mycomob

a mobile phone application and web community

by

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Abstract

Mycomob, an open source Java application for mobile phones, is a comprehensive mushroom hunting and identification guide with visual and written descriptions of roughly 300 mushroom species commonly found in Finland. There are different areas within the application that were specifically designed to aid beginner, intermediate and advanced mushroom hunters.

Alongside the Mycomob mobile application is a web community, which acts as a portal. From the Mycomob website, people can download the application, communicate with others interested in mushrooms via the bulletin board and contribute to the application by uploading more visual and written descriptions of mushroom species and furthering the programming.

The concept of Mycomob was inspired from my interests in mobile phone technology and mushrooms. With mobile phone technology advancing at a rapid rate, I believe that mobile phone features, via a mobile phone application, can be utilised to revolutionize the conventional methods of mushroom identification.

During the development of the Mycomob mobile application and web community, I was able to exercise and showcase my design capabilities, from web to icon design. Most importantly, I was able to develop and utilise my knowledge in design specifically for mobile applications, such as graphical user interfaces, interaction and usability.

Keywords

mobile phone application, J2ME, J2EE, concept design, graphical user interface design (GUI), Interactive design, mushrooms


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Chapter 1: Introduction

We currently live in a time where years of technological research and development have aided in the advancement of human innovations. Systems have been developed to extend human capabilities and to essentially make life a little easier for us. Systems are ever evolving, becoming more technologically advanced as time progresses. An example of such human innovation is the Internet.

Although the Internet was created by the U.S. government in 1969, it wasn’t until the early 90s with the creation of the World Wide Web by Tim Berners-Lee that the Internet started to become publicly recognised\(^1\). 16 years ago the people who mainly used the Internet were those who helped develop it. Today, out of the 6.5 billion people who inhabit this world, approximately 1.04 billion people use the Internet\(^2\). From creating a website to e-mailing to file sharing, the Internet has become a common digital media for people to communicate with each other and to also gather information.

Another example of a human innovation that has impacted how people communicate with each other is the telephone. With the invention of the telephone dating back to 1876 by Alexander Graham Bell, during the majority of the 20\(^{th}\) century, telephones proved to be a quicker and easier way for people to communicate than for example, writing a letter\(^3\). Telephones have evolved from being a static device found only in homes and offices to mobile digital devices that can fit in a person’s pocket. Just a few years ago mobile phones had limited capabilities, only allowing people to make phone calls and send text messages. Today, mobile phones have become all-in-one devices, allowing people to access the Internet, take photos with built in cameras, capture sound and video, listen to sound and video, can be used as a tracking device, install and use applications and games – the possibilities are endless.

![Figure 1-1: The evolution of Nokia mobile phones from the late 90s till present. From L-R, Nokia 640, Nokia 3210, Nokia 7210, Nokia 6110, Nokia N93.](image)

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At the rate that mobile phone technology is progressing, mobiles will soon be a pinnacle in digital media. The strongest benefit of mobile phones is its compact size. Combined with people being able to communicate, gather and store information, mobiles have the capability in the future to surpass the need of dedicated devices, for example, pocket sized digital cameras.

1.1 My final thesis objectives

As a New Media designer, I have worked with different types of “digital medium” – from creating websites to creating graphical user interfaces for Windows based applications. One of the goals I have with my final thesis project is to showcase some of the design skills I have acquired over the years. I also want to acquire new design skills in an area of New Media which I haven’t had much experience in, mobile phone devices.

I am highly interested in mobile phone technology and believe that as time progresses, more people will start to regularly utilise the capabilities that these devices offer. For example, cameras on mobile phones are becoming more advanced and much better in picture and video taking quality. Surfing the Internet for information is becoming more appealing to users as the screen size and resolution increases on mobiles, making it easier to view websites with lots of text and many images.

Being an avid fan of the popular Finnish hobby of mushroom hunting, I wanted to incorporate my interests in mushrooms with my interests in New Media. With my final thesis project entitled Mycomob, I would like to show how harnessing the multiple functionalities of a smart phone has the capabilities of revolutionizing the way people identify mushroom species in the wild. Along with Lauri Svan, another student at the Media Lab, we have achieved the Alpha version of the Mycomob mobile phone application. Alpha version is a part of the development stage of an application, in which technical issues and functionalities still have to be developed and resolved. I have also created a website/web community dedicated to the mobile application. The purpose of the Mycomob project is to help people in the correct identification of mushrooms during hunting and to also expand people’s general knowledge about mushrooms.

1.2 Framework of my written thesis

In this first chapter, I give details of how I became interested in the subject of mushrooms and what had inspired me to come up with the concept of Mycomob.

In the second chapter, I explain how mushrooms have been used by different cultures throughout history – as food, medicine and as an aid in religious ceremonies. I also give insight on past methods of mushroom identification and how present methods have evolved from them.

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In the third chapter, I introduce the Mycomob mobile application in whole. I describe the different sections comprising Mycomob, from the content found in each section to the general flow and functionality. I also explain how the concept of each section was inspired from my personal experiences in mushroom hunting and identification.

In the fourth chapter, I give details about the design process of creating the Graphical User Interface (GUI) and other design related elements such as icons used in the Mycomob mobile application. Since the majority of the design work done is centred around mobile devices, I give background information on GUI design for Symbian phones and explain how the function keys should work in conjunction with the user interface of Mycomob.

In the fifth chapter, the technical background of the Mycomob mobile application is described. The purpose of this chapter is to clarify how Lauri and I came up with the best programming language for Mycomob, to explain the Mycomob technical architecture, to define problems with the different sections and navigational flow in the Alpha version of the application, to give reasoning as to why the coding is open source and a more in depth view of the licenses which apply to Mycomob.

In the sixth chapter, I describe the user testing conducted from the low-fi paper prototype testing sessions in Spring 2006, to the Alpha version of Mycomob testing sessions in Autumn 2006. The purpose of this chapter is to show that user testing and the results achieved from it is important during the development stage of a mobile application.

In the seventh chapter, I give details about the design process of creating the Mycomob website and bulletin board, as well as an in depth explanation of the different sections comprising the website. The purpose of this chapter is to show how the website is an integral part of the Mycomob project in whole.

In the eighth chapter, I give a more in depth view upon the processes that Lauri and I have gone through during the development of the Mycomob mobile application and web community. Explanation of the timescale for research, design and programming can be derived, as well as the unconventional method of how Lauri and I worked with each other on the project.

In the final chapter, I give an explanation as to how the Mycomob mobile application and web community can be further developed in the future by Lauri and I, as well as by others who may be interested in contributing towards Mycomob. I also give insight on the flexibility of the application framework and how it can accommodate to any subject.

