associated with each are presented in table 2.1.

GEMEINSCHAFT (COMMUNITY)	GESELLSCHAFT (SOCIETY)
heart, feeling, common (group) projects, altruism	reasoning, thinking, individual projects, egoism
cooperation, acquaintances, friends and enemies, love and hate (in relationships)	competition, strangers, competitors, relativistic moment-to-moment calculation
religion, belief, honour	science, evidence, ethics
belonging, obligation, undifferentiated	alienation, convenience, differentiated
relationship as significant, long-term, informal, personal	relationship as convenient, transient, formal, anonymous
small (village), slowness, tradition, homogeneity	big (city), speed, fashion, fancy, segmentation
natural, unplanned organism	constructed, artificial organism
self-governing democratic village communes, interpersonal communication	professional associations, nation-states, mass communication

Table 2.1: Some selected terms associated with Gemeinschaft and Gesellschaft (Pargman, 2000).

Schröder summarizes this by saying that to be a member of *gemeinschaft* is to be recognized and respected for who we *are* in *relation* to others, whereas in *gesellschaft* we are only recognized for what we *perform* in *competition* with others (Schröder, 2002). To define community Pargman gives community a general, loose and flexible definition that can be used to describe both on- and off-line communities:

“Community is characterized by shared values, goals, concerns, routines, procedures, practices, rituals, symbols, artefacts, history and institutions as well as mutual commitment and responsibility to the community and the community members, not necessarily based on personal relationships.”

I believe that the community boom of today is a result of a movement towards *gemeinschaft* and the type of relations it is characterized by. As Schröder put it “people can get together, experience *gemeinschaft*, and escape the dull life

of *gesellschaft*”. Hence it is natural that community flourishes outside the ordinary structures of society where relations are characterized by *gesellschaft*. Pargman writes that:

“You can expect to find community among people with a lot of time on their hands but not necessarily that much money, that is, among the economically or experientially handicapped (i.e. youth). We can further expect to find community in counter-cultures and in leisure, play, parties, carnivals and masquerades. We can furthermore not expect to find community among the anonymous spectators of professional entertainers (e.g. artists, sports) or commercial mass entertainment (e.g. television).”

Pargman goes on by stating that “[a] community is a place where it is part of the fabric of every-day life to encounter a relatively small number of friends and acquaintances instead of a large number of strangers” and that a community therefore cannot be too large as it is based on personal relationships or overlapping networks of relationships, on which he launches the idea of “the good city” as an alternative to community.

2.1.1 The virtual city and the virtual meeting place

The idea of the good city is in my opinion better suited to describe so called virtual communities of the large Lunarstorm-type – of which an instance was the result of this project – than the idea of a virtual community. What people aspire that cause them to “join” a good city, or as one would rather call it in this context, a virtual city, is not primarily to return to community or *gemeinschaft* –which is better accomplished in smaller virtual communities – but to experience the creative, unexpected, pluralistic, surprising variation that the good city can provide (Pargman, 2000). The constant flow of human activities and the variation this offers in a densely populated area is what the members of such virtual cities seek.

The creation of a virtual community is better suited to small autonomous groups who manage the task as a hobby or even a lifestyle and who thus recreate their own vision of a good place (*ibid.*) where there is place for *gemeinschaft*. For commercial purposes it is according to Pargman better to try to recreate “good cities” than “good communities”, since communities by necessity are small and local whereas cities are large and dynamic; plus economic interests seem to spoil community. To conclude, there should be a super-word for the sub-words community and city. I introduce the *virtual*

meeting place that can be used to describe any kind of social Computer Mediated Communication (CMC) establishment.

2.2 History of Virtual Meeting Places

The virtual world has obviously not existed for a very long time. The roots are commonly traced back to the US Department of Defence's ARPANET, the predecessor to today's internet, and its birth in 1969. The first e-mail message was sent on the ARPANET in late 1971 (Pretext.com) and soon thereafter mailing lists, that allowed group discussion, were implemented. The first one to cultivate an own culture was a list called SF-LOVERS – SF as in Science Fiction (Rheingold, 1994). This happened in 1979 – the same year that the Usenet was invented (ibid.) – and with a somewhat loose definition of virtual community it can be called the first one (Schröder, 2002). The use of mailing lists and social CMC increased rapidly and soon accounted for the majority of all traffic on the ARPANET. Some people saw this as a disturbance and noise, as the net was intended for scientific and research purposes, and tried to shut this kind of activity down. According to Rheingold, we have the top managers of ARPA to thank for letting the first virtual communities form and keep existing despite the explosive growth in network communications traffic. Schröder mentions that Sproull & Kiesler (1990) talk about communities, but only in the sense of professional communities wherein work knowledge is transferred between members. There was little understanding of purely social CMC at the time, and Nancy K. Baym (1998) describes the sightlessness this way:

“Early scholarship on CMC was oriented towards organizational uses of computing. The primary questions asked were how CMC could enhance work processes such as group decision-making. Conducted primarily in organizations and laboratories, this research generally argued that computers are inherently inhospitable to social relationships. Scholarship has finally caught up with what many users of CMC had long known: Social relationships thrive online and have since the beginning of interactive computing.”

One type of early networked computer application was the Multi User Dungeon, or MUD. They were text-based fantasy role-playing games and also one of the first multi-user computer games. The first MUD was created at Essex University in the UK in the spring of 1979 and MUD quickly became a very popular game amongst modem-using computer hobbyists (Ibiblio.org).

Even though university network- and computing resources were sparse, the authorities let the gaming go on, albeit only in the night (ibid.). One thing led to another, and in 1989 TinyMUD – the first purely social MUD – was created (Pargman, 2000).

To see when the term “virtual community” was first used, Usenet messages from the period 1981 to 1991 were searched for the term using google groups. The first time the term was mentioned in a Usenet message was on 15 February 1988 in an invitation to join TWICS – “a community, a unique virtual community”. Based in Japan and “full-featured” in 1986 (multi-user in 1985), it was a globally oriented multi-user Bulletin Board System, or short, a BBS. It was however not until 1994 that the term got popularized when Howard Rheingold wrote the book *The Virtual Community* (Rheingold, 1994). The book is about the virtual community that had made a lot of impact on him, The WELL – The Whole Earth ‘Lectronic Link. The WELL, based in the San Francisco Bay area, is often considered the most influential of all virtual communities; a lot of insightful and prominent people have been carrying out discussions, often on a high level, there since 1985 (Well.com).

Since *The Virtual Community* lots of things have happened. The World Wide Web is not even mentioned in Rheingold’s book that was published the year after, but written mainly the year as, Marc Andreessen released the first web browser NCSA Mosaic. As the web became ever more popular, more and more people gathered – and are still gathering – on the internet in small virtual communities. Stajl Plejs was founded as a BBS in 1996 by Rickard Eriksson and after a few years it became the first virtual city in Europe (Susning.nu, they use the term *community* in the sense of a *city*). In January 2000 (Ne.se) the name was changed to Lunarstorm and it became a business instead of a hobby (Lunarstorm.se). Other examples of virtual cities are the Spray suite of communities; Skunk with the target group youth in general founded in 1998 with 200,000 members, SprayDate which is a general dating community released in October 1999 with 110,000 members – but also present in nine other European countries, Sylvester which is a gay dating community started in January 1999 with about 40,000 members and Sylvia which also is a gay dating community, but for women, founded in August 2000 with 20,000 members (Schröder, 2002).

There are now hundreds, if not thousands, of virtual communities and dozens of virtual cities in Sweden alone. If one were to try to predict the future – which in itself often is an unrewarding task – of virtual meeting places, it could possibly be that the use of them will be more widespread and integrated in our daily lives as more and more people discover this new way of meeting people and interacting socially.

2.3 Getting to Know Lunarstorm

As stated above, the history of Lunarstorm begins in 1996 when its predecessor Stajl Place was founded. The Lunarstorm of today is one of the most well known sites in Sweden, and it recently got an own entry in the, in Sweden, famous encyclopædia Nationalencyklopedin. Lunarstorm now weekly reaches a majority of 12-24 year olds in Sweden, as can be seen in table 2.2.

AGE GROUP	DAILY REACHES		WEEKLY REACHES	
	No. of people	Percentage share	No. of people	Percentage share
12-17	171,567	26 %	510,349	76 %
15-20	156,994	25 %	474,985	77 %
15-24	182,545	18 %	543,881	53 %
18-24	83,563	12 %	250,274	35 %
12-24	244,845	18 %	713,205	51 %

Source: TNS/Gallup, RedMeasure, April 2003

Table 2.2: Lunarstorm’s reach of different age groups in Sweden (Lunarstorm.se).

Statistics provided by Lunarstorm on the total number of visitors can be found in table 2.3. Lunarstorm reports to have “only” 1,092,000 members but 2,497,115 unique visitors per month. Factors that may explain this discrepancy include non-member visitors and members logging in from different computers. It is also not clear how the unique visitors have been counted.

The business concept of Lunarstorm is to use the potential of the “unique position” on the Swedish media market it has by selling i) advertisement space that can be directed to, for example, “16-25 year old girls in Luleå” with a

certain frequency and ii) polls where the results also can be broken down in age groups and geographical location. The unique position is that Lunarstorm reaches about as many of the 12-24 year olds in Sweden as commercial television, but is more dialogue-based than television, press or radio and, while still suitable for promotion – as action marketing, telemarketing and the web are – it is also apt for branding (Lunarstorm.se).

LUNARSTORM MEMBER STATISTICS	
Number of pages shown:	593,460,471
Pages shown/visit:	31.4
Unique visitors/month:	2,497,115
Unique visitors/week:	909,287
Unique visitors/day:	323,553
Visitors monthly:	18,885,736
Time spent/visit:	20 min
Time spent/user and day:	41 min
<i>Source: TNS/Gallup, Red Measure, April 2003</i>	

Table 2.3: Number of visitors to Lunarstorm and time spent (Lunarstorm.se).

The large Lunarstorm-type of virtual community has strong elements of *gesellschaft*; it has more than one million members, the purpose is to make money, it is constructed and as such not an unplanned organism kept alive as a result of a hobby or a lifestyle, has strong central rule and strong features of mass communication and is big and segmented as opposed to small and homogenous. This kind of virtual meeting place should from the point of view put forward in section 2.1 rather be called virtual city than virtual community. There are however communities within the city, as there are in real cities. The city consists of separate networks of friends where the relations are characterized by *gemeinschaft* and, generally but not strictly speaking, everybody knows everybody else (albeit not on a personal level). Seen as a whole however, most inhabitants will never even be made aware of the existence of a given member of the inhabitant set, let alone form a *gemeinschaft*-characterized relation to that member.

2.4 Usability

The following practical example quoted from Faulkner (2000) will perhaps give a better initial picture of what the lack of usability results in, than anything else:

“A company got in a group of technical engineers to design a laser engraving machine. Unfortunately they forgot to consider the operator. Design consultants found that for someone to use the machine they had to have at least three arms, all of which were three feet long, and that person had to be under three feet tall.”

The technical engineers had basically forgotten the user that should be in the centre of attention. In an attempt to explain usability easily Schröder (2002) writes that a product shows good usability if it is easy to learn and remember, efficient, visually pleasing, fun to use, and quick to recover from errors.

The idea of usability in some ways builds on the older idea of user friendliness, that according to Faulkner was abandoned by parts of the academic community as early as 1986 – the year Schackel published his first formal definition of usability (Schackel, 1990) – and almost by all of it by the beginning of the nineties; the reasons were that no one could explain precisely what advantage a user friendly system might offer, and it implies user’s needs can be described along a single axis. The term is, however, still alive in marketing literature and to a great extent present in regular people’s vocabulary (Faulkner, 2000). All the same, it has for the time been abandoned in favour of usability.

To Faulkner usability, usability engineering and usability evaluation are components that will make up a User Centred Design (UCD) approach. She defines usability engineering as the entire process of producing usable products and usability evaluation as the process by which products are evaluated to ensure they are usable. Usability, on the other hand, is not a word with one simple and clear definition. Different authorities have different definitions. For example ISO has the following definition of usability:

“...the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments...”

- ISO DIS 9241-11

Faulkner, however, feels this definition is not enough. She thinks particularly Shackel’s (1990) definition – based on effectiveness, learnability, flexibility

and attitude – can help give a better picture of the word. Especially, Faulkner thinks ISO's *satisfaction* should be replaced with Shackel's *attitude*.

When conducting the evaluation of the second paper prototype a synthesis of ISO's definition of usability (Effectiveness, Efficiency, Satisfaction), Löwgren's (1993) REAL (Relevance, Efficiency, Attitude, Learnability) and Shackel's (1990) LEAF (Learnability, Effectiveness, Attitude, Flexibility) was used. The reason for not choosing only one model was that Faulkner made it clear that there is no single complete definition of usability. Usability must first be generally defined, which scholars still have not managed, so that one can pick a definition that suits the particular product (Faulkner, 2000). The chosen subset, which can be found in table 2.4, is based on the set of the above mentioned definitions where they represent a more objective or general definition of the term.

Attitude	Within acceptable levels of human cost in terms of tiredness, discomfort, frustration and personal effort. Satisfaction should be enhanced by the use of the system. Shackel.
Learnability	How easy the system is to learn initially and how well the users remember the skills over time. Shackel, Löwgren.
Effectiveness	Merely means that an intended task can be accomplished. ISO.
Efficiency	If a task can be accomplished in five minutes with one system, and ten with another, then the first system is the most efficient. ISO, Löwgren.

Table 2.4: Definition of the terms used to define usability for this project, or ALEE for fun.

2.5 Sociability

Usability alone does not provide enough direction when it comes to designing virtual meeting places, because they are not like most other software products whose mere purpose it is to facilitate the completion of certain tasks. They merely exist, i.e. to the user, to support purely social CMC and so it is necessary to understand how people interact with each other on the internet.

This is where the relatively new concept of sociability comes in. To explain sociability one can describe its role as that of letting the users *communicate* smoothly and efficiently with *each other*, whereas that of usability is to let the users *work* smoothly and efficiently with a *computer interface* (Schröder 2002, my emphasis). Preece (2000) makes the following case for sociability:

“Developers have much less control over social interaction than over usability, but planning good sociability support for the early life of an online community can have a strong, positive impact on how it develops. Terms like social design conjure Orwellian images of social control, so sociability support is used instead. It is unrealistic to assume that communities will always be able to sort out their own social policies. Yes, some do, but many others fail because the developers assumed that their job ended when the software was implemented. Carefully developed minimalist social policies can encourage the evolution of good sociability.”