Included with my final thesis paper is a CD that contains the Alpha version of the Mycomob mobile application file (Mycomob.jar), an installation text file and a copy of the current Mycomob website.
1.3 My interests in mushrooms

My interest in mushrooms started in 2000, after I surfed the Internet one evening and stumbled across a website which had tutorials on how to grow edible mushrooms at home. After reading a lengthy tutorial and becoming interested in the whole process, I decided to challenge myself and grow mushrooms. I was surprised that all the materials needed to grow could be found at the supermarket and the hardware store. My initial investment into the project was relatively low cost, approximately £60. Three months later, I had my first “flush,” also known as batch, of mushrooms. I grew more than enough mushrooms for myself that I had to resort to giving them away to friends. I also saved a substantial amount of money by growing instead of buying mushrooms from the market. During the growing process, I became highly interested in Mycology. I consider myself an amateur mycologist, due to not receiving any formal education in Mycology.

It wasn’t until I moved to Finland in 2003 that I went mushroom hunting in the wild for the first time. I had been accompanied by “experienced” mushroom hunters for the first couple of hunts, but saw that they could only recognise the edible mushrooms which they had been taught were safe. It was a similar story with many Finnish people I had gone hunting with. It was usually the case that an elder who had gone hunting many times previously had taught them as a child which mushrooms were safe to pick. Otherwise, their knowledge of the hundreds of other species of mushrooms, which grew alongside edible ones, was very little. It was quite surprising to see that I recognised more species of mushrooms than they had, despite the fact that I hadn’t gone on mushroom hunts as much as my Finnish hunting partners did. Most of my knowledge came from browsing Internet websites dedicated to mushrooms in Finland, where many colour images were available.

I noticed that although carrying a mushroom guidebook would be a convenient way to identify mushrooms whilst hunting, it is often too heavy to carry along and many do not have enough detailed images to help with visual identification. Plus, one often has to go through hundreds of pages until they find a suitable description, which can take a long time and the end result is a person becoming disinterested in identifying what they have picked. It is the same situation with Internet mushroom pages, although highly helpful, it is not available when a person is out in the wild hunting. One often gets discouraged from identifying a mushroom they don’t know about if they have to bring it back home to look on the Internet for identification.

1.4 The concept behind Mycomob

During the Media Lab kick-off in Ruotsipyhtää in September 2005, all the Media Lab students and faculty who attended went on a nature walk. Whilst walking, I came across some mushrooms that I wanted to identify. With no guidebook or Internet access available, I was disappointed that I couldn’t get a quick identification and left the mushrooms alone. It was then that I came up with the idea for Mycomob, after putting my hands into my pocket and noticing my mobile phone.

I became interested in mobile phone technology after attending Jürgen
Scheible’s Rapid Mobile Application Prototyping workshop in early September before the Media Lab kick-off. During the workshop, we learned how to program Python and Macromedia Flash applications for Series 60 Nokia phones, as well as how to utilise the different phone enhancements such as Bluetooth, GPRS (General Packet Radio Service) and the camera. When I noticed my mobile in my pocket during the nature walk, I thought of the following:

- A majority of people own mobile phones and carry it with them everywhere. Some people can’t leave their homes without having it on them.

- Mobile phone technology is ever evolving, becoming more technological advanced as the years progress. Soon, all-in-one phones will be more convenient to carry in one’s pocket rather than carrying separate dedicated devices such as a camera, phone and laptop. They will also become more reasonably priced as the years’ progress.

- There are many mobile phone applications out there, which can be used for anything, from cataloguing different drink recipes to IRC (Internet Relay Chat) clients that utilise a phone’s GPRS connection.

With these particular points I had thought of, I was convinced that an application, utilising the different functions of a camera and containing mushroom information, would be a better solution than the conventional mushroom guidebooks and mushroom related Internet pages. Using a mobile phone’s features can prove to be a much more advanced, quicker and easier way to identify mushrooms and could eventually become the standard guide to have whilst hunting.

Instantaneously, I had also thought of a convenient name for the mobile application, Mycomob. Mycomob stems from two words, “myco” from the Greek word mykes meaning “fungus” and “mob” from the word “mobile.”

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Chapter 2: The existence of mushrooms

Mushrooms have existed on this planet since the Pennsylvanian period, approximately 300 million years ago. Mushrooms can be found on every continent, even in areas that prove to be inhabitable by humans due to extreme temperatures. The largest biological entities inhabiting this planet are networks of thread-like living cells called mycelium, which is the vegetative part of mushrooms. A mushroom, generally consisting of a cap and stem, is the fruit body found above ground. The role of a mushroom is to produce and disperse millions of microscopic spores from its gills (though some mushrooms have a pore, ridge or teeth-like layer), essential for its reproduction.\(^6\)

Many types of edible mushrooms are considered a delicacy in different cultural cuisine. Not only can they be eaten for palatable pleasure, but a considerable amount edible mushrooms are very nutritious and high in protein. Some mushrooms are high in vitamins such as thiamine (B1), riboflavin (B2), niacin (B3), biotin (B7), cobalamins (B12), ascorbic acid (C) and minerals such as iron, selenium, potassium and phosphorus\(^7\). Some mushrooms also have medicinal properties and many species are being researched for their potential anti-cancer, anti-viral and immunity-enhancement properties. Many medicines administered today in Western and Eastern medicine are also made from mushrooms.

![Figure 2-1: *Ganoderma lucidum* (Reishi) is known for its immunity-enhancing properties and has been used in Chinese medicine for over 4,000 years. Photo courtesy of Eric Steinert.](image)

There are an estimated 140,000 species of mushrooms in which only 14,000 have been identified and named. 7000 of the identified species are considered edible to a degree, 3000 being prime edibles, 2000 classified as being medicinal, 1400 having poisonous characteristics and 30 to be considered highly lethal.

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Cultivation of edible and medicinal mushrooms first started in China around 600 A.D. Today, mushrooms are considered an important agricultural product worldwide, with over six million metric tons being produced each year, with an estimated value of $26 to 30 billion US dollars. Though the majority of mushrooms consumed and sold as food are cultivated in a controlled environment, hunting for edible mushrooms all year round is still a popular activity in many cultures.\footnote{Chang, Shu-Ting and Miles, Philip. 2004. \textit{Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact}. 2nd Ed. Page 1.}

\section*{2.1 Mushroom usage and hunting through the ages}

The use of mushrooms by modern humans has been dated back to the Upper Palaeolithic age (approximately 30,000 BCE – 10,000 BCE) when hunting and gathering for food was a normal part of life\footnote{Allen, Zel and Reuben. 1999, last modified 2006. \textit{The Humongous Fungus Among Us}. [WWW-document]. <http://www.vegparadise.com/highestperch34.html>}. Men would hunt for animals, which was a primary part of their diet, while the women collected supplementary foods such as vegetation and mushrooms. When a hunt was unsuccessful, what the women collected became the staple food, suggesting that mushrooms were an influential part of their diet.