Moreover, sociability is not only more indistinct than usability, it also spans the entire lifetime of the application and not only the development phase. Schröder summarizes the purpose of sociability in the following way:

“The purpose of sociability is twofold: One, it provides a set of guidelines for the designers and developers of a community so they can create a product that stimulates social functions as good as possible; and two, it provides a set of guidelines for the administrators so they can govern a community the best way they can and further stimulate the social activity within it.”

There are not yet any processes to follow when it comes to trying to ensure sociability, there are merely guidelines. An explanation of the sociability guidelines, as well as the usability guidelines, held in mind during this project follows in the next section.

2.6 Guidelines

Generally, usability guidelines for the web have been intended for static web publications and not dynamic web applications. In addition to this, it is necessary to consider sociability for a primarily social CMC application. A synthesis of usability guidelines for ordinary software applications and usability guidelines for the web, as well as sociability guidelines have to form the guidelines for a virtual meeting place, such as a virtual city.

The guidelines used in this project are a selection of the ones assembled by Schröder in his Master Thesis *Virtual Community Guidelines* (Schröder, 2002), which includes a synthesis of these guideline types. Schröder has based the guidelines on for example Schneiderman, Tognazzini, Nielsen, Preece and Godwin, who were all directly consulted as well. The ones that seemed fit for this project were selected. Some of them were modified or exemplified further.

But, as Schröder puts it, the problem with heuristic guidelines is that they are all subjective, fuzzy and contradictory and the product of the person who created them. Many of the guidelines in a set oppose one another, making it impossible to use all rules at once. The way you should use guidelines is by finding a good balance that suits the particular product and see them as advice, not rules.

Most guidelines held in mind when developing the design can be found in appendix A. It will not be explained why these particular guidelines have been chosen, the interested is left with a reference to the aforementioned thesis.

3 Design Process Approaches

This chapter gives a brief overview of the different design process approaches employed during the project, and why they were chosen.

The general design process used in this project was primarily Usability Engineering (figure 3.1). It was chosen principally because it is well suited when the end-user group is diffuse and large (CM, 2002).

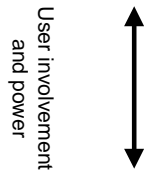


Figure 3.1: Approaches to usability oriented design

The reason for not using any of the methods where the user involvement is higher was the same; that the end-user group was diffuse and large. It is also doubtful if the end-users could have provided that much more valuable input compared to what they now did relative to the resources that would have been needed.

The reason for not using theory-based design was that the method is not very usability oriented. It is based solely on guidelines and is far too general to be of any practical value. The method can be considered obsolete.

Prototypes were built iteratively in a lo-fi, i.e. paper, fashion since it is a method that is very cheap, fast and focuses on the right things (e.g. Lindarto, 1994). The disadvantages of hi-fi, i.e. software, prototyping should also be common knowledge judging by the way it is described by all sources consulted. Figure 3.2 illustrates the iterative nature of the prototyping process used (CM, 2002).

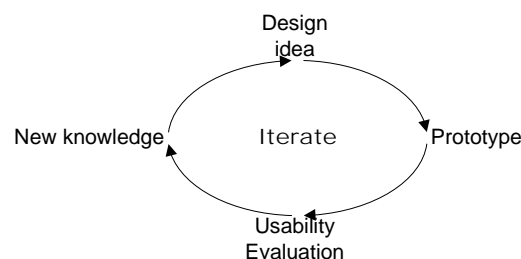


Figure 3.2: The prototyping process

A good design process is characterized by the alteration between sequential and structural thinking (Beyer & Holtzblatt, 1998). The design process used in this project was custom-assembled and is illustrated in figure 3.3.

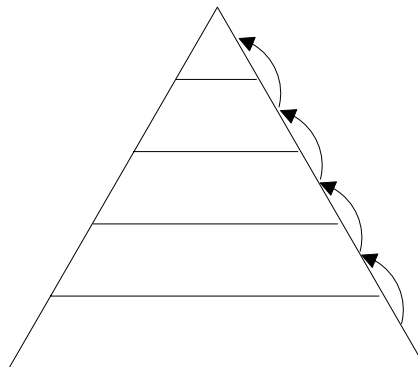


Figure 3.3: The design process

For the requirements gathering a scaled down version of the use of storyboards was adopted. Storyboarding is a method of representing screen designs in the form of screenshots with indications as to how the user will proceed through the system (Faulkner, 2000). The storyboards can be used to build a User Environment Design (Beyer & Holtzblatt, 1998). A full UED as defined by Beyer & Holtzblatt was deemed unnecessary; the method is mainly used in contextual design.

4 Method

The different activities performed in order to reach the purpose of the project are presented in this chapter. It begins with a brief overview of how the project was planned.

The project was divided into phases identified and laid out in time in figure 4.1; in the project plan it was defined what to do during these phases. The activities actually performed are described in the following sub-chapters. The diamonds represent baseline dates for the reports mentioned in section 1.2.1. The project plan also included a risk management plan, which can be found in appendix G, to try to identify things that could jeopardize the project and specify what to do if they were to occur.

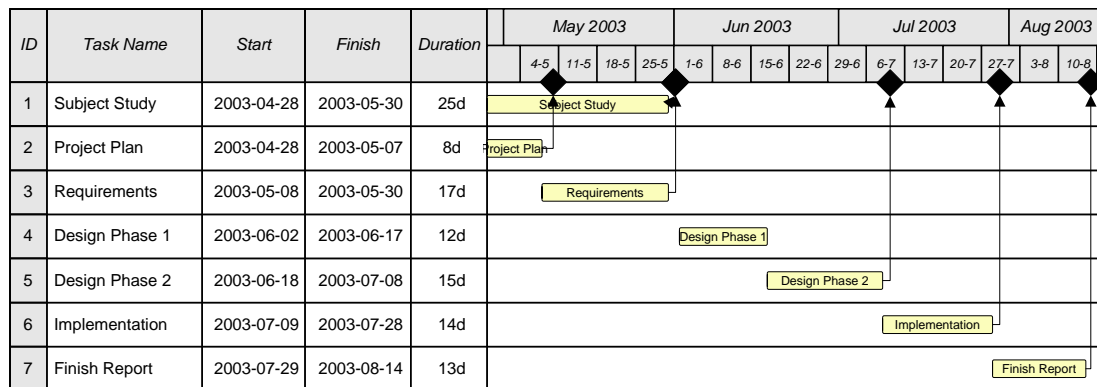


Figure 4.1: The second and final Gantt chart identifying phases and deadlines.

In the original Gantt chart many of the usability related activities had not been taken in mind, which was noted two weeks after baselining the project plan. Another three weeks were then allocated to the project.

4.1 Literature Study

4.1.1 Reading and learning

To get to grips with the whole usability concept, what a community is, making elegant and simple designs, learning what can be done in HTML etc. a lot of reading was done.

The initial theoretical base on what community is relies heavily on Pargman's (2000) Ph.D. thesis *Code begets community*, Preece's (2000) *Online Communities: Designing Usability, Supporting Sociability* as well as the

Master thesis *Virtual Community Design Guidelines* by Schröder (2002) – from which most design guidelines also have been taken.

The books that made the biggest impression on me when it came to work-domain specific knowledge, i.e. usability engineering and the processes involved, were primarily *Usability Engineering* by Faulkner (2000) and to a lesser extent *Contextual Design* by Beyer & Holtzblatt (1998). The books *Designing Visual Interfaces* by Mullet & Sano (1995) and *The Design of Everyday Things* by Norman (1999) were used to become more aware of what constitutes good design and how to design an interface. Most of the material made available to the students who take the Human Computer Interaction course (CM, 2002) at LTH Campus Helsingborg also came to use at different times during the project.

The book *Mastering HTML 4* (Ray & Ray, 1999) was used to learn what can be done in HTML. Digital imaging was learned by watching the videos on an Adobe Photoshop 7 CD-ROM tutoring kit.

There was no need for a very rigorous and extensive project plan since the project mainly was a one-man job. Inspiration was drawn mainly from *LC Powers project planning tutorial* (Lcpowers.com) but also from the somewhat heavy book *Managing High-Technology Programs and Projects* (Archibald, 1998).

4.1.2 Article and literature Search

A search for relevant studies and articles concerning the work-domain was conducted by searching for “community”, “communities”, “web” and “lunarstorm” in different combinations in Lund’s own dissertation database, ELIN, Libris, Lovisa, and promising databases in DoD (Database over Databases). Thereafter a search with the same terms was conducted on a couple of individual universities and institutes.

A general search for information on the subject available on the web was also conducted using google (www.google.com). On top of that Lunarstorm itself was a source of information, in the statistics and other information they publish about themselves, but also by using the community and seeing how things work.

4.2 User Analysis

It is essential in usability engineering that you know the user (Faulkner, 2000). Although the search for information while looking for relevant articles and literature gave some results (see section 5.1) it was not considered to be enough. Therefore the needs, opinions and wishes of the future users of the community had to be learned by conducting an own investigation. Three areas where more information would be useful were identified:

- Who are the users? (Essential)
- What functions/features are most frequently used? (Relevance)
- What do the community users think, like or dislike? (Attitude)

Data for the user analysis was gathered by means of a computer-administered questionnaire that included both open and closed questions. A class in the second grade of the Swedish gymnasium as well as a first grade class at Lund Institute of Technology was to answer the questionnaire, to get an age dimension into the findings and thereby facilitating the question of who the users are.

4.2.1 Conducting the survey

A free service on the web (www.createsurvey.com) was used for administering the questionnaire, which can be found in appendix B. To make the intended sample able to answer the questions as freely and as accurately as possible it was written in Swedish.

The number of respondents was too low after having asked one class of first year students at Lund Institute of Technology to fill out the questionnaire to say very much. Therefore another first year class was asked to fill it out.

To reach a second grade class at a Swedish gymnasium a teacher was contacted who would let such a class fill out the questionnaire in a computer room. A date was set but on that very day Kommunal – the largest labour union in Scandinavia – went on strike, for some reason resulting in no school for the pupils. Since it was late in the semester the whole thing unfortunately had to be called off.

Luckily it turned out that Redburst had contact with 52 people, 27 girls and 25 boys, representing the end-users. A plea was sent to these people to fill out the form.

4.2.2 Ethical considerations

Everyone asked to fill out the questionnaire was informed of its purpose as well as told they would be completely anonymous.

4.2.3 Analysis method

When analysing the results standard deviation, sd , standard error of mean, se , and the true population mean, \bar{x}_p , with a confidence level of 95%, have been calculated using the following formulae:

$$sd = \sqrt{\frac{n \cdot \sum x^2 - (\sum x)^2}{n(n-1)}}, \quad se = \frac{sd}{\sqrt{n}}, \quad \bar{x}_p = \bar{x}_s \pm 1.96 \cdot se$$

A confidence level of 95% means that the population mean will lie within the limits of the confidence interval with a probability of 95%.

The formula for calculating the standard error of the differences of means, used to see if there is a statistically significant difference in populations, is

$se_{diff} = \sqrt{se_1^2 + se_2^2}$. The significance level 0.01 has been chosen, thus the differences in means must be greater than $2.58 \cdot se_{diff}$.

4.2.4 Note on the Questionnaire

The ambition of the questionnaire was never to be fully scientific; it would have blown the time-frame and would have been overly ambitious for this project. The ambition was simply to give an idea of what the missing information could be. Nonetheless it became tempting to use the data for statistical analysis, for which it was not designed.

4.3 Requirements Elicitation

The requirements specification contained the requirements, both functional and non-functional, for the design of the virtual city. What functions to include was based on the information gathered prior to and during the user analysis, but also on Redburst's ideas of what the community should be like. The greater part of the requirements specification was established by identifying the various parts of the system and their issues and constraints using storyboards (figure 4.2). The requirements were subsequently subject to constant reviews and refinements.

During the requirements elicitation phase Redburst decided that the meeting place was to be released in Poland after all. According to Redburst this did not have to be paid much attention. It did however affect many non-functional requirements such as i) the file-size of the images and overall graphical bandwidth weight since most users in Poland still use modems, ii) the possibilities to use newer features in HTML 4.01 and CSS2 as most users in Poland still use Windows 98 and Internet Explorer 4 and iii) the screen resolution for which to design as most users in Poland still use the screen resolution 800*600 pixels. Cultural issues were not considered as Redburst found it unnecessary.

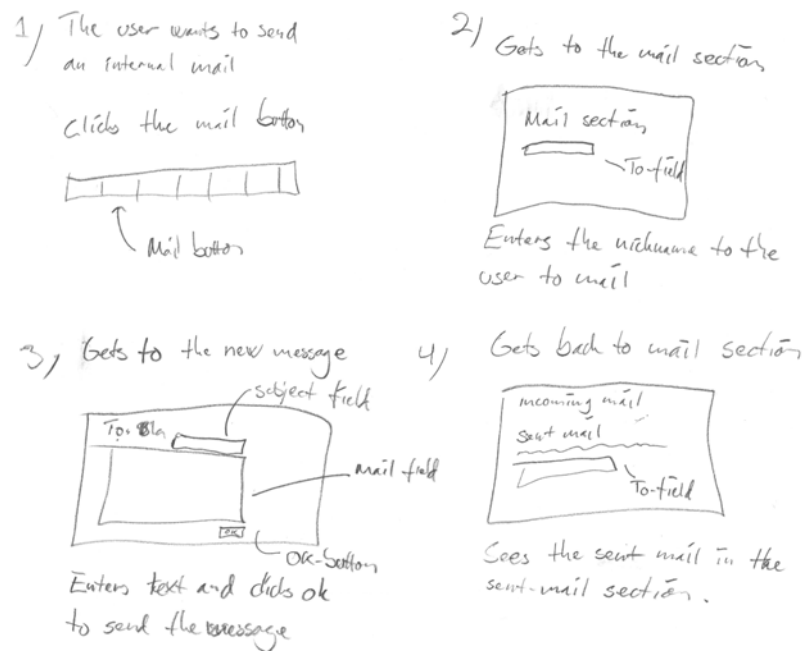


Figure 4.2: The storyboard for sending a mail.

4.4 Paper Prototypes

The prototyping phase had been divided in two, the first paper prototype was made to get an overview of the system and make sure the basic structure of the community, decided upon in the requirements specification, was all right. The second paper prototype was merely a refinement based on the findings from the evaluation of the first one, but also a bit more detailed since it was to be used in a usability inspection involving end-users. The methods for evaluating

the prototypes are described in the next section, 4.5 “Usability Evaluations”. This section concentrates on the method for developing the prototypes.

4.4.1 Development, first prototype

The first paper prototype was developed using Microsoft Visio, where the basic layout was drawn. Visio was also used to produce buttons, widgets and the basic elements of the interface. The more detailed aspects of the interface were then drawn on these basic elements by hand. The greater part of the system was drawn to see if the structure was all right and would work.

4.4.2 Development, second prototype

The findings from the evaluation of the first paper prototype were pretty sparse, therefore not much further development was needed. A new basic layout, without the personal menu, was drawn in Visio and new basic window elements, where the scrollbar is on the very right, were also drawn.

As with the first prototype most of the system was modelled in the second, but this time because it was supposed to be tested on test subjects.

4.5 Usability Evaluations

There were two usability evaluations. The first one – a formative and analytical evaluation – was in the shape of a cognitive walkthrough (Faulkner, 2000:183). The second – a summative and empirical evaluation – was in the form of a usability inspection with planned outcome levels by which the gathered metrics were compared (ibid.).

4.5.1 Evaluation, first prototype

The first paper prototype evaluation was carried out by the student and the supervisor at IKDC in Lund. The scenarios used can be found in appendix C.1. In short, the tasks to be performed were to i) create a relation, ii) send an internal mail, iii) search for a member and iv) answer a contribution made to the own guest book.

4.5.2 Evaluation, second prototype

The second paper prototype was evaluated based on a usability specification that had been developed at the same time as the requirements specification.

In order to evaluate the usability, the term usability was broken down into measurable attributes (ALEE, see section 2.4 or the end of this section); each measurable attribute was given an objective indicator. Information about each was obtained by observing 4 subjects from the target end-user group performing selected tasks on the second prototype, then interviewing them. The scenarios for the usability evaluation can be found in appendix C.2; the observation forms and instructions for the observers can be found in appendix C.3. In short, the tasks were to i) create a relation to another user, ii) send private mail to another user and iii) post a reply to a contribution made to the own guest book.

The metrics with the planned outcome levels – that were simply reasoned out – along with the actual observed metrics can be found in the Results chapter. The usability test was performed by me acting as computer and instructor, with the aid of a friend who took all the notes. The test subjects – of whom none had been involved in paper prototype testing but two had experience of communities whereas two had not – were all chosen from the software engineering programme at LTH Campus Helsingborg.

As customary when performing a user study the test subjects were all informed of the purpose of the test, that they would be anonymous and that the test was voluntary. After having gone through all scenarios each test subject was given a little reward as a sign of appreciation for their time and participation.

The following are the metrics based on ALEE used in the usability evaluation of the second paper prototype.

- Attitude
 - Satisfaction level: Number of users who would use the system again.
 - User tiredness level: Number of users fatigued by the system.
- Learnability
 - The time required to learn the system.
 - Ratio of completed/uncompleted tasks (out of the core tasks, e.g. guest book, mail etc.)
 - Help request level: Number of times help is requested.
- Effectiveness

- The success to failure ratio in completing a task.
- Efficiency
 - The time required to perform selected tasks.
 - The number of actions required in order to perform a task.
 - The time spent dealing with error.

In order to measure the last attribute of the efficiency metric, error was defined in the following way:

“Error will be taken as a generic term to encompass all those occasions in which a planned sequence of mental or physical activities fails to achieve its intended outcome, and when these failures cannot be attributed to the intervention of some chance agency.”

– James Reason, as quoted by Faulkner (Faulkner, 2000:125).

4.6 Implementation

No specific process was used when implementing, or coding and designing, the site. The site was coded entirely in a text editor in order to stay in control, know what is being done to the code and being able to fine-tune and tweak the code down to the last settable variable and attribute. No graphical HTML editor was used except to check that the code was compliant with the target browser Internet Explorer 4.

The graphics were all drawn in either Adobe Photoshop or Jasc Paint Shop Pro and saved in the respective application’s original format to preserve the layers and accommodate future updates of the graphics, then exported for use on the web.

For the reason that the virtual city is going to be released as a commercial product it can not be described in this thesis why certain decisions – based on the information that had previously been gathered – were taken as this would reveal too much about what the virtual meeting place will be like. This section will consequently not be very thorough. The theory in chapter two, the guidelines from appendix A and the results from the article and literature search along with the findings from the user analysis were however all influential. More “guidelines” – or really just reflections from studying design books and course material – have been held more latently in mind.

It was important to get the basic site structure right at an early stage. Having to make alterations later on would have been very time-consuming. Which parts for instance, if any, should be in their own inline frames? Should there be any ordinary frames? Since it should be possible to change the look of it as much visual formatting as possible was defined in style sheets. The community was to be designed for a screen resolution of 800*600 pixels, therefore the width was set to 760 pixels to make sure it would fit on screen. As the basic site structure was in place, the layout was the next thing to work out. A boxed two-column layout was chosen, with the ability to stack boxes vertically. How to implement this in the code was sketched on paper. When the layout was in order the HTML file was saved as a template after which the pages on the site were built. New CSS style rules were introduced as necessary.

5 Results

The results of the activities described in the previous chapter are presented here. The results of an activity were used in subsequent activities. Results that may be of general interest are mainly to be found in sections 5.1, 5.2 and possibly 5.5.

5.1 Article and Literature Search

This is what was found on Lunarstorm-like meeting places:

- A study (Henningsson & Möller, 2002) points out that i) keeping in touch with friends, also the ones they meet outside of the community, and ii) making new friends are the primary reasons for using Lunarstorm.
- Lunarstorm's target user group are pupils at the Swedish gymnasium, of whom $\frac{3}{4}$ were registered users of Lunarstorm as of 2001, and upwards in age. (Nilsson, 2001)
- Out of all Lunarstorm users, 40% were older than 24 years of age as of 2001. Source (ibid.), quoting Rickard Ericsson, main editor at and founder of Lunarstorm.
- In November 2001, Lunarstorm had 681,000 unique visitors (ibid.).
- Of pupils studying at the Swedish gymnasium level, 90% are registered users of Lunarstorm as of 2003. Source Andersson & Grundström, quoting a statement made by Rickard Ericsson in Sundsvalls Tidning 2003-02-13.
- A vast majority of the population in one study logged in to Lunarstorm several times a day. (Andersson & Grundström, 2003)
- Most users spend about 30 minutes online at every log in, boys tend to be logged in longer than girls (ibid.).
- Strengthening the results of the study by Henningsson & Möller, the study by Andersson & Grundström also finds that the primary reasons for using Lunarstorm is to i) meet friends, ii) meet new friends, but also iii) to discuss, which falls not far behind reason number 2. In fact, girls would rather have the order of reasons number 2 and 3 switched. Other reasons for using Lunarstorm are practically ruled out.

To conclude, the main results are information on who the users of Lunarstorm are and why they frequent the virtual city. The general user of Lunarstorm logs in regularly and often and is probably a pupil at the secondary education level. The main reasons for visiting are i) to meet friends, ii) to meet new friends and iii) to discuss.

5.1.1 Information already gathered by Redburst

In August 2002 a competing virtual city, *www.epuls.pl*, was launched in Poland. It had 23,000 registered users as of late May 2003. This meant that the Polish market was not uncharted territory, which was spurring to do a better job.

Redburst had also gathered some information on the web users in Poland, which would limit the design options. Web users in Poland (according to Redburst) have the following computer setup as of early 2003:

- 60% have a screen resolution of 800x600 pixels
- the majority still uses Windows 98
- Internet Explorer is the browser of choice for 90% of the users.

5.2 User Analysis

The results from the questionnaire are presented in this section. It has been divided into two parts; first a presentation of the main findings and then a summary of conclusions. The isolated findings from the student sample and the Redburst end-user sample have been confined to appendix D.1 and D.2 respectively so as to focus on the overall findings here. In the just mentioned appendices you will also find the underlying numbers and how the weights were assigned.

Out of all approximately 80 students asked to fill out the questionnaire, 13 did. Three of these use Lunarstorm. The average age out of all respondents in the student group was 23.4 years. Out of the ones who stated they use Lunarstorm the average age was 22. Redburst's end-user group consisted of 52 people living in Sweden, but most of them with a Polish background, who were all asked to fill out the questionnaire. 10 people did, 9 of them used Lunarstorm. The average age out of all respondents in Redburst's end-user group was 17 years. Out of the ones who stated they use Lunarstorm the average age was 16.2 years.

The numbers presented below refer only to the ones who stated they use Lunarstorm. For the raw data from which more conclusions can be drawn, see appendix D.3.

5.2.1 Main findings

As can be seen in table 5.1 there are slight differences in the findings from the two groups when it comes to the *popularity* of the features. Most of it can probably be attributed to the small sample sizes, especially when it comes to the students. Nevertheless the top three features are the same for both groups, namely the guest book followed by private mail and the diary. In a prejudice mind one could suspect that the chat function would be more popular the younger the user. The numbers in table 5.1 contradict that theory and place the chat function at the bottom of the list for the younger users, but second last for the older students. It is not possible to calculate the significance of the difference with absolute accuracy because the dispersion and size differ between the samples (Rowntree, 1981). If one would do so anyway, one would come to the conclusion that the differences in rating of the guest book and message board signify different populations at the 1% level.

COMPARING THE POPULARITY RATINGS OF THE FEATURES				
	Students (n=3)		Redburst's end-user group (n=9)	
Guest book	1	3.33 ±0.65	1	4.56 ±0.66
Private mail	2	3.00 ±1.13	2	2.67 ±0.57
Message board	6	1.00 ±0.00	4	2.22 ±0.85
Discussion forum	4	1.67 ±0.65	5	1.89 ±0.69
Chat	5	1.33 ±0.65	6	1.22 ±0.29
Diary	3	2.00 ±0.00	3	2.33 ±0.73

Table 5.1: Weighed feature popularity rating comparing both samples.

When combining the rankings as has been done in table 5.2, the guest book tops the popularity ranking and does so by far. It is in fact the only feature where the rating interval does not overlap with that of another feature. Nilsson also found in his study (Nilsson, 2001) that the guest book was the primary means of communication at Lunarstorm, which supports these findings. The ability to send private mail is also popular, which makes sense since every other mean of communication is public. The popularity of the diary, the message board and the discussion forum are pretty much the same, with the diary being the only one not overlapping with the chat function, which comes

in last with an almost non-overlapping margin. The numbers in table 5.2 are visualized in figure 5.1. Based on these findings functions that should be included are i) a guest book, ii) a private mail function and iii) a diary. A chat function is not very valuable, nor a discussion forum. A message board comes somewhere in between.

RATING OF THE POPULARITY OF FEATURES, TOTAL (N=12)						
	Guest book (1)	Private mail (2)	Message board (4)	Discussion forum (5)	Chat (6)	Diary (3)
mean	4.25	2.75	1.92	1.83	1.25	2.25
conf. int. 95%	±0.60	±0.49	±0.70	±0.53	±0.26	±0.55
sd	1.06	0.87	1.24	0.94	0.45	0.97
se	0.30	0.25	0.36	0.27	0.13	0.28

Table 5.2: Weighed ratings of the popularity of features, both samples combined.

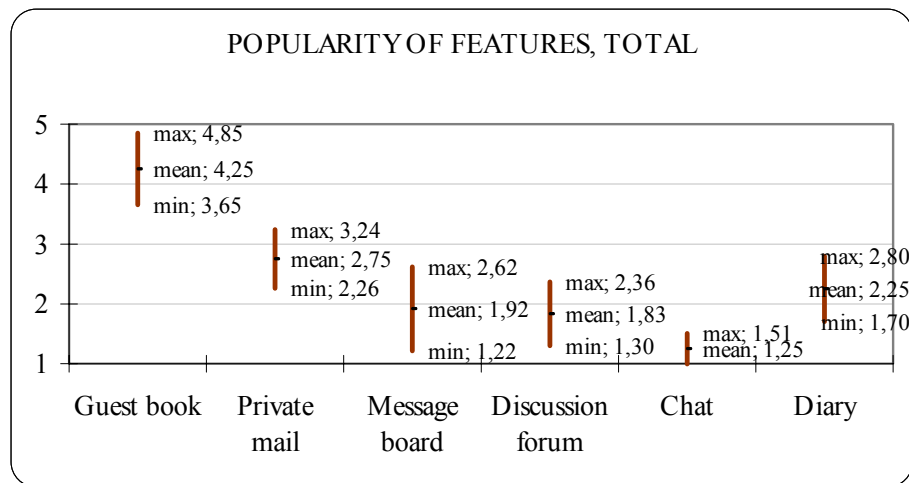


Figure 5.1: Weighed ratings of the popularity of features visualized graphically, both samples combined.

It can be seen in figure 5.1 that as n grows, even by such a small number as three (adding the student sample to the redburst sample), the accuracy of the prediction increases. The confidence intervals shrink and are now as good as within the natural limits of $1 \leq \theta \leq 5$.

COMPARING THE FUNCTIONALITY RATINGS OF SELECTED FEATURES				
	Students (n=3)		Redburst's end-user group (n=9)	
Guest book	2	3.89 ±1.09	1	3.44 ±0.94
Private mail	1	4.44 ±1.09	2	2.89 ±0.59
Message board	3	1.00 ±0.00	3	1.67 ±0.64

Table 5.3: Weighed feature functionality rating comparing both samples.

As can be seen in table 5.3 there is a greater variance – not statistically speaking – in the answers regarding the *functionality* of the features. Redburst's end-user group rates the functionality of the guest book highest, while the students do the same for the mail feature. Again, the small and differing sample sizes prevent statistical significance to be calculated. In this rating only three functions were included; Redburst had already decided the virtual meeting place should contain them.

The ratings based on both samples combined (table 5.4, illustrated in figure 5.2) put the mail feature at second place though, but the rating of the guest book is almost the same. It is fairly safe to say that most users are not very impressed by how the message board works. The actual ranking is however not as important for the *functionality* of the features as it was for the *popularity* of them. The purpose of these questions was to get to know if any of the three features should be constructed in a very different way from that on Lunarstorm. The ratings of the guest book and the mail feature are both positive, however the message board should be reconstructed based on these findings.