The oldest archaeological evidence of humans ingesting mushrooms was found in a cave painting dating back to 3,500 B.C. in the Tassili n’Ajjer mountains of the Sahara desert in Southeastern Algeria. Depicted in the cave painting is a man, outlined with mushrooms emanating a visible aura (field of energy which surrounds living beings). It is widely believed that cave paintings done in the Upper Palaeolithic age were probably made by respected elders or by shamans, medicine men who could communicate with the supernatural, heal illnesses and protect people from evil influences.\footnote{Coppens, Philip. Last modified November 2003. \textit{Cave paintings: entrancing the Otherworld}. [WWW-document]. <http://www.philipcoppens.com/cavepaintings.html>}

Shamans would ritually eat entheogens, plants or other substances containing psychoactive properties, to enter a trancelike state where they can communicate with the supernatural. The mushrooms depicted in the cave painting suggests that the figure of the man is probably a shaman, who had eaten psychoactive mushrooms where he retreated into a dark cave and painted his visions. There are many species of mushrooms, which contain psilocybin, an alkaloid with psychedelic properties.\footnote{Stamets, Paul. 2000. \textit{Growing Gourmet & Medicinal Mushrooms}. 3rd Ed. Ten Speed Press, Berkeley, California.}
On September 19, 1991, two German tourists, Helmut and Erika Simon found what is known to be Europe’s oldest human mummy on a glacier in the Ötztal Alps between Austria and Italy. The mummy dates back to 3300 B.C. and is nicknamed “Ötzi the Iceman.” Other items were discovered next to Ötzi’s body such as a knapsack, a copper axe, a longbow, flints and two types of polypores, mushrooms which are generally shelf-like in shape, have a woody surface, grow on tree trunks and have a porous underside. 

The mushrooms within Ötzi’s possessions were *Piptoporus betulinus* (Birch polypore) and an unidentified polypore. *Piptoporus betulinus* is known for its medicinal properties. It can be used as an antibacterial to treat wounds or if prepared as a tea, can boost a person’s immune system. The unidentified polypores were used as tinder, to start fires. It is obvious that Ötzi gathered the two types of polypores in the wild and knew of its benefits. Otherwise, the mushrooms wouldn’t have been found within his survival kit.

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Egyptian Hieroglyphics found by archaeologists dating back to 1650 B.C. depict that the Ancient Egyptians believed mushrooms to be a source of immortality, “Food of the Gods.” Common people were prohibited from eating mushrooms, only pharaohs, who had a god-like reputation, were able to feast on them. 14000 years ago, Egypt was filled with fertile and lush land before an extreme climate change occurred, resulting in the formation of the Sahara Desert. It is believed many species of mushrooms grew in Egypt back then due to perfect growing conditions.

Many cultures in the world have a rich history of using mushrooms. In Ancient China and Japan, mushrooms such as *Cordyceps sinensis* (Winter worm) and *Lentinula edodes* (Shiitake) are used as treatments for all types of sicknesses. The Chinese and Japanese also believe some medicinal mushrooms contain aphrodisiac-like properties. They have successfully integrated many of these medicinally beneficial mushrooms into their cuisine, adding delicious flavour to different traditional dishes.

In Central and South America, shamans from different Latin countries traditionally use mushrooms for visions. One famous shaman is Maria Sabina, from Huala de Jimenez, Mexico. In 1955, Maria Sabina allowed two westerners, R. Gordon Watson, who was the vice president of the banking firm J.P. Morgan and Allan Richardson, a New York fashion photographer, to witness a velada, a traditional Mazatec nocturnal mushroom ceremony. The two had a positive life changing experience after the ceremony and told of their tales in a Time Life magazine article in May of 1957. After the article was printed, many famous western celebrities such as John Lennon and Bob Dylan flocked to Huala de Jimenez to take part in the traditional mushroom ceremony.

European countries, especially the Slavic and Nordic regions, regard mushroom hunting as a popular hobby for people of all ages. Mushrooms can be found all year round in these particular regions due to perfect habitat conditions, especially abundant during Spring and Autumn. Some mushroom species, which would be considered poisonous and avoided by people in other parts of the world, can be considered edible and delicious in Slavic and Nordic opinion. A popular method of making mushrooms edible is by “prehandling” them, boiling the mushrooms in water until the toxins have dissipated.

It is said that Vikings who had occupied parts of the Nordic region had edible mushrooms as a staple food in their diet. A theory by a Swedish professor Samual Ödman in 1784, suggests that the Nordic warriors, also known as Berserkers, would have violent rages due to consuming *Amanita muscaria* (fly agaric) during pre-battle

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ceremonies. His theory stems from the use of fly agaric mushrooms by Lappish shamans around the same time period and the Vikings being influenced by this.  

![Image of Amanita muscaria](image)

Figure 2-4: *Amanita muscaria* (fly agaric), a mushroom that was believed to be used by Lappish shamans and Viking warriors, also known as Berserkers.  

### 2.2 Present ways of identifying mushrooms

For thousands of years people have been gathering mushrooms for food, learning what was edible or poisonous through trial and error. Knowledge of edible mushrooms was passed on by word of mouth, generation to generation in different cultures.  

It wasn’t until 1793 with the publication in France of Paulet’s book of mushroom cuisine that mushroom descriptions and recipes were documented. Not long after, Mycology, the scientific study of the Kingdom of Fungi, was acknowledged as a branch of Botany within Biology. Mycologists research the genetic and chemical properties of fungi, as well as their taxonomy (scientific classification), use as medicine and food.  

With the introduction of Mycology, mycologists classified mushrooms into divisions, classes, orders, families, genus and species. For example, the division Basidiomycota contains many different classes of mushrooms. Within Basidiomycota one class is Homobasidiomycetes, which contain the order of Polyporales which has under it the family of Polyporaceae. Different species of polypores have many similar physical characteristics, such as not containing gills on the underside of the mushrooms but instead a pore layer and many are bracket-like in shape. A mushroom’s physical characteristics, spore colour and spore shape under the microscope can help mycologists determine its taxonomy.  

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There are thousands of mushroom guidebooks available in different languages around the world. Most mushroom guidebooks show mushroom species that are common within the region they were written in. A typical guidebook will have physical descriptions, toxicity (edible or poisonous), habitat information and imagery to help mushroom hunters with identification.

Nowadays, with the Internet being a popular way of gathering information, websites dedicated to mushrooms are a good way for those interested in mushroom hunting to get identification information. There are many websites created by Mycology groups around the world, which have thousands of mushroom descriptions along with images available for people to browse. There are also various online communities dedicated to mushrooms where people from around the world chat with each other and organise mushroom forays in certain countries.
Chapter 3: Mycomob the mobile application

The main goal of Mycomob is not only to aid people in safely identifying edible from inedible mushroom species by the use of a digital medium, but to also help expand people’s knowledge about Mycology. In order to do this, Mycomob has to cater to all types of people, whether they have beginners, intermediate or even advanced knowledge of mushrooms. Definition of the three types of hunters is as follows:

- A beginner hunter is a person who has little knowledge about mushrooms and in what sort of environment they grow in. He or she has also not gone mushroom hunting before, or on less than a couple of mushroom hunts.

- An intermediate hunter is a person who has gone mushroom hunting a few times previously. He or she will have knowledge about some species of mushrooms. Those who have learned how to pick edible mushrooms by word of mouth for example.

- An expert mushroom hunter is a person who has been hunting mushrooms for many years and has gone hunting hundreds of times. He or she will be able to recognise a considerable number of mushroom species, know their names in its Latin form and will have some knowledge about Mycology.

There are also some prerequisites before a person is able to utilise Mycomob. This includes having to have had previous knowledge in using a mobile, preferably Nokia Series 60 mobile phones. Depending on which section of Mycomob is used, the phone’s camera, GPRS or external GPS unit (Global Positioning System) must be operated.

At the moment, Mycomob only contains information about the mushroom species that can be found in Finland, due to the application first being tested and used in Finland. There are just under 300 mushroom species featured in the application.

3.1 The different sections within Mycomob

The different sections within Mycomob have mainly been inspired from my personal experiences with mushroom hunting, as well as issues which I felt (along with other amateur Mycology colleagues I know through the Internet) lacked in mushroom guidebooks and the Internet mushroom pages. Mycomob comprises of 11 sections, with some sections intended for specific users.

Due to certain circumstances that will be explained later in Chapter five, the functionality and flow of certain sections have been slightly altered from how I originally envisioned them to be. Included with some of the section descriptions are images of the graphical user interfaces (GUI) implemented into the Alpha version of Mycomob and images of the GUIs that I conceptualized.
Figure 3-1: A diagram the different sections comprising Mycomob.
3.1.1 Loading screen

When a person starts up the application via the phone’s main menu, he or she will first encounter the Loading screen. The Mycomob logo and a loading bar will be present, indicating to the user that the application will soon start.

![Loading screen mockup](image)

Figure 3-2: A mock up image of how I envisioned the loading screen.

3.1.2 Disclaimer

Mushroom hunting can be dangerous, if a person decides with his or her own judgment to ingest a mushroom that turns out to be inedible or poisonous. Because of this issue, I do not want to be held responsible for a person’s actions, hence the need for a disclaimer. I decided that the Disclaimer screen would be shown every time Mycomob is loaded, instead of once when the application is loaded for the first time, which is quite customary of many applications. This ensures that the user understands that the Disclaimer is not to be taken for granted and that the terms are serious. The user has to scroll down after the Disclaimer text is complete and select AGREE or DISAGREE. If the user agrees, it will continue onto the main menu of Mycomob. If the user disagrees, then the application will exit and return the user to the main menu of the phone. The Disclaimer text is as follows:

“Mycomob was created to serve as a knowledge base for those interested in mushroom hunting and identification. Despite Mycomob trying to provide correct written information and imagery of the various mushroom species found wild in Finland, the makers of Mycomob are in no way responsible for the decisions made by the users of the application and cannot be held responsible for any actions taken, in example, ingesting of any mushrooms picked.

Please remember, as a rule of thumb, DO NOT eat any mushroom that have
not been properly identified - it can be toxic and lead to ill implications."

3.1.3 Main menu

The Main menu contains a list-like view of all the usable sections. To the left are icons depicting each section and to the right are the text names of each section.
3.1.4 Hunting tips

Intended for beginner and intermediate mushroom hunters, this section gives useful advice on how to safely hunt. The majority of the text comprises of standard hunting information, which can usually be found in mushroom hunting guidebooks and mushroom related websites. Even though this section can contain much more text since there are many types of advice to give to hunters, the tips in this section are what I feel are fundamental points which all users must know. I wrote the tips myself and the text was inspired from mushroom related books and websites I studied before I went mushroom hunting for the first time. The Hunting tips are as follows:

- Keep your eyes sharp! Sometimes it can be hard to find mushrooms if you're not in the right state of mind but after a bit of practice you'll be able to find them within their surroundings!

- Bring with you a knife (one specified for mushroom hunting preferably), a basket or paper container (plastic can make the mushrooms soggy) where you can put mushrooms you pick and a small brush to clean the mushrooms. Sometimes the weather can be a bit gloomy when picking so remember to keep warm and dry with the appropriate clothing.

- Keep the different types of mushrooms in separate containers or in different areas in your basket. If it so happens you picked a poisonous mushroom, that single mushroom can contaminate the others. If this occurs, dispose of all the mushrooms.

- DO NOT eat any mushroom(s), which have not been identified properly. There are many poisonous species of mushrooms, which can look similar to edible ones. Please get a proper identification first through the application (utilise the different sections such as easy identification, smart search and the mushroom catalogue) or through another source such as the Internet, there are many pages dedicated to mushroom hunting and identification.

- If you're a beginner or intermediate hunter, it's best to stay away from "LBMs" or "little brown mushrooms." It can be very difficult to distinguish one type from another due to their similar characteristics.

- Pick only mushrooms which are young, but not immature ones. The more mature the mushroom is, the less likely it will taste good when prepared and can also cause allergic reactions to some people. Older mushrooms can also have insect infestations such as maggots, which wouldn't be nice to eat would it. ;)

- Carefully clean the edible mushrooms you've picked with a brush making sure that any debris such as dirt or insects are removed if you plan on preparing them to eat. Cut the mushrooms in half to see if there have been any insect infestations.
- Lastly, if you consume any edible mushrooms, start off by eating a small amount first. Some people can get allergic reactions to some edible mushrooms.

![Hunting Tips](image1)

![Hunting Tips](image2)

Figure 3-5: a) A screen capture of the Hunting tips section in the Alpha version of Mycomob. b) A mock up image of how I envisioned the Hunting tip section’s GUI.

### 3.1.5 Easy identification

Easy identification comprises of a tutorial on how to take photos of mushrooms, intended for beginner hunters. This section works in conjunction with the mobile phone’s camera and GPRS connection, in which the images photographed by the user will be sent via the application to the Mycomob web server (explained in Chapter five). A mushroom hunting expert will receive the images and try to identify the mushroom. If the expert can identify the mushroom correctly, then the species information will be sent back to the user’s mobile phone via GPRS, where the user can view the reply in an area of the section entitled “Check for incoming answer.”

The user is given instructions to take photos of the following:

- The mushroom within its natural surroundings, also known as its habitat.
- The top of the mushroom’s cap.
- Gills, pore layer or teeth layer on the underside of the mushroom’s cap.
- The mushroom’s stem.

The Easy identification section was inspired from the many Internet mushroom related websites that provide identification in an almost similar fashion. A person takes photos of the mushroom he or she wants identified and then posts it on the mushroom related website’s bulletin board. There is a downside to this, sometimes a reply isn’t made until a few hours or a few days after the post was made, depending
on how much traffic goes to the bulletin board. Plus, not all the replies might be correct, anyone can reply and could give false information about the identification intentionally or by mistake.

I had asked two colleagues from the Internet who have been studying Mycology and are well versed in mushroom hunting for years to do the identifications for the Easy identification section. In theory, Easy identification would work well if there were many experienced mushroom hunters available to identify 24 hours a day seven days a week. But for example, due to the different time zones and my two colleagues being situated in North America, Finnish hunters might not receive a quick enough reply. Though, if a reply is made, it will be much more accurate than for example, the user asking for identification help from a mushroom hunting site where anyone and everyone can give possibly false identifications.

Although ideally for beginner hunters, if the Easy identification section does not work well for a user, he or she can try out other sections of Mycomob.

Figure 3-6: a) A mock up image of how I envisioned the first screen of the Easy Identification section. b) A mock up image of how I envisioned the last screen of the Easy identification section.