RATING OF THE FUNCTIONALITY OF SELECTED FEATURES, TOTAL			
	Guest book (1)	Private mail (2)	Message board (3)
mean	3.56	3.28	1.50
conf. interval 95%	±0.74	±0.63	±0.51
<i>sd</i>	1.31	1.12	0.89
<i>se</i>	0.38	0.32	0.26

Table 5.4: Weighed ratings of the functionality of features, both samples combined.

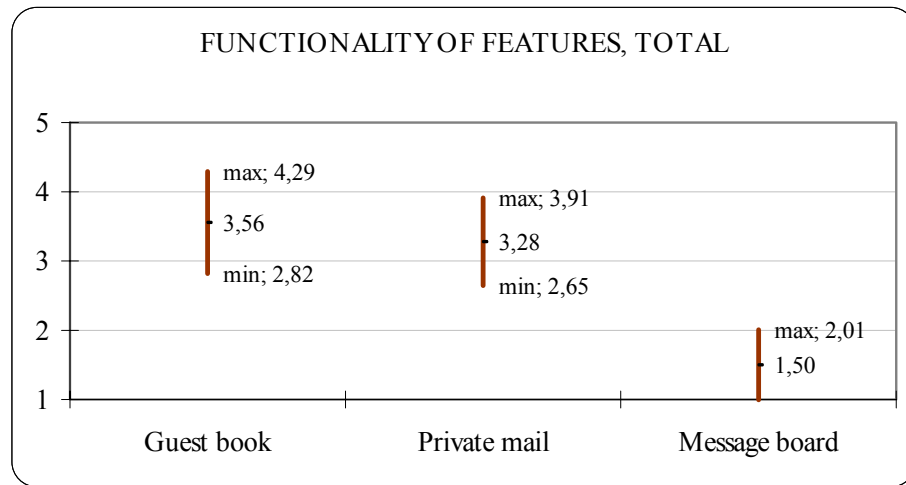


Figure 5.2: Weighed ratings of the functionality of features visualized graphically, both samples combined.

In the remainder no inferences are made from the sample to the population, it is merely descriptive statistics.

Most users have been registered at Lunarstorm for more than 3 years (figure 5.3). This is interesting since Lunarstorm, as stated in section 2.2 “History of Virtual Meeting Places”, was released in January 2000 and the questionnaire was distributed in May 2003. The community was called Stajl Plejs beforehand, and was originally released in 1996. Either the users claiming to have used Lunarstorm for more than 3 years have registered during the first 5 months of the community or were already registered at Stajl Plejs.

Another interesting finding, as can be seen in figure 5.3, is that out of the respondents from Redburst’s end-user group, with an average age of only 16 years, more than $\frac{2}{3}$ report to have used Lunarstorm for more than 3 years. This means they were only approximately 13 years old or younger when registering. This finding is merely suggested by this study, but would of course need further research due to the small number of respondents.

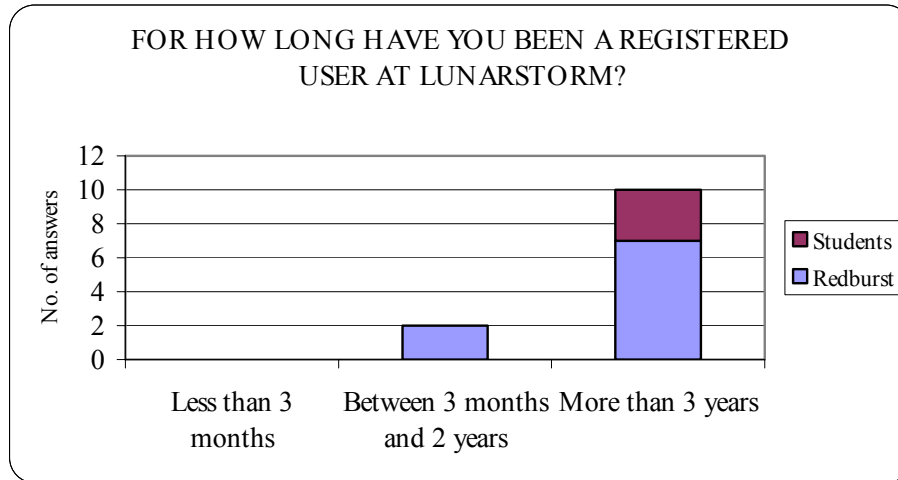


Figure 5.3: Time registered at Lunarstorm, both samples presented.

Out of 12 respondents, 10 claim to log in as good as every day and the remaining 2 claim to log in 1-3 times a week (figure 5.4). This suggests that only, or mainly, hard core lunarstormers cared to respond to the questionnaire. Another plausible explanation is that you have to log in this often to maintain a community spirit.

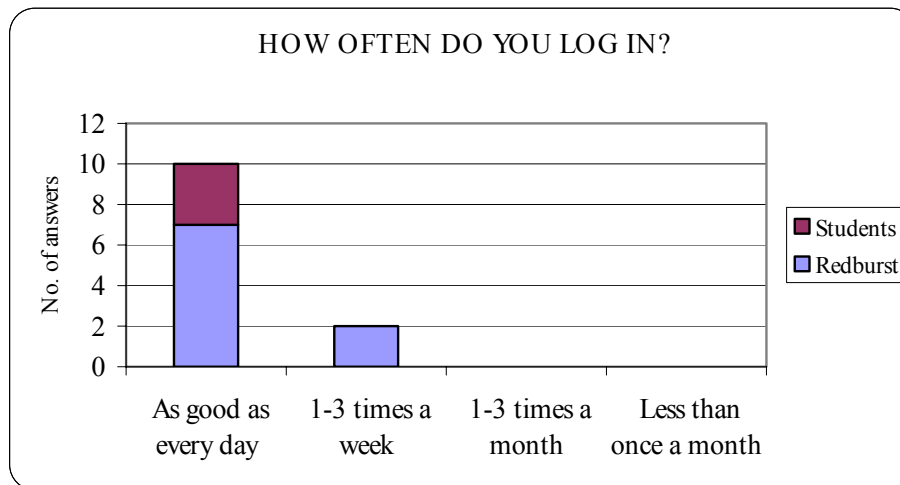


Figure 5.4: Log in frequency, both samples.

When it comes to how long a typical community visit lasts there is a greater spread (figure 5.5). Even though the spread is greater than in the other answers 75% are logged in between 10 minutes and 1 hour per visit, with a slight majority for the ones logged in no more than half an hour. This is in accordance with Lunarstorm’s statistics reporting that the average duration of a community visit lasts for 20 minutes (table 2.3).

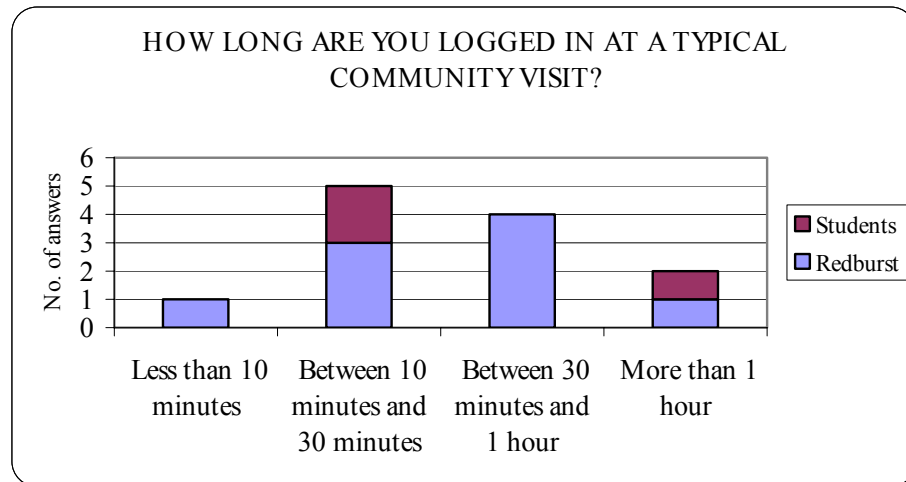


Figure 5.5: Typical log in duration, both samples.

5.2.2 Conclusions from the questionnaire

Conclusions that may be drawn from the gathered data – sorted after the top-questions that were to be answered by the survey – include:

Who the user is (descriptive)

- In this study, the younger the respondent the more likely it is he/she uses Lunarstorm.
- In this study, engineering students generally seem quite uninterested in using Lunarstorm.
- In this study, most users of Lunarstorm have been members for a long time (more than 3 years).
- In this study, most users were very young when registering.

Relevance (inferences)

- The guest book is by far the most popular feature, followed by private mail, which in turn has a pretty good lead over the diary. That the diary is popular enough to get the bronze medal is supported by Nilsson's findings (Nilsson, 2001).
- The chat feature is not very popular at all in any age group.

Attitude (descriptive)

- In this study, that Lunarstorm is slow tops the bad list with 7 out of 12 respondents saying so (open question).
- In this study, that you get to learn a lot of people tops the good list with 4 out of 12 respondents (open question).

- In this study, that you have to pay for some services bothers some respondents (open question).
- In this study, the respondents are generally quite pleased with the way the guest book and the mail feature works, but not so pleased with how the message board works.

Basic functionality that based on this user analysis should be included in the requirements specification are i) a guest book, ii) a private mail function and iii) a diary. Neither a chat function nor a discussion forum should be included. A message board can be included.

The ratings of the functionality signal that the guest book and the mail feature are well constructed, however the message board should be constructed in a different way.

5.3 Requirements Elicitation

Because the site is to be released as a commercial product it is not possible to list the requirements in this thesis. The table of contents of the requirements specification can however be found in appendix E to give an idea of the structure.

The requirements were all in the form of shall-requirements and numbered with a unique identifier for every such requirement. They were a good foundation for the paper prototypes and for the implementation in HTML code.

5.4 Paper Prototypes

There were two paper prototypes, the look of both can be found in appendix F. Most of the system was modelled in both prototypes but for different reasons. They were primarily used for usability evaluations as can be seen in section 5.55.

It was also valuable having as good as the entire system modelled as it made it very easy to implement it in HTML; you could (approximately) see how the components were to be placed.

5.5 Usability Evaluations

5.5.1 Evaluation of the first paper prototype

The evaluation of the first paper prototype was, as mentioned in the previous chapter, of formative nature and conducted by means of a cognitive walkthrough by the student and the supervisor in Lund. The following were the results of it:

- The personal menu should be abandoned in favour of a more simple and intuitive approach, as discovered during the evaluation and incorporated in the second prototype.
- The scrollbar should be on the very right, not divide the contents frame.
- It was proposed that it should be possible to follow the answer of a contribution to a guest book. After checking with Redburst this was deemed unnecessary and so not incorporated in the second prototype.

5.5.2 Evaluation of the second paper prototype

The purpose of the second evaluation was different from that of the first, it was to see that the system would be usable whereas the purpose of the first evaluation was to see that the structure was all right. The results from the second evaluation along with the planned outcome levels can be found in table 5.5.

METRIC	ATTRIBUTE MEASURED	OBJECTIVE INDICATOR	SOURCE	PLANNED LEVEL ¹	OUTCOME LEVEL ²
ATTITUDE	Satisfaction level	Number of users who would use the system again	Interview	50%	75%
	User tiredness level	Number of users fatigued by the system	Interview	25%	0%
LEARNABILITY	Initial learning time	The time required to learn the system	Ask subject to state when the subject feels it has an overview of the system	2 minutes	2:01 min
	Help request level	Number of times help is requested	Observation	Relation: 1 Mail: 0.5 GB: 0	Relation: 0.25 Mail: 0 GB: 0
	Understandability	Ratio of completed / uncompleted tasks out of the core tasks	Observation	Relation: 3/1 Mail: 3/1 GB: 3/1	Relation: 4/0 Mail: 4/0 GB: 4/0
EFFECTIVENESS	Conformance level	The success to failure ratio in completing a scenario	Observation	75%	100%
EFFICIENCY	Efficiency of different functions	The time required to perform selected scenarios	Observation	Relation: 3 min Mail: 2 min GB: 1 min	Relation: 1:51 min Mail: 0:49 min GB: 1:11 min
	Structural efficiency of community	The number of actions required in order to perform a scenario	Observation	Relation: 6 Mail: 6 GB: 5	Relation: 5.5 Mail: 6 GB: 4
	Intuitiveness of community structure	The time spent dealing with error	Observation	Relation: 1:30 min Mail: 1 min GB: 0:30 min	Relation: 0:25 min Mail: 0 min GB: 0 min

Table 5.5: Results of the second and final usability evaluation.

¹ The level stated is planned level per subject

² The level stated is the average level of all four subjects

The planned outcome level represented the lowest acceptable level. More detailed information on the test results and how the average was calculated can be found in Appendix C.4.

5.6 Implementation

The coding and designing resulted in a complete static HTML model of the virtual city after which the dynamic site will be built.

As stated in section 4.6 the final product can not be described in too much detail. It can also not be illustrated too heavily, but sneak previews of the developed model can be found in figures 5.6 and 5.7 depicting, respectively, what it looks like when visiting some other member of the virtual city and when looking at the own relations page. In the figures you can for example see an action pane and below it an information pane who both are present in most of the site for consistency, anticipation and proactive assistance. There are also the relatively large main menu buttons with regard to Fitt's law. You can also see the high contrast between text and background, colour-blind friendly online status, the striving for simplicity in the simple visual scheme as well as the non-aggressive animations in the top-left.



Figure 5.6: Sneak preview when visiting someone else's member page.

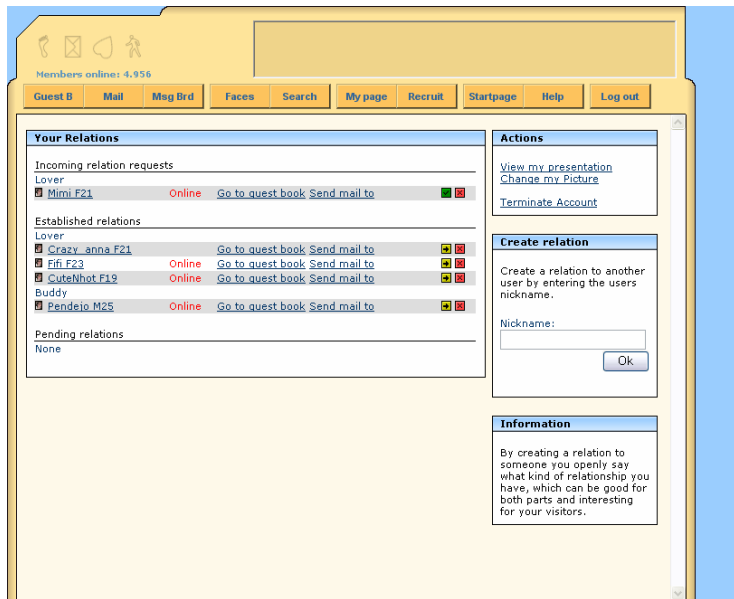


Figure 5.7: Sneak preview of the relations page.

6 Discussion

The purpose of the project as stated in the introduction was in short to create a Lunarstorm-inspired web community, or *virtual city* using the developed terminology. In this chapter the methods, results and the final product are discussed and criticized. Some ideas and recommendations for future work are identified in the process.

6.1 Literature Study

The underlying theory relies heavily on one or two sources per field. That they are influenced by a lot of other people and the fact that the purpose of this thesis was not to define community, sociability or develop guidelines justify this. When it comes to work-domain knowledge not very many studies or articles were found. They did however give a pretty good view of why people use Lunarstorm and to some extent who the users are. It is possible that more information exists, but there was also a time-plan to follow.

6.2 User Analysis

As time was perceived to be short and resources limited a quantitative inquiry, a questionnaire, seemed better than a qualitative one. Interviewing people to get enough information seemed to be much too time-consuming, and the questions that remained were considered to be answered better through a questionnaire. This was probably a correct assumption.

There were however limitations to using the free web based questionnaire service. The structure of the survey could not be altered once the questions had been typed in and the form of the questions was also limited to basic text frames, radio buttons, check boxes and list boxes. If the questionnaire to be distributed is nothing but a very simple one, it should be considered to create it entirely oneself. This would however take away some of the advantages of a quick electronic survey – such as it being a very easy method to dispense a survey and you get the answers in an electronic spreadsheet – which should be held in mind.

There was also a lot more to think about when conducting a survey than imagined. The response rate was much lower than expected – about 10 %. The explanation might be that many people will delete anything even resembling spam immediately as soon as it has reached the inbox, something to keep in

mind when distributing a questionnaire electronically. Unfortunately the gymnasium class could not participate. The response rate would probably have been relatively high given that they were to fill out the questionnaire during school time.

The ratings of the functions imply that the scale is linear, which it is not quite. The weight has been assigned afterwards, when analysing the data, so the respondents had no idea of the scales. Also, when quantifying the answers no quantification errors have been taken into account.

When having a smaller sample size than 30 – it was however 12 in this survey – the t-distribution should really be used instead of the normal distribution to reflect the greater risk of error. With such a small sample it is also not possible to accurately estimate the population mean from a sample mean without fear of inducing an error that may cause the prediction to be somewhat off. In addition it is customary to divide by $n-1$ instead of n when calculating the estimate of the population standard distribution, again to reflect the greater inaccuracy. All according to Rowntree (1981).

Regarding the results there are uncertainties as to how reliable the inferred estimations made really are. You can not be 95 percent sure that the ranking order is true for the entire population for reasons mentioned above, plus the intervals overlap. The only thing you can say with much certainty is that the guest book is the most popular feature. On the other hand the purpose of the survey was simply to give an idea of the missing information, which it did. For certainty however, further research with a large enough sample size should be carried out to verify the results from this survey. It can be recommended to make sure one has enough knowledge of both how to construct a questionnaire and how to analyze the data before doing too much.

6.3 Requirements Elicitation

A more structured approach to eliciting the requirements could have been used, for example a full User Environment Design (Beyer & Holtzblatt, 1998) but that would really have been unnecessary for this project. The gathered information, and later the use of storyboards, did give a pretty good overview so the rest of the requirements could be thought up. The iterative process of constant reviews and refinements until the specification was considered good enough to be baselined ensured the document's reliability.

The resulting requirements specification was solid and useful when it came to implementing the site. The value of a good requirements specification revealed itself as the structure was all right and most matters had already been considered when moving on to developing paper prototypes and later on to implement the site in HTML.

6.4 Usability Evaluations

6.4.1 Evaluation of the first prototype

The so called cognitive walkthrough of the first prototype could have been replaced by some other kind of analytical, or expert, evaluation method. Using property checklists (Faulkner, 2000:187), i.e. a list of high-level goals such as consistency, more problems might have been identified. Per se a cognitive walkthrough was fit for the purpose but in order to carry one out you have to have a deep understanding both of the system and of the future end users (ibid:183), something that was not at hand in both evaluating parties at the time.

Yet the formative evaluation was not ineffectual; the structure was seen to be basically all right but it can not be ruled out that more issues could have been discovered. The scenarios, which can be found in Appendix C.1, were not entirely realistic because the purpose was to go through as much of the system as possible and it was to be evaluated by experts not end-users.

6.4.2 Evaluation of the second prototype

As was seen in the results chapter the usability test went a lot better than planned. Only two metrics out of 19 ended up worse than planned. These were the guest book scenario, which took 1 minute and 11 seconds instead of 1 minute, and the time taken before the subject felt it had an overview of the system, which took 2 minutes and 1 second instead of the planned 2 minutes sharp. Worth noting might also be that the 2 errors logged during the test were logged when the subjects were to create a relation, i.e. during scenario #1, but given the fact that the time spent on error was still safely below the planned level it should probably not be given too much thought. Given the much better outcome levels, the planned levels of the test might have been on the pessimistic side. To try to circumvent this in future usability evaluations a

pilot test on an existing virtual city can be performed, thereby gathering the planned outcome levels by which to compare.

By only testing on people from the software engineering programme at LTH Campus Helsingborg – who nevertheless all belong to the end-user group *youth* – the test might have been more biased than if randomly selecting people from the entire spectrum of people that is *youth*, and so a more random mode of selection is recommended in future evaluations if resources are available.

Since, on the other hand, the results of the usability evaluation were so positive it is fairly safe to say that the general structure of the virtual meeting place is quite usable.

6.5 Implementation

It was good to use a text editor when coding as it was possible at all times to control every aspect of the design. It would not have been possible to create the site as it is using a graphical HTML editor. If possible it is also recommended not to use one single digital image application. Doing so would at least in this project have limited the design options.

Even though the book *Mastering HTML 4* (Ray & Ray, 1999) gave a good outlook on what can be done in the language, the actual specifications for HTML 4.01 and CSS 2 published by the World Wide Web Consortium (W3.org) proved more valuable when actually coding the site as they were more in-depth.

The type of language and terminology to use in the virtual city has not been specified. It should really be considered but since the product was to be released in Poland it has been left to Redburst to decide.

For the reason stated in the preceding section on the implementation, the specific decisions taken based on previously gathered information cannot be discussed. One can however say that it was very good to have a solid information base on which to ground design decisions.

6.6 Conclusion

Although some areas have been identified in this chapter – mainly that it should be made sure that there will be a large enough sample size when conducting a survey – that could have been done differently during the course of the project most things have developed nicely. Although the indecisiveness during the project as to what kind of end product was to be developed and where it was to be released made it more difficult to determine the already blurry end-user group and what their wishes are, it did however not seriously affect the project.

The purpose of the project was to implement a web community application that should:

- be Lunarstorm-inspired
- be usable
- provide the option to easily change skins

The site has now been implemented in HTML and the graphics have also been drawn. It is Lunarstorm-inspired and it is possible to change skins simply by replacing CSS-files and graphics folders. Since the final paper prototype was tested against usability criteria – and passed the test – you should be allowed to call it usable. Redburst were also quite happy with the result. Therefore the purpose and objectives of the project can be considered accomplished.

On top of this some new knowledge has been infused in the academic world. The findings from the user analysis is an example of this, although the value of it should be confirmed or refuted through further research. Nonetheless the main finding was the popularity ranking of some selected features where for example the guest book was clearly the most popular with the mail function coming second, the diary third and the chat function last. The functionality rating also revealed that the general structure of the guest book and the mail function is fine, whereas the message board should be constructed differently.

Furthermore, in the theory chapter the new term *virtual meeting place* was defined as a more general term than *virtual community* (small, hobby-driven) and *virtual city* (large, business). The term *virtual community* was first used on the Usenet in 1986, its use was spreading in the early nineties but it did not get popularized before the book *The Virtual Community* by Howard Rheingold was published in 1994.

Even though it lies outside the scope of this thesis, it is hereby pointed out that the launch and marketing of a virtual city is critical for its success. This can be done by for example raising awareness among potential users and creating interest to make people start using it. Ensuring usability and sociability will not alone guarantee success.

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Appendix A: Guidelines

The guidelines used in this project are a selection of the guidelines assembled by Schröder in his Master Thesis *Virtual Community Guidelines* (Schröder, 2002). The ones that seemed fit for the particular instance of virtual meeting place that was to be developed during this project were selected. Some of them were modified or exemplified further. They are not only intended for design but also for managing the site when released.

I have followed the pattern used by Schröder, but leaving the source, as he presents his Final Design Guidelines. That pattern is:

Principle

Guideline

Rule/Example

A.1 Usability guidelines

Consistency

Look and Feel

Always use the same term for each concept to avoid confusion.

Predictability

Do not suddenly change the behaviour of a specific function in the feature, unless there is a strong reason for it. If possible, allow the old behaviour.

Familiarity

Do not use interface widgets in other ways than defined in the Windows UI Standard.
Do the same as everybody else.

Control

User control

Support users' endeavours and never intrude adversely.
Place the user in control and provide proactive assistance.
Put the user in control of the environment, but provide fundamental interaction rules.

Alerts

If something happens which causes the need for immediate user action, the user should
be alerted of the situation to be able to take control.

Browser behaviour

Avoid opening new windows against the will of the users.

Explorable interfaces

Anticipation

Bring to the user all the information and tools needed for each step of the process.

Encouragement

Make sure users understand the interface and how to accomplish tasks.

Visible interfaces

Obviousness

Make icons as easily understandable as possible, but also always include an easily accessible explanation.

Visible navigation

Descriptive headlines.

Reduce short-term memory load

Provide closure.

Simplicity

Keep things simple and elegant.

Safety

Security

Minimise the risk of account intrusion.

Protect user's work

If a user is automatically logged off, make sure none of the user's data is lost.

If inactive member accounts are being purged, make sure users are informed of this and make sure the allowed period of inactivity is reasonable.

If a user deletes him/herself from the system, make sure no data belonging to other users is also deleted.

Error prevention and error handling

Make sure error messages are accurate and informative to help users avoid the error in the future.

Reversibility

All actions where users might accidentally reveal personal information must always be reversible.

All actions where users might affect their member profile must be reversible.

Users must be able to delete themselves and all their content from the service.

Satisfaction

Task satisfaction

Design dialogs to yield closure.

Provide informative feedback.

Efficiency of the user

- Support alternative ways of completing a task.
- Provide shortcuts for experienced users.

Accessibility

Disabilities

- Make sure there is a high contrast between text and background to make it easily readable.
- Do not code text in red or green to signal different states, this feature would then not be accessible to colour-blind people.
- Make sure that auto-generated passwords or activation codes only include characters that are easily distinguishable and easy for the users to enter.

Personalization

- Consider creating several different visual schemes and letting users choose the most appealing and/or appropriate.

Visual Design

Fitt's Law

- The time to acquire a target is a function of the distance to and size of the target.
- Use large objects for important functions (big buttons are faster).

Affinity

- Visual design should support the user model and communicate the function of that model without ambiguities.
- The final result should be an intuitive and familiar representation that is second nature to users.

Graphical Elements

- Users ignore legitimate design elements that look like advertising.
- Animation avoidance makes users ignore areas with blinking or flashing text or other aggressive animations.
- Users close pop-up windows before they have even fully rendered.

A.2 Sociability guidelines

People

Presence

- Make sure that online status is as accurate as possible.
- Make sure it is easy to find other users that are present in the system to increase communication between users.

Member profiles

- Member profiles should reveal how long and since when a user has been a member.
- Users should have complete control over their own member profile and what it

displays.

Member profiles should reveal how active a user is.

If the username cannot be changed, help the users create good member profiles that never become outdated, which is the case if they include age or location in the username, and never reveal too much information about the user.

Member search

Include a wide range of search criteria such as registration date, geographical region and last time of activity.

Include a wide range of search criteria such as cool facts and keywords from the member profile.

Blocking

Users should be able to block other users, which should make the blocked user's actions invisible from the point of view of the blocking user.

A blocked user should not be able to find out if he/she is blocked by someone.

Trust

Encourage empathy, trust and cooperation among members.

Policies

Access

Make sure that users who might damage the community are not allowed access to the community at all.

Use a registration policy that users must accept prior to becoming members.

Administration

Make sure every user knows how to contact the administrators.

A good rule is that all users own their words and any other content they have contributed to the service.

When using automated email responses, make sure they explicitly state that they are automated.

Define rules.

Enforce rules.

Develop a code of conduct.

Trust

Users should be able to choose how much they reveal about themselves and users should be encouraged to trust the system with personal data.

Administrators should be able to perform all their duties without having to ask for individual user's passwords since doing so would undermine their trust.

Make sure users can cover their tracks and hide their involvement with a service.

Protect private information.

Provide disclaimers about reliability of information.

Purpose

Clearly state the purpose of the community.

Host a particular interest group.

Communication

Content

A community-specific jargon will inevitably come into existence. To help acquaint new users, provide explanations for the jargon, especially if it is used to create the “look and feel” of the service.

Provide cyclic events, preferably from the real world, to offer the users something to talk about.

Promote talkative, diverse people.

Form

There should be as few technical limitations as possible of the communication between

users. There should be no intrusive limit on the length of messages.

Users should be able to track the status of their sent messages.

Context

There should be gathering places to converse or just spend time in.

Appendix B: The Questionnaire

Appended here is the questionnaire administered to the students at LTH Campus Helsingborg. It is a simple import of the HTML-file, you will not be able to see all options in the list-boxes.