3.1.6 Smart search

Considered the highlight of Mycomob, the Smart search is intended for intermediate mushroom hunters, though, any type of user can try to utilise it (as with the other sections within the application).

In the Smart search, the user is asked a series of multiple-choice questions, mainly pertaining to the mushroom’s physical characteristics. The user has the option to check one or more answers listed below a question. Some answer options can be tricky for an intermediate mushroom hunter to understand, due to the terms being Mycology related. So, some of the answer options are underlined in blue where a
user can click on the word to find out its definition. There are also answer options that have a 30x30 pixel or 10x10 pixel illustration next to it to visually aid the user.

Figure 3-7: Example of 3 30x30 pixel illustrations that is included next to an answer choice. From l-r: mushroom cap shape, mushroom stem shape, mushroom gill appearance.

The questions and answers in the Smart search were inspired from the issues noted in mushroom hunting guide books and mushroom related websites on what a person must closely observe in order to be successful with identification. Listed below are all the questions that I comprised:

- What type of habitat did you find the mushroom(s) in?
- Does the mushroom have a cap?
- What is the shape of the mushroom’s cap?
- What colour is the mushroom’s cap?
- How does the surface of the mushroom’s cap look/feel like?
- How does the margin of the mushroom’s cap look like?
- What best describes how the mushroom’s body looks like?
- What sort of fertile layer does the mushroom have?
- How does the mushroom’s gills look? What is its shape?
- What is the colour of the fertile layer (gills, pores, teeth)?
- Does the mushroom “bleed” a milky substance from its gills?
- What colour is the milk?
- Does the milky substance appear to change colour?
- What colour did the milky substance change to?
- Did the tissue where the milky substance was “bleeding” from change colour?
- What colour is the tissue where the milky substance was “bleeding” from?
- Does the mushroom have a stem?
- How does the shape of the mushroom’s stem look like?
- What colour is the stem of the mushroom?
- How does the surface of the mushroom’s stem look/feel like?
- Is there a veil present on the mushroom between the stem and the cap?
- How does the veil look?
- Is there a ring present on the mushroom between the stem and the cap?
- How does the ring look like?
- If the mushroom has been bruised by heavy handling for example, has the flesh on the cap changed colour?
- What colour did the cap flesh change to after bruising?
- If the mushroom has been bruised by, for example, heavy handling, has the flesh on the stem changed colour?
- What colour did the stem flesh change to after bruising?
- Has the fertile layer (gills, pores, teeth on the underside of a cap) been bruised and changed colour?
- What colour did the fertile layer change to after bruising?
- Did the mushroom you pick drop some spores, if so, what colour are the spores?

Not all of the 30 questions listed above will be asked from the user. It all depends on what mushroom the user wants to identify – some mushrooms have less physical characteristics to observe than other mushrooms. The number of questions asked also matters on how accurately the user answers the questions. There is a margin of error, if for example the user answers a colour question incorrectly, the Smart search engine will ask another question to make up for the incorrectly answered question.

Figure 3-8: a) A screen capture of the first screen of the Smart search section in the Alpha version of Mycomob. b) A screen capture of the last screen of the Smart search section in the Alpha version of Mycomob.
After the user has answered a sufficient number of questions, the Smart search engine will deduct from the database of mushroom species within Mycomob a list of mushroom names which the engine believes is the best matching to the mushroom the user wants identified. The user can then select a single mushroom name and view its written description along with its colour images. After the user has carefully studied the written description and images of one mushroom the smart search has suggested, he or she can go back to the list of mushroom names to view other descriptions. From this, the user can get a good idea of what mushroom he or she has picked.

Although it is possible to list just one mushroom species if the user has accurately answered all questions and the answers match all the characteristics of one particular mushroom on the database, it has been decided that two or more will be listed for sake of safety and liability. There is always a risk of legal trouble if the user decides to ingest a mushroom, especially if the mushroom happens to be poisonous.

3.1.7 Mushroom catalogue

The Mushroom catalogue is linked to the sections Easy identification, Smart search and Myco dictionary. Intended for all users, this section can majority be used by advanced users who think he or she might know what mushroom species he or she might have picked but need to double check just to be sure.

When a user is within the Mushroom catalogue, a list of mushroom names in alphabetical order is shown. Three tabs to the top of the list allows the user to select a view of mushroom names they are most comfortable with, whether it’s the Finnish common names, English common names or Latin names. The user can then select a particular mushroom and view its written description. Above the written description of
the mushroom are two thumbnail photos depicting the mushroom in its natural habitat and also close-ups of its physical characteristics to aid in visual identification. Each image also has the name of its photographer to the side of the image. If the user wants to view a larger version of the mushroom image, he or she can click on the image and a 200x130 pixel sized image will appear on the screen. The user has the ability to navigate back to the individual mushroom description after viewing the enlarged image.

The written descriptions have the following listed format:

- Common name of the mushroom in Finnish
- Common name of the mushroom in English
- Latin name of the mushroom
- Family the mushroom belongs to
- Edibility information, if the mushroom is edible, inedible or poisonous.
- Two thumbnail-like images of the mushroom will be shown, where the user can click on a thumbnail to view the larger (200x130 pixel) image. The images show the general profile of the mushroom in its habitat.
- Habitat information
- Season information, describing what season or months the mushrooms can be found growing.
- Cap description, shape, size and colour.
- Fertile layer description, from gill shape, orientation and colour to pore layer and teeth layer colour.
- Milk description (if applicable to the mushroom species) with milk colour and staining information.
- Veil description (if applicable to the mushroom species), look, colour and feel.
- Stem description, from colour, size, shape and texture.
- Flesh description, colour, bruising colour (if applicable), look and feel.
- Spore colour.
- Additional information for some mushrooms if applicable, i.e. if a mushroom is inedible and can be “prehandled” (boiled) for edibility.
Figure 3-10: a) A screen capture of the first screen of the Mushroom catalogue section in the Alpha version of Mycomob. b) A screen capture of an individual mushroom description in the Alpha version of Mycomob.

Figure 3-11: a) A mock up image of how I envisioned the first screen of the Mushroom catalogue section. b) A mock up image of how I envisioned an individual mushroom description.

If there are some words within the descriptions that users are likely to be unfamiliar with, the words will be underlined and in blue which indicates that the user can click on the word to view its definition.
3.1.8 Myco dictionary

Myco dictionary is intended for beginners and intermediate mushroom hunters. Similar to the Mushroom catalogue, the Myco dictionary section contains a list of mushroom/Mycology related words in alphabetical order. When a user selects a word, the word’s definition appears. Myco dictionary works in conjunction with the Mushroom catalogue’s individual mushroom species written descriptions.

All the Mycological related terms have been inspired from words defined in mushroom guide books and mushroom related websites.

![Myco Dictionary](image1.png)

![Mock up of Myco Dictionary](image2.png)

Figure 3-12: a) A screen capture of the Myco dictionary section in the Alpha version of Mycomob. b) A mock up image of how I envisioned the Myco dictionary section’s GUI.