Användning av Communities bland studenter

Introduktion

Denna enkät har som huvudsakligt syfte att ge en viss bild av hur populär användningen av s.k. communities, och då i synnerhet Lunarstorm, är bland studenter men framförallt ge bilden av studenternas subjektiva bedömningar av vilka funktioner de använder mest och hur väl utformade vissa av dessa är. Svaren från enkäten kommer att användas i ett examensarbete av mig, Mikael Folkesson, vid Lunds Tekniska Högskola i Helsingborg. Du som svarar är fullkomligt anonym.

Tips vid ifyllning av enkäten

Om något av de fördefinierade svarsalternativen inte passar till 100% välj då det som stämmer överens bäst. Om du undrar över definitionen av ett community är du inte ensam. En definition är "... i korta drag handlar det om ett socialt sammanhang där medlemmarna samlas kring vissa gemensamma mål och värderingar. De följer gemensamma regler som gäller för just den communityn. Man kan likna en community med en vanlig chat. Den största skillnaden är att man i communityn har ett gemensamt ansvarstagande, personlig identitet och kollektiva tillgångar och existens över en längre tid". ([Källa](#)) Om det lät konstigt är en enklare förklaring att det är typ Lunarstorm. *fniss*

Nu följer själva enkäten, tack på förhand för din medverkan!

1. Är du Kille Tjej

2. Hur gammal är du? (fyllda år)

3. Använder du Lunarstorm? Ja Nej

Om du svarade "Ja" på fråga 3 hoppa då till fråga 5.

Om du svarade "Nej" fortsätter du på fråga 4.

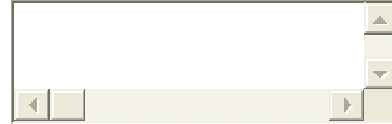
4. Använder du något annat community och i så fall vilket?

Om du svarade nej på fråga 3 och svarade på fråga 4 behöver du inte fortsätta fylla i enkäten, utan kan skicka in den genom att trycka på knappen "Skicka"

enkätsvaren" längst ner på sidan. Dina svar i denna undersökning är värdefulla även om du inte använder något community. Tack för din medverkan!

5. *Hur länge har du varit registrerad på Lunarstorm?*
6. *Hur ofta loggar du in?*
7. *Hur länge brukar du vara inloggad vid ett typiskt communitybesök?*
8. *Hur ofta kollar du i gästboken eller skriver i någon annans gästbok?*
9. *Hur ofta skickar du eller får du "mejl"?*
10. *Hur ofta besöker du klotterplanket?*
11. *Hur ofta besöker du diskussionsforumet Diskus?*
12. *Hur ofta är du inne på chatten?*
13. *Hur ofta brukar du antingen skriva i dagboken eller besöka någon annans dagbok?*
14. *Hur tycker du gästboken fungerar?*
15. *Hur tycker du "mejl" fungerar?*
16. *Hur tycker du klotterplanket fungerar?*
17. *Näm upp till tre dåliga saker med Lunarstorm*
18. *Näm upp till tre bra saker med Lunarstorm*

-
19. *Om du fick lägga till funktioner eller ändra på någonting med Lunarstorm, vad skulle du då göra?*



Skicka enkätsvaren

Tack så mycket för din medverkan!

Appendix C: Usability Evaluations

C.1 Scenarios for cognitive walkthrough of first paper prototype

Basic pre-conditions

The user has already created an account and is logged in.

Scenario 1: Create a relation

Pre-conditions

The user is looking at the page with faces.

Task

The user shall in some way create an optional relation to the user whose picture is located in the top right of the “faces matrix”.

Problems/Observations

Scenario 2: Send mejl

Pre-conditions

The user is currently browsing the own guest book.

Task

The user shall in some way send a mail to the registered user lolo.

Problems/Observations

Scenario 3: Search for a member

Pre-conditions

The user has just logged in.

Task

The user shall check if a friend named Kalle Svensson from Duvemåla is a registered user.

Problems/Observations

Scenario 4: Answer a contribution made to the own guest book

Pre-conditions

The user is currently browsing the own guest book.

Task

The user wishes to answer a contribution.

Problems/Observations

C.2 Scenarios for usability inspection of second paper prototype

Pre-conditions

You, the user, have already created an account and have logged in. Your nickname is pachi-pachi.

Scenario 1: Create a relation to another user

Pre-conditions

You are currently checking out the “Faces” page on which you notice a picture. It is in fact the face of your neighbour, apparently she has the nickname Mimi. It is located in the top-right of the faces matrix.

Task

You wish to initiate the creation of the relation “Neighbour” to the registered user Mimi, who is a 17 year old girl and your neighbour.

Scenario 2: Send private mail to another user

Pre-conditions

You are currently looking at your own guest book. There are no messages from the registered user lolo in your guest book.

Task

You wish to send a mail to the registered user lolo.

Scenario 3: Post a reply to a contribution to the guest book

Pre-conditions

You have just logged in. You wish to check out the new contributions to your guest book.

Task

You go to your guest book to check out the new contributions made to it. You wish to post a reply to the contribution made by Tina, in her guest book.

C.3 Observation forms for usability inspection of second paper prototype

Initial learning

Before starting to perform tasks the subject shall have some time to get an idea of the structure of the community. Ask the subject to state when the subject feels it has an overview of the system.

Time taken: _____

Scenario 1 Observation Form

Start Time: _____

Finish Time: _____

Complete: yes no

HELP REQUESTED	HELP GIVEN	RESULTING ACTION

Number of actions required to perform task: _____

Time spent dealing with error: _____

Scenario 2 Observation Form

Start Time: _____

Finish Time: _____

Complete: yes no

HELP REQUESTED	HELP GIVEN	RESULTING ACTION

Number of actions required to perform task: _____

Time spent dealing with error: _____

Scenario 3 Observation Form

Start Time: _____

Finish Time: _____

Complete: yes no

HELP REQUESTED	HELP GIVEN	RESULTING ACTION

Number of actions required to perform task: _____

Time spent dealing with error: _____

Questions to ask when tasks run through

User would use system again: yes no

User fatigued by system: yes no

User used to communities: yes no

C.4 Raw data from second paper prototype evaluation

	INIT TIME TAKEN	TIME COMPLETE TASK 1	NO. OF ACTIONS NEEDED	TIME COMPLETE TASK 2	NO. OF ACTIONS NEEDED	TIME COMPLETE TASK 3	NO. OF ACTIONS NEEDED
SUBJECT#1	00:45	01:50	7	00:35	7	02:30	4
SUBJECT#2	01:00	01:50	7	00:20	5	00:20	4
SUBJECT#3	04:00	01:00	4	00:45	5	00:25	4
SUBJECT#4	02:20	02:45	4	01:35	7	01:30	4
AVERAGE	02:01	01:51	5,5	00:49	6,0	01:11	4,0

	WOULD USE SYSTEM AGAIN	FATIGUED BY SYSTEM	USED TO COMMUNITIES
SUBJECT#1	yes	no	yes
SUBJECT#2	yes	no	yes
SUBJECT#3	yes	no	no
SUBJECT#4	no	no	no

Time spent dealing with error	TASK #1	TASK #2	TASK #3
SUBJECT#1	00:00	00:00	00:00
SUBJECT#2	01:00	00:00	00:00
SUBJECT#3	00:00	00:00	00:00
SUBJECT#4	00:40	00:00	00:00
AVERAGE	00:25	00:00	00:00

HELP REQUESTED ³	HELP GIVEN	RESULTING ACTION
From where can you create a relation?	Told the subject on the personal place	The subject found it and could complete the task

³ The help box directly above contains only one help request because only one was made during the whole evaluation. Subject #4 asked the question.

Appendix D: User Analysis

D.1 The students

In the following three figures and table no inferences are being made to the population, the numbers are simply descriptive. They have not been commented due to the low participation level (n=3). In the ratings that follow, inferences are however being made to the population.

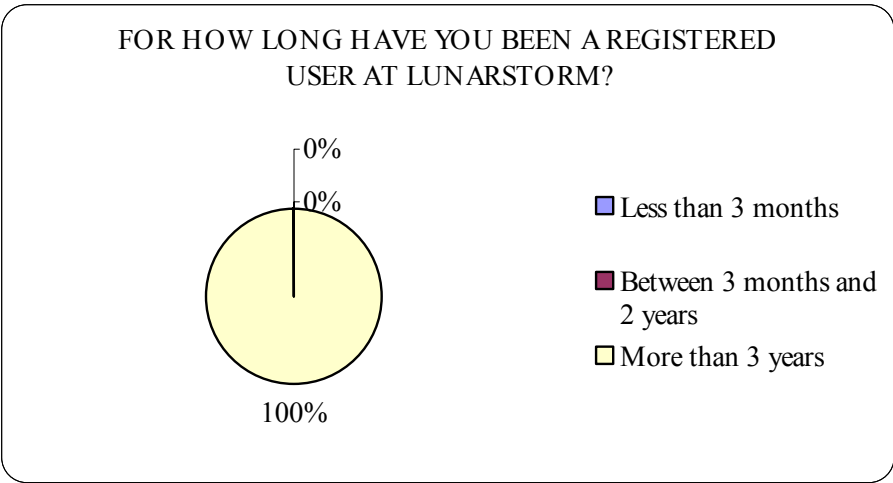


Figure A: Time registered at Lunarstorm, student sample presented.

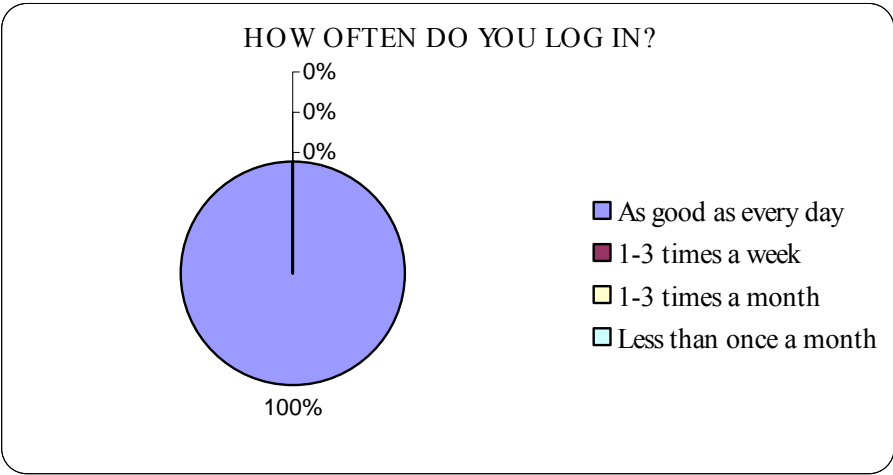


Figure B: Log in frequency, student sample.

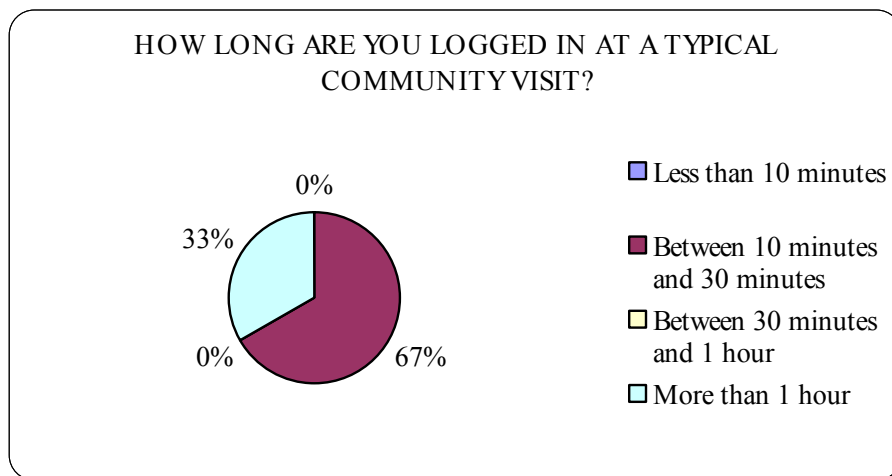


Figure C: Typical log in duration, student sample.

HOW OFTEN DO YOU USE THE FOLLOWING FEATURES? ⁴					
	Every time	Often	Now and then	Rarely	Never
Guest book		1	2		
Private mail		1	1	1	
Message board					3
Discussion forum				2	1
Chat				1	2
Diary				3	

Table A: Feature usage, student sample

The answers in table A have been weighed to give an approximation of how valuable the users find the different features. *Never* has been given the weight 1, *Rarely* the weight 2, *Now and then* the weight 3 and so on to produce a rating ranging from 1-5. The ratings are listed and illustrated in table B and figure D.

⁴ This was the intended layout of these questions, however because of the limitations of the free questionnaire service used on the web they were asked as separate questions. See appendix 1.

For all ratings that follow, the true population mean rating must always be within the interval $1 \leq \theta \leq 5$. Therefore where the values exceed these limits it is due to a too small sample which makes the intervals too big and imprecise.

RATING OF THE POPULARITY OF FEATURES						
	Guest book	Private mail	Message board	Discussion forum	Chat	Diary
mean	3.33	3.00	1.00	1.67	1.33	2.00
conf. int. 95%	± 0.65	± 1.13	± 0.00	± 0.65	± 0.65	± 0.00
sd	0.58	1.00	0.00	0.58	0.58	0.00
se	0.33	0.58	0.00	0.33	0.33	0.00

Table B: Weighed feature popularity rating, student sample.

Due to the small sample in this category none of the respondents ever use the Message board, and all respondents use the Diary rarely. This means the standard deviation is 0 and therefore the confidence interval is also 0. Here it is clear that a larger sample would have been needed to make accurate estimates.

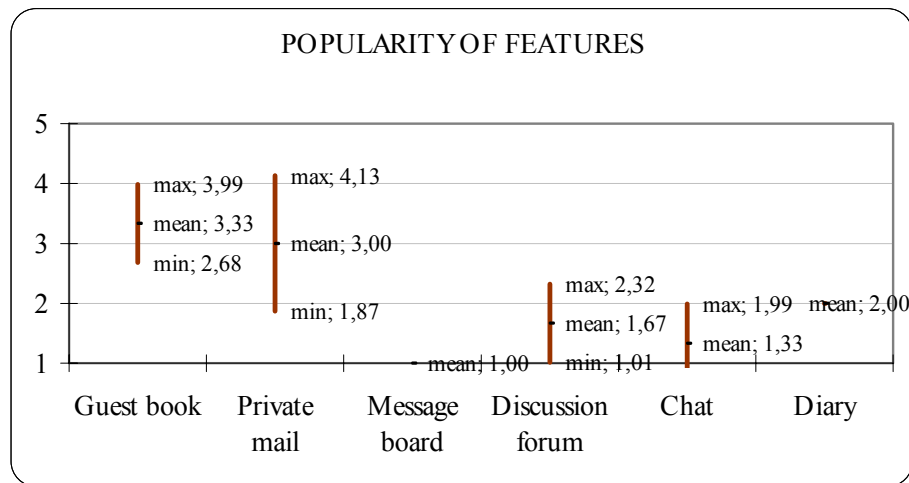


Figure D: Weighed feature popularity rating visualized graphically, student sample.

HOW DO YOU THINK THE FOLLOWING FEATURES WORK?				
	Bad	Good	Very Good	Don't know
Guest book		2	1	
Private mail		1	2	
Message board				3

Table C: Feature functionality rating, student sample.

The answers in table C have been weighed to give an approximation of how well constructed the users find the different features. *Bad* has been given the weight $5/3$, *Good* $5*(2/3)$ and *Very Good* 5. *Don't know* has been given the weight 1 to produce a rating ranging from 1-5. The ratings are listed and illustrated in table D and figure E.

RATING OF THE FUNCTIONALITY OF FEATURES			
	Guest book	Private mail	Message board
mean	3.89	4.44	1.00
conf. interval 95%	± 1.09	± 1.09	± 0.00
<i>sd</i>	0.96	0.96	0.00
<i>se</i>	0.56	0.56	0.00

Table D: Weighed rating of the functionality of features, student sample.

Due to the small sample in this category all of the respondents claimed they do not know how they think the message board works. This means the standard deviation is 0 and therefore the confidence interval is also 0. Here it is also clear that a larger sample would have been needed to make accurate estimates.

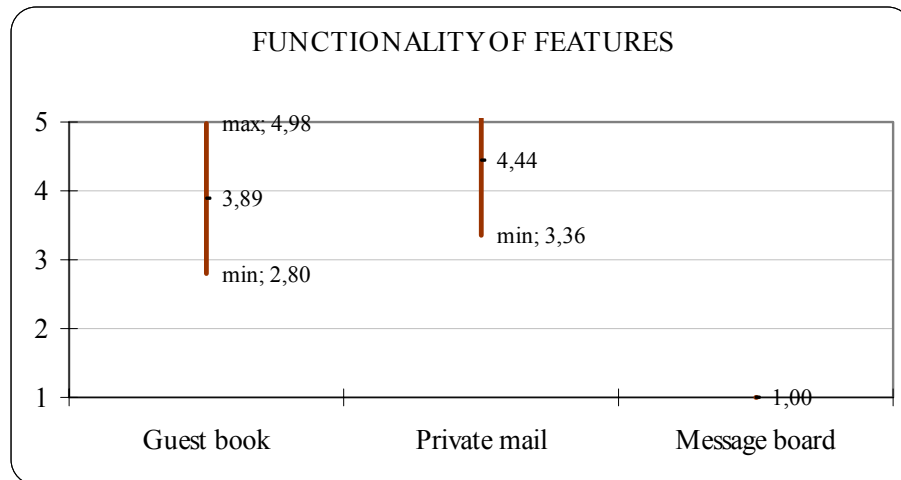


Figure E: Weighed rating of the functionality of features visualized graphically, student sample.

The following are the answers from the open questions “Name up to three bad things with Lunarstorm”, “Name up to three good things with Lunarstorm” and “If you had the opportunity to add functions or change something about Lunarstorm, what would you do?”

Things that are bad about Lunarstorm

- There is no one to contact when you are stuck, for example with a photograph.
- Some features cost money.
- Their bad explanations.
- The status system is bad, discriminating for people with low status, for example when they are not shown in search results.
- You should be able to search by more than 1 variable at a time.
- Slow, too big and they reject some images.

Things that are good about Lunarstorm

- Smart, quick, fun.
- Accessible and a wide variety of things to do.
- You can pick up girls, send nice little messages.

Suggestions

- Remove everything but the core functionality to make it quicker. The mail-function is all too slow.
- Approve all pictures.

D.2 Redburst's end-user group

In the following three figures and table no inferences are being made to the population, the numbers are simply descriptive. They have not been commented due to the low participation level (n=9). In the ratings that follow, inferences are however being made to the population.

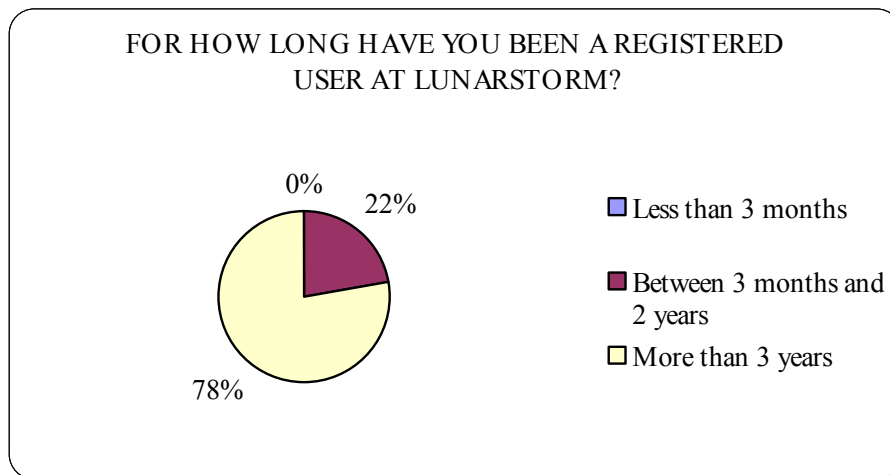


Figure F: Time registered at Lunarstorm, redburst sample.

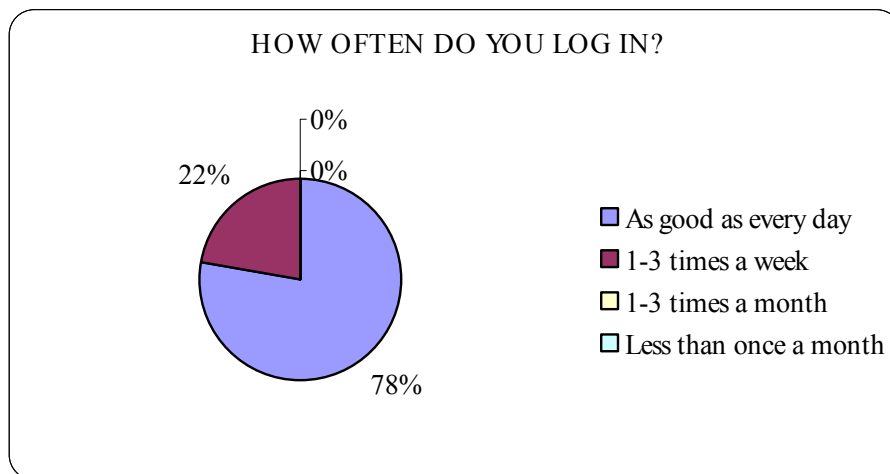


Figure G: Log in frequency, redburst sample.

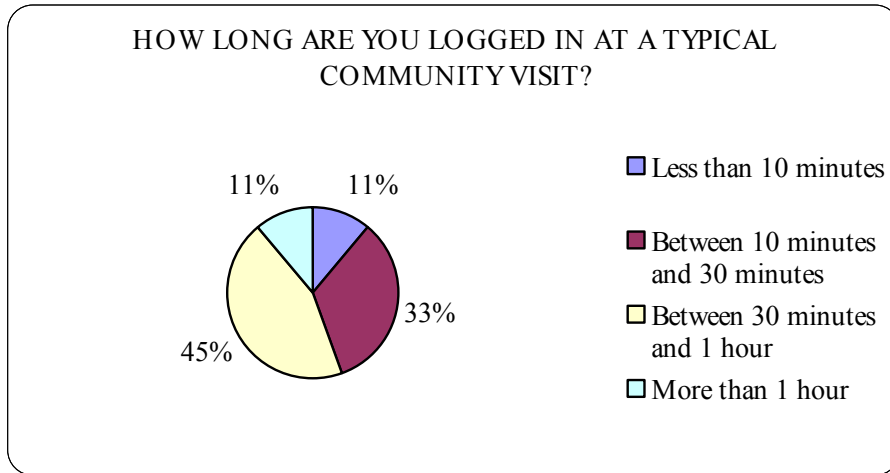


Figure H: Typical log in duration, redburst sample.

HOW OFTEN DO YOU USE THE FOLLOWING FEATURES? ⁵					
	Every time	Often	Now and then	Rarely	Never
Guest book	7	1		1	
Private mail		2	5	2	1
Message board	1		2	3	3
Discussion forum		1	1	3	4
Chat				2	7
Diary		2	1	4	2

Table E: Feature usage, redburst sample.

As was done with the answers of the student sample, the answers in table E have been weighed to give an approximation of how valuable the users find the different features. *Never* has been given the weight 1, *Rarely* the weight 2, *Now and then* the weight 3 and so on to produce a rating ranging from 1-5. The ratings are listed and illustrated in table F and figure I.

⁵ This was the intended layout of these questions, however because of the limitations of the free questionnaire service used on the web they were asked as separate questions. See appendix B.

RATING OF THE POPULARITY OF FEATURES						
	Guest book	Private mail	Message board	Discussion forum	Chat	Diary
mean	4.56	2.67	2.22	1.89	1.22	2.33
conf. int. 95%	±0.66	±0.57	±0.85	±0.69	±0.29	±0.73
sd	1.01	0.87	1.30	1.05	0.44	1.12
se	0.34	0.29	0.43	0.35	0.15	0.37

Table F: Weighed feature popularity rating, redburst sample.

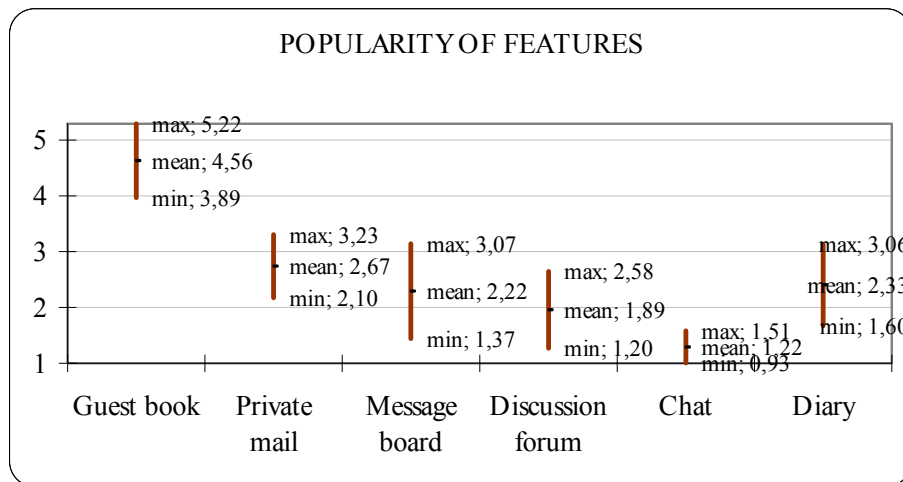


Figure 1: Weighed feature popularity rating visualized graphically, redburst sample.

HOW DO YOU THINK THE FOLLOWING FEATURES WORK?				
	Bad	Good	Very Good	Don't know
Guest book	1	4	3	1
Private mail	1	7		1
Message board	2	2		5

Table G: Feature functionality rating, redburst sample.

Again, the answers in table G have been weighed to give an approximation of how well constructed the users find the different features. *Bad* has been given the weight $5/3$, *Good* $5*(2/3)$ and *Very Good* 5. *Don't know* has been given the

weight 1. This to produce a rating ranging from 1-5. The ratings are listed and illustrated in table H and figure J.

RATING OF THE FUNCTIONALITY OF FEATURES			
	Guest book	Private mail	Message board
mean	3.44	2.89	1.67
conf. interval 95%	±0.94	±0.59	±0.64
<i>sd</i>	1.43	0.90	0.99
<i>se</i>	0.48	0.30	0.33

Table H: Weighed rating of the functionality of features, redburst sample.

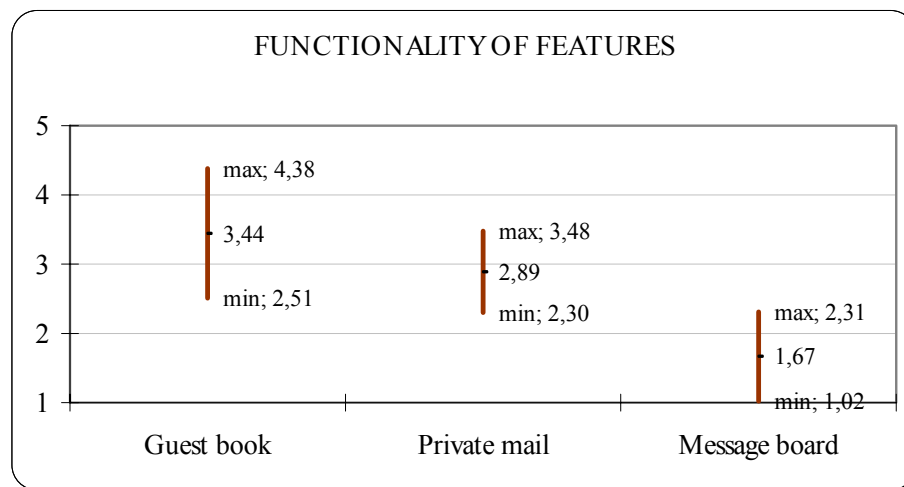


Figure J: Weighed rating of the functionality of features visualized graphically, redburst sample.

The following are the answers from the open questions “Name up to three bad things with Lunarstorm”, “Name up to three good things with Lunarstorm” and “If you had the opportunity to add functions or change something about Lunarstorm, what would you do?”

Things that are bad about Lunarstorm

- It's very slow. (6)
- You have to pay to use many services. (2)
- Ugly design, boring design. (2)
- Too many advertisements.

- It's not possible to send a private message in the guest book.
- Every little child uses it nowadays.
- Sometimes it's not possible to log in.