3.1.9 Patch tracker

Although intended for all types of users, this section requires the user to have a GPS unit, which he or she can use in conjunction with their mobile. A GPS unit is a satellite based navigation system, which accurately shows the position of where the unit is on a graphical map. GPS units are widely used as a navigation system aid for cars. For example, a screen is located on the dashboard of a car and a person can enter in destination details and get driving instructions, or see in real time their position on a map, which is constantly updated.

With the Patch tracker, a user can see a graphical map on the mobile screen with a point, which indicates their position. A user can put different coloured points on the map to track anything from certain mushroom patches, as mushrooms tend to grow in the same spot every year, to where he or she has entered a forest so the user can navigate back to exit.
The Patch tracker was inspired from the second mushroom hunt I had been on. I ventured with my mother in law into a small forest by her backyard. The size of the forest is apparently comparable to that of a city block, just 100 meters. After being unsuccessful in finding any edibles, my mother in law decided to head back home and I started to hunt by myself. After finding a big patch of yellow Chanterelle mushrooms, I decided to go back to my mother in law’s house to inform her. There was a slight problem, I didn’t know how to get back and walked around in circles for a good 45 minutes. During the 45 minutes, I used my mobile phone to call my husband, but hadn’t charged my phone previously so lost connection. I started to cry due to fear and never getting lost in this manner before. Luckily, my husband and his stepfather had gone on a search for me and found me just 15 meters from their house. Although a funny situation, there is a possibility that others can relate. So for those who are unfamiliar with navigating through forests or areas where there’s little sense of direction, the Patch tracker can help.

![Patch Tracker](image)

Figure 3-13: A mock up image of how I envision the Patch tracker section’s GUI.

### 3.1.10 Acknowledgements

As suggested by the title of this section, users can view the list of people’s names who have contributed to Mycomob. It also lists the names of the photographers who took the photographs of all the mushroom species images in the Mushroom catalogue section. Due to the fact that it would be virtually impossible to take photos of all the mushroom species in Finland myself, I had to rely on the Internet to collect mushroom images. All the images used are copyrighted by the photographer, but, permission was asked via e-mail to use the images for Mycomob.
3.1.11 Help

The Help section is intended for all types of users and is available from all sections within Mycomob by clicking on the left select button. A popup will appear with different options, one of them being Help. Users can find information on how to navigate through the application, such as what keys to use and a summary of what each section is so the user would know which is best for he or she to start off with or use.

In order to make Mycomob a truly “user friendly” mobile application, I felt that the Help section was a mandatory addition. Some users might figure out how to use certain sections by navigating through random sections within the application, whilst others may read the Help text to learn how to use the application first time around. If looked at or not, a Help section should always been included within an application.
3.2 Section concept not realized

When I had first come up with the section concepts, there were originally 12 that were to be implemented into Mycomob. Since then, I decided to drop one of the sections entitled Mushroom images.

Mushroom images was intended for all types of users, in which the section would allow users to manage the images they had taken, from example, the Easy identification section. A user would have been able to rename images, browse through their photos in thumbnail and full sized view and share their images with friends by being able to upload an image to the Mycomob web bulletin board or via MMS (multimedia message) to another person’s mobile.

As these particular features are already possible for the user to do outside of the Mycomob application, in example, the images taken within the application will automatically be stored in a gallery folder within the mobile phone by default, there was little need to implement this section.
Chapter 4: Mycomob graphical user interface design

A graphical user interface is an integral part of an application; it can make or break how well the product does with the general public. For example, an application can be considered “excellent” if many hours of programming have gone into making it, but if the user interface is too hard for the end user to learn or use, the application could fail in gaining acceptance. If an interface is easy for any type of user to use and it’s aesthetically pleasing, it is a well-designed application.21

As stated earlier, it is essential that a user must have previous experience with using a mobile phone in order to operate Mycomob. This is due to the fact that the application must be installed onto the mobile, which can prove to be a difficult task for someone who doesn’t know much about mobile phone technology. There will be tutorials for beginner mobile phone users on how to install Mycomob on the website where it will be available for download.

4.1 Series 60 and Symbian

Due to the many Nokia phone users in Finland and Mycomob first being launched for Finnish mushroom hunters, the application will initially be made for phones that run on Symbian OS (Operating System). The Series 60, 80 and 90 phones launched by Nokia all use Symbian OS.

In 1998, the companies Psion, Nokia, Ericsson (now known as Sony Ericsson) and Motorola joined together to create the Symbian OS based from Psion’s EPOC32 platform22. The aim was to develop an industry standard OS for mobile phones and handheld personal computers. Due to Symbian being made especially for such devices, which tend to have limited resources, an advantage Symbian has over other mobile operating systems is that it’s more memory and power efficient. Developing applications for Symbian OS is flexible, it supports programming languages such as Java (J2 Mobile Edition/MIDP 1.0 and 2.0), C++, Python, Perl, VB (Visual Basic), OPL (Open Programming Language) and Simkin23.

4.1.1 Series 60, 80 and 90 GUI design

From low resolution monochromatic LCD (Liquid Crystal Displays) screens found on past model mobile phones to high resolution which supports millions of colours TFT (Thin Film Transistor) screens on present mobile phones, this is a prime example of mobile screen technology advancing as the years progress. With the various mobile

phone models out on the market, this means that there are also various screen resolutions available as well.

Series 60 phones support multiple resolutions and millions of colours with the original display size being 176x208 pixels. With the introduction of Series 60 second edition, two other resolutions are also supported, QVGA (Quarter Video Graphics Array) with a display size of 240x320 pixels and Double, 352x416 pixels. Series 80 phones have a display size of 640x200 pixels, and the Series 90 phone (only the 7710 was released) display is 640x320 pixels.

![Figure 4-1: From left to right, Series 60 Nokia phone examples 6680 (176x208), N80 (352x416) and E61 (240x320). Series 80 Nokia phone example, the Communicator 9300 (640x200). Series 90 Nokia phone example, 7710 (640x320).](image)

It is essential that the user interface of a mobile application caters to the various display resolutions. Instead of spending countless hours developing multiple variations of a single application so that the GUI fits on all screen sizes, the use of a scalable GUI on one coded application would be more beneficial. A scalable GUI essentially means that the application can detect the screen resolution of the mobile and can scale itself to the appropriate size, all specified within the coding behind the application. Applications with scalable GUIs are supported by Series 60 phones.

### 4.1.2 Mycomob's GUI

When designing the GUI for Mycomob, the first issue that I thought was important was to make the GUI as simple and straightforward enough for a beginner mobile phone user to use. If a beginner mobile phone user can understand Mycomob's functionality and can easily navigate through it without problems, then it's apparent that intermediate and advanced mobile phone users could use it too.

As mentioned previously, the Main menu of Mycomob is a list-like view with icons to the left and the section titles to the right. The layout was mostly inspired from the main menu list view of Nokia phones. If a user is familiar in using the Nokia main

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menu, then the chances are the user can easily adapt to the Mycomob Main menu. Most importantly, all the main functions (sections and Help) can be easily accessed through the Main menu.

With the Main menu's GUI in a simple list-like view, it can easily adapt to the different screen resolutions of Series 60 phones. If the screen resolution is small, the user would simply have to scroll down to see the section options that do not fit within the screen. If the screen resolution is large, all the sections can be seen easily within the screen without the user having to scroll down. No matter what screen resolution the phone is, the general look of the Main menu will remain the same.

It came across my mind to make the Main menu innovative and dynamic, such as having icons that rotate and appear 3D-like when selected and disappear into the background when inactive. But, I decided not to go towards the “aesthetically pleasing” approach due to usability issues and also the fact that such functions can make Mycomob slow to use, since most of the mobile’s resources could be used up in order to make these “special effects” work. There is the possibility that a user might have other applications running simultaneously, so using as few resources as possible is better, giving quicker response times to the user. Also, such a menu could not be scaled properly on different screen resolutions, making it look distorted.

4.1.3 Function keys

In order for a user to smoothly navigate through Mycomob, it is important to ensure that all the function keys work with its usual commands. For example, the left “softkey” is used for positive commands such as next, select and start. The right “softkey” is used for negative commands such as back, close and exit.26

Another key utilised is the “rocker” key, the key labelled with arrows that is commonly used for navigating up, down, left and right. Selecting and positive commands can be made by pressing the middle of the rocker key.

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4.1.4 Icon design

Icons are an integral part of an application’s user interface. If an icon’s metaphor can easily portray to a user what section of the application it represents without the user having to read a written description of what the section is, then it is considered a well-designed icon.\(^\text{27}\)

Many icon metaphors are used over and over again in different applications, due to users being familiar with the metaphors and automatically knowing what the section or function the icons represent. For example, in Figure 4-3, the print function in Microsoft Word is simply represented by a printer icon, straightforward in its message. Some parts of a metaphor can also be utilised to portray its message. For example, a flash (which looks like a star), usually represents the function to create something new.

Being an application icon designer by profession, I enjoyed coming up with metaphors for the icons representing each section in Mycomob. I wanted to incorporate icons in the Main menu to give it more of an aesthetic appeal. It came as a challenge to design the icons, due to the sections being unique in name and function compared to standard functions found in applications such as “New” and

“Open.” Also, I am used to designing icons for Windows applications that are generally bigger in size than icons used for mobile applications. This was my first time designing and creating icons for a mobile application.

Each icon has a mushroom image incorporated into it, since the theme of the application is about mushrooms. I designed each individual icon with metaphors that I thought users can associate it with the section it represents. The description of each icon is as follows:

Hunting tips – A single mushroom is to the left of a notepad with a checklist and a pencil.

Easy identification – A single mushroom is shown in three different ways. To the left the mushroom in its young form, in the middle the mushroom sliced in half and to the right, the mushroom with its fertile layer (gills) shown.

Smart search – A magnifying glass (metaphor commonly associated with the search function) magnifying part of the cap of a mushroom.

Mushroom catalogue – A golden mushroom emblem on a book that resembles an encyclopaedia.

Myco dictionary – A cluster of three mushrooms next to the letter’s A-Z.

Patch tracker – An old style paper treasure map with dashed lines leading to a patch of mushrooms.

Mushroom images (not added into the Mycomob mobile application, but, I had created the icon before it was pulled) – two photographs showing a cluster of three mushrooms growing on grass. One photograph is placed on top of the other.

About and acknowledgements – Two Mycomob logos placed next to each other.

Figure 4-4: The 44x29 list view icons designed for the different Mycomob sections that appear on the main menu.

Each Mycomob Main menu icon is 44x29 pixels in size. This is the standard size of a “list-view” icon for some S60 phones. The application icon, the icon that a user first
encounters on the Nokia main menu, is 29x29 pixels in size. The icons were created in Adobe Illustrator and saved in PNG (Portable Network Graphics) format. XML (Extensible Markup Language) coding was then applied to the icon images and saved in SVG (Scalable Vector Graphics) format. SVG images work in conjunction with the Symbian OS’ scalable UI, which essentially means that the icons can scale to a proper size, where pixilation or distortion should not be an issue no matter what screen resolution the application is viewed on.

4.2 Miscellaneous design – the Mycomob logo

After I had come up with the name, Mycomob, I instantaneously pictured in my head possible logos and colours for the application and website. I wanted to keep the logo simple, yet, incorporate something mushroom related into the logo.

The first draft I had done in Adobe Illustrator was the logo I ended up sticking with. It was quite simple to create. I ended up using the font Helvetica and a -60 tracking, or spacing between each character, was used. The “myco” part of the logo is in bold and is maroon in colour, while the “mob” is in normal text and is simply black in colour. Above the b in “mob” I had incorporated a maroon coloured “cap.” The vertical line of the letter b represents a mushroom’s stem.

Figure 4-5: A cropped screen capture of the Adobe Illustrator file after creating the official Mycomob logo.

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Chapter 5: The technology behind Mycomob

Although I had become fascinated and learned how to program mobile phone applications after attending Jürgen Scheible’s Rapid Mobile Application Prototyping workshop, my programming skills are very minimal. My knowledge and experience would not be sufficient enough to program Mycomob, let alone any other type of complex application. I had enlisted the help of Lauri Svan, an experienced and excellent programmer from Media Lab, to program the first version of Mycomob. I also looked to Lauri for advice on what programming language would be the best to use for the application.

5.1 Picking a programming language

There were three important objectives when it came to picking out the programming language for Mycomob:

- That Mycomob could eventually run across different platforms. This would mean that it’d be sufficient and logical to first program Mycomob in a language that is recognised by all smart phones. If Mycomob was first programmed in a language recognised only by Symbian phones, then it would mean extra work and hassle for the programmer since it’d have to be programmed in another language in order for it to work with other smart phones.

- That Mycomob can run independently without the user having to execute a language interpreter first. An example of this is with Python running on Symbian phones. A user would first have to run the Python program, then execute the Python coded program. Problems with this is it involves an extra step for users which can be confusing to some and it would require a user to find on the net or install the language interpreter, since it doesn’t come standard as a prepackage on phones.

- That Mycomob wouldn’t be “buggy,” or, the user having problems with the application due to the programming language. An example of this is Python on Symbian phones. Although Python is becoming a popular language to program mobile applications with, it doesn’t fully support some items working alongside a phone, such as a GPS unit. Plus, applications coded in Python can be unstable.

Two languages that could fulfil these objectives are C++ and J2ME. The majority of smart phones out on the market come prepackaged with C++ and J2ME libraries, which can be described as a collection of code and data that aids in the development of software. These two languages are well supported by the operating system of smart phones, for example, phones running Symbian29.

With C++, the libraries tend to be platform dependent. This essentially means more work for the programmer. The application needs to be programmed for each platform separately, instead of programming one application to work on all platforms. With an exception to Nokia Symbian phones, there are no C++ platforms available for mobiles made by other manufacturers, for example, Samsung and Sony Ericsson phones.

With J2ME, there are better sets of libraries readily available on phones making it possible for programming only one application to work cross platform. Also, applications programmed with J2ME tend to have better support when utilising a phone’s features such as the camera or Bluetooth functionality. Thus, it was decided that J2ME would be the best solution for Mycomob.