Things that are good about Lunarstorm

- You get to learn a lot of people. (4)
- You can have your own presentation. (2)
- Fun with people from different parts of Sweden.
- Many users from where you live.
- There are many interesting people there.
- Good way of keeping in touch with your friends.
- It's free.
- You can contact everybody.
- Easy to use.
- Good functions, for example “prylar”.

Suggestions

- Everything should be free. (2)
- More languages should be available.
- Change the colours.
- It should be possible to use more images when choosing picture.
- It should say in the Guest book if the person who sent the message is online.
- You should have to be 12 years old.
- Don't know, but don't like that the messages in the guest book are “secret” in some communities.

D.3 Raw data

D.3.1 Student sample

Är du	Hur gammal är du? (fyllda år)	Använder du Lunarstorm?	Använder du något annat community och i så fall vilket?	Hur länge har du varit registrerad på Lunarstorm?	Hur ofta loggar du in?	Hur länge brukar du vara inloggad vid ett typiskt community besök?	Hur ofta kollar du i gästboken eller skriver i någon annans gästbok?	Hur ofta skickar du eller får du "mej"?	Hur ofta besöker du klotterplåsten eller diskussionsforumet?	Hur ofta är du inne på chatten?	Hur ofta brukar du skriva i dagboken eller besöka någon annans dagbok?	Hur tycker du gästboken fungerar?	Hur tycker du "mej" fungerar?	Hur tycker du klotterplåsten fungerar?	Nämnd upp till tre dåliga saker med Lunarstorm	Nämnd upp till tre bra saker med Lunarstorm	Om du fick lägga till funktioner eller ändra på någonting med Lunarstorm, vad skulle du då göra?	
Tjej	20	Ja		Mer än 2 år	Så gott som varje dag	Mellan 10 minuter och 30 minuter	Ofta	Då och då	Aldrig	Sällan	Aldrig	Sällan	Jättebra	Jättebra	Vet ej	Att de inte har någon man kan kontakta vid problem (t.ex. med foto) Att de börjat ta betalt för vissa funktioner, deras dåliga förklaringar!!	smart, snabb, rolig	Vet inte...
Kille	23	Ja		Mer än 2 år	Så gott som varje dag	Mellan 10 minuter och 30 minuter	Då och då	Ofta	Aldrig	Sällan	Sällan	Sällan	Bra	Jättebra	Vet ej	1. För det mesta tråkigt folk där man inte kan ha ryttva av. 2. Status är dåligt, det kan medföra etisk kränkning samt att vissa medlemmer ej syms i en sökning dvs de med låg status. De behöver inte alla va dåliga människor! 3. Man kan ej söka tillräckligt	1. tillgängligt 2. stort se 17 utbud	
Kille	23	Ja	vida webben, nightlife	Mer än 2 år	Så gott som varje dag	Mer än 1 timma	Då och då	Sällan	Aldrig	Aldrig	Aldrig	Sällan	Bra	Bra	Vet ej	långsamt, för stort och dom spårar vissa bilder hehe	man kan ragga, man kan hälsa små saker o man kan bli bannad!	ta bort all skit så att de går undan när man ska göra nåt, sen är mail funktionen aaaaasag, o inte så bra upplagt. godkänn alla bilder/foton också
Kille	37	Nej	inga	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Aldrig	Sällan	Aldrig	Aldrig	Då och då	Aldrig	Vet ej	Vet ej	Vet ej	Har aldrig besökt det.	Kan inte!	Har ingen aning om!
Kille	23	Nej	Spraydio	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	21	Nej	www.altomjonko ping.se	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	23	Nej	nej	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Tjej	21	Nej	ICQ	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	19	Nej	nej	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	20	Nej	dvdforum.nu, swedockers.com (båda är forum)	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	19	Nej	diverse forum	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Tjej	27	Nej		Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			
Kille	28	Nej	nej	Mindre än 3 månader	Så gott som varje dag	Mindre än 10 minuter	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Varje gång	Dåligt	Dåligt	Dåligt			

D.3.2 Redburst sample

Är du	Hur gammal är du? (fyll i ålder)	Använda Lunarstorm?	Använder du något annat community och i så fall vilket?	Hur länge har du varit registrerad på Lunarstorm?	Hur ofta loggar du in?	Hur länge brukar du vara inloggad vid ett typiskt communitybesök?	Hur ofta kollar du i gästboken eller skriver i någon annans gästbok?	Hur ofta skickar du eller får du "mej"?	Hur ofta besöker du klotterplankan?	Hur ofta besöker du diskussionerna?	Hur ofta är du inne på chatten?	Hur ofta brukar du antingen skriva i dagboken eller besöka någon annans dagbok?	Hur tycker du om gästboken?	Hur tycker du om "mejl" funktionerna?	Hur tycker du om klotterpänkan?	Nämnp tre dåliga saker med Lunarstorm	Nämnp tre bra saker med Lunarstorm	Om du fick lägga till funktioner eller ändra på någonting med Lunarstorm, vad skulle du då göra?
Tjej	17 Ja		Mer än 2 år	Så gott som varje dag	Mer än 1 timma	Varje gång	Sällan	Då och då	Sällan	Sällan	Sällan	Sällan	Jättebra	Bra	Bra	Många besökare så de går segt, många betaltjänster.	Man träffar mkt nytt folk, bra kontakt källa	Allt skulle va gratis...
Tjej	17 Ja		Mellan 3 månader och 2 år	Så gott som varje dag	Mellan 30 minuter och 1 timma	Ofta	Då och då	Aldrig	Aldrig	Aldrig	Sällan	Bra	Bra	Vet ej	borde vara snabbare,	kul med folk från olika delar av Sverige	Göra det på fler språk, men det e ju på väg så..	
Kille	18 Ja		Mer än 2 år	Så gott som varje dag	Mindre än 10 minuter	Sällan	Aldrig	Aldrig	Aldrig	Aldrig	Sällan	Dåligt	Dåligt	Dåligt	Jobbigt med all reklam och att den är seg	Mycket folk från sin ort	Att allt blev gratis igen	
Tjej	13 Ja		Mer än 2 år	1-3 gånger per vecka	Mellan 10 minuter och 30 minuter	Varje gång	Då och då	Sällan	Sällan	Aldrig	Aldrig	Bra	Bra	Bra	Ful design.	mycket intressanta personer finns där.	Ändra färgerna.	
Tjej	14 Ja		Mellan 3 månader och 2 år	Så gott som varje dag	Mellan 30 minuter och 1 timma	Varje gång	Ofta	Sällan	Aldrig	Aldrig	Aldrig	Bra	Bra	Vet ej	Att man inte kan skriva privat i gb. Att man inte kan skriva TILL NÅGON TVÅ GÅNGER DIRKT!! Att de som inte använder pro inte kan ha pro säckerna	att man träffar folk. Man kan ha egen press. Och det e gratis	Att man skall kunna använda mera bilder när man skall ficksa foto	
Tjej	18 Ja		Mer än 2 år	Så gott som varje dag	Mellan 30 minuter och 1 timma	Varje gång	Sällan	Då och då	Sällan	Aldrig	Ofta	Jättebra	Bra	Dåligt	Väldigt SEGT!	bra sätt att hålla kontakten på med sina vänner.	Att det står i Gästboken istället personen som skickat inlägget är online	
Tjej	16 Ja		Mer än 2 år	Så gott som varje dag	Mellan 10 minuter och 30 minuter	Varje gång	Då och då	Aldrig	Då och då	Aldrig	Ofta	Vet ej	Vet ej	Vet ej	alla små barn har det nu... man får inte skriva fritt om sig själv på sidan, för då kommenterar alla det, den är väldigt trög.	man kan träffa olika sorters människor, man har sin egen sida och man kan kontakta alla.	skulle göra så att små arn inte kan ha det, att det ska va från 12 år eller något sånt...kommer inte på något mer.	
Tjej	17 Ja		Mer än 2 år	1-3 gånger per vecka	Mellan 10 minuter och 30 minuter	Varje gång	Då och då	Varje gång	Aldrig	Aldrig	Sällan	Bra	Bra	Vet ej	ibland går det inte att logga in	man kan träffa folk		
Tjej	16 Ja		Mer än 2 år	Så gott som varje dag	Mellan 30 minuter och 1 timma	Varje gång	Då och då	Sällan	Ofta	Sällan	Då och då	Jättebra	Bra	Vet ej	1. Ibland laddas sidan väldigt långsamt 2. Ganska tråkig yttre design	1. Bra grundidé 2. Lätt o enkel att använda 3. Bra funktioner som tex prylar	Vet inte...Men jag gillar inte det som finns på vissa communities att "secret" jobbigt...	
Kille	24 Nej	epuls	Mer än 2 år	1-3 gånger per månad	Mindre än 10 minuter	Sällan	Sällan	Aldrig	Aldrig	Aldrig	Aldrig	Vet ej	Vet ej	Vet ej			är de något liknande Lunar ni försöker få igång så finns de redan www.epuls.pl men väskiet som lycka till!	

Appendix E: Requirements specification Table of contents

FUNCTIONAL REQUIREMENTS 4

BEFORE HAVING LOGGED IN 4

- 1 Account registration 4*
- 2 Forgotten password 5*
- 3 Log in 5*
- 4 Index page 6*

MAIN MENU 7

- 5 Guest book 7*
- 6 Community mail 7*
- 7 Member Search 8*
- 8 Recruitment 8*
- 9 Message board 8*
- 10 Faces 9*
- 11 Online Help 9*
- 12 Log out 9*
- 13 Personal Place 9*

INSIDE THE PERSONAL PLACE 10

- 14 Personal presentation 10*
- 15 Relationships 11*
- 16 Points 12*
- 17 Terminate account 12*

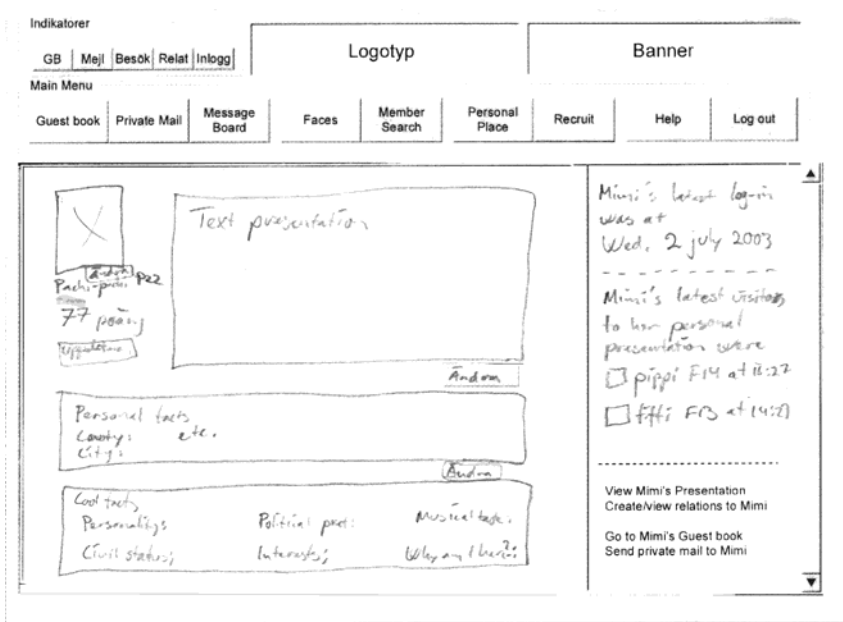
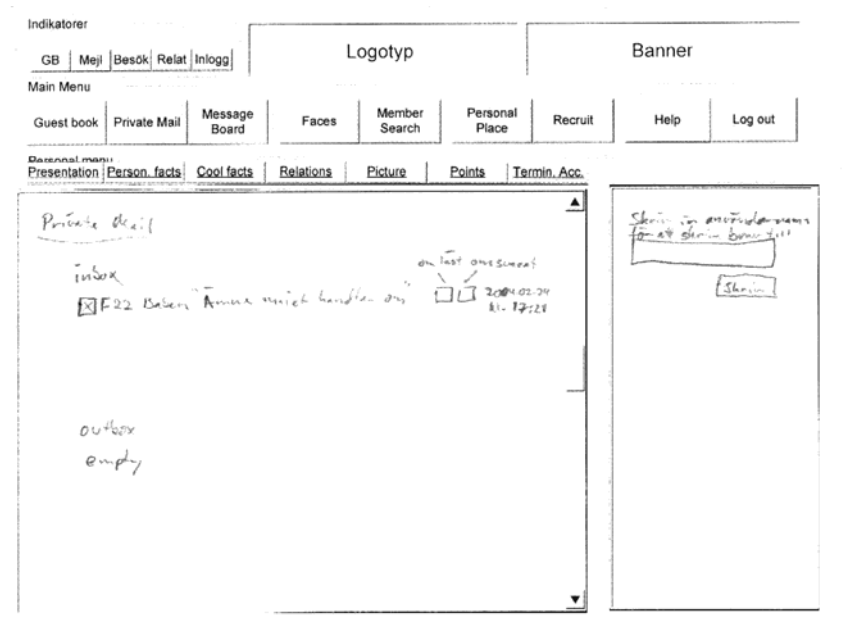
NON-FUNCTIONAL REQUIREMENTS 13

- 18 Loading time 13*
- 19 Browser compliance 13*
- 20 HTML4/CSS1/JavaScript 1.2 13*
- 21 Screen resolution 13*
- 22 Banners 13*
- 23 Look and Feel 13*

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Appendix F: Paper prototypes

The paper prototypes are illustrated in the following two pictures, first number one and second number two.



Appendix G: Risk Management Plan

DESCRIPTION OF RISK	PROBABILITY OF OCCURRENCE (LOW/MEDIUM/HIGH)	MITIGATION / CONTINGENCY PLAN
Overly optimistic schedule	Medium	Prioritize, reduce scope of work.
Task too complex	Low	Reduce scope of work. Focus on what can be done.
Communication problems	Low	Specify how and when communication is to take place.
Review cycle slower than expected	Medium	Might be a need for flexibility on the baseline dates.
New requirements after beginning of project	Low	Put good work into the requirement elicitation phase.
Geographical locations hindering effective work	Medium	Identify when work should be done where to maximize efficiency.
Belief design process is static/describable in advance	High	Understand that the process is only a guidance tool.