5.2 Mycomob’s architecture

Mycomob’s architecture (the way an application is designed) is client-server, in which the client is the Mycomob application located on a user’s mobile phone and the server is a computer connected to the Internet, containing all mushroom data. With a client-server architecture, the client requests data from the server and receives data back. With the case of Mycomob, its architecture is a bit more complicated than just client-server, it is three-tier, a client-server architecture in which there is a presentation tier, logic tier and a data tier.

5.2.1 The presentation tier

The presentation tier is best known as the part of the application that translates tasks and results into information that a user can easily interpret. The presentation tier is located client-side, in the case of Mycomob, is the J2ME application installed on a user’s mobile. Mycomob’s presentation tier contains three components (units that comprise an application) – the display (GUI), the controller (J2ME Mobile Information Device Profile, MIDP for short) and the data gateway (entrance to the data tier).

The display within the presentation tier is what the user sees and interacts with. Mycomob’s display consists of all the sections’ GUI layouts (images such as icons and files) and Thinlet, compiled Java files known as a “Java class.” I helped Lauri create some of the GUIs in a free Java GUI development application called ThinG (http://thing.sourceforge.net/), which creates the layouts in XUL format. XUL is XML (Extensible Markup Language) User Interface Language that was developed by the Mozilla Foundation, the foundation responsible for the creation of web browsers such

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as Firefox and Thunderbird\textsuperscript{32}. XUL uses coding from existing web based programming such as CSS (Cascading Style Sheets used to define the look such as colours, fonts and layout of a webpage coded in HTML) and Java Script (web based scripting language adding effects to a webpage such as mouseovers or opening up popup windows in a web browser). The Thinlet Java class handles some events, actions in an application that triggers a function. An example of an event that the Thinlet class handles is when a user browses through the UI components (clicking “next” within a section).

The controller mainly handles complex events, such as the user clicking on a section within the Main menu of Mycomob. It generally controls the application flow. Known as the Mycomob core, the controller is J2ME MIDP 2.0, a Java API (Application Program Interface) used for creating mobile applications. An API is a set of routines in libraries that extend a programming language’s functionality\textsuperscript{33}.

When even more complex events are performed, such as the user answering questions within the Smart search section, the controller requests data that is not stored in the application itself. This is when the data gateway comes into action. It


sends the request from the controller to the logic tier, comparable to opening a session with the server-side. The technology behind the data gateway is Net Caboodle (http://www.netcaboodle.com), a gateway specifically for wireless devices to connect to a server. The Net Caboodle solution being used for Mycomob is J2EE (Java 2 Platform Enterprise Edition), a programming language developed for running multi-tier Java applications from a server. Net Caboodle is not a free solution, but, Lauri was able to acquire a free Academic license for the software valid until the end of 2006.

The client-side application with components from the presentation tier was programmed by Lauri. Lauri had used Java development applications such as Netbeans version 5.5 (http://www.netbeans.org) and Eclipse (http://www.eclipse.org) to compile the Mycomob application. Both applications are freeware, meaning the application doesn’t need to be bought in order for developers to utilise it. An extra J2ME mobile media API will be used for the Easy identification section. The mobile media API 1.0 (JSR 135) allows the application to utilise the camera feature of the phone.

Sections such as the Loading screen, Disclaimer, Hunting tips and Acknowledgements have events and actions that only occur within the presentation tier. The Easy identification, Smart search, Mushroom catalogue and the Myco dictionary sections have some events that occur in the presentation tier, but the majority of the events and actions get passed to the logic tier.

5.2.2 The logic tier

The logic tier is best known for making the logical decisions, calculations and evaluations of some complex events requested from the presentation tier. The logic tier essentially moves and processes some data between the presentation tier and the data tier. Located server-side, the presentation tier comprises of three components – the data gateway (Net Caboodle), web server and a decision tree.

Net Caboodle on the logic tier receives events from the data gateway (also Net Caboodle) in the presentation tier and relays it to the Mycomob web server via HTTP (Hyper Text Transfer Protocol), a protocol used to transmit data files via the World Wide Web.

On the Mycomob web server is a decision tree, used only for the Smart search section of the application. A decision tree is a model for making decisions, where cases of all possible outcomes are generated from sets of decisions, in order to find

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an answer. For example, when a user answers the first question in the Smart search, there are thousands of possibilities of mushrooms that the user had found. As the user starts to answer more questions, the application “walks down” the decision tree and eventually finds one mushroom that fits a particular answer set.

The cases of possible outcomes were created by Lauri using a freeware data mining (the process of analyzing large amounts of data to identify patterns or relationships) software called Orange (http://magix.fri.uni-lj.si/orange/), which uses the C4.5 algorithm, a decision tree generating algorithm. In total, there were approximately 801,000 cases generated from mushroom information (habitat, physical characteristics) inputted onto a Microsoft Access database form. The data entry of these forms were done by myself. All the cases were then fed into a Java script called Groovy (http://groovy.codehaus.org/), in which the decision tree was created on the Mycomob web server.

![Figure 5-2: A screen capture of the MS Access database checklist form with mushroom information used for the Smart Search case generations in Orange.](image)

### 5.2.3 The data tier

The data tier is where large data, such as the mushroom written descriptions and images used in the Mushroom catalogue section, are stored and retrieved by the logic tier to be sent to the presentation tier. Just like the Smart search mushroom information, the written descriptions and images are stored on a Microsoft Access database, in which all the written information was inputted into a form.

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Figure 5-3: A screen capture from the MS Access database form where all the mushroom information for the Mushroom catalogue section was entered.

All queries for mushroom data from the data tier to the logic tier are sent via SQL (Structured Query Language). SQL is a popular interactive programming language used to receive, update, create and modify data from a database. Developed by IBM in the 70s, SQL has become an ISO (International Standard Organization) standard, making SQL a command method to communicate with databases.39

Figure 5-4: A diagram of the three-tier architecture of Mycomob. Illustrated are the different components comprising each tier and the general flow of the application.
5.3 Technical and miscellaneous problems

There were quite a few problems that occurred during the programming process. Due to this, a significant number of changes were made to the flow and functionality of the application, making it considerably different to how I had originally envisioned it to be.

5.3.1 Function keys and GUI changes

We had decided to use Thinlet and XUL to create the GUIs because it was the best and easiest option to implement with the amount of working time allocated. But, using these two technologies created differences with how the function keys and GUIs were supposed to work. Listed below are the changes that had to be made in order for Mycomob to function and functions that were not implemented.

- In the Disclaimer section, the GUI contains two Windows-like buttons for AGREE and DISAGREE. I wanted AGREE to be assigned to the left softkey and DISAGREE to the right. But, Lauri had no choice with the time allowance to implement this button feature, due to it being difficult to assign these functions to the keys.

- In the Main menu, the left softkey is labelled “Options” with the options of “Next,” “Help,” “Close” and “Exit.” The “Next” function doesn’t work. I originally wanted the left softkey to have the function of “Select” and “Help,” in which “Select” allows the user to advance to another section of the application. Also, as “Exit” is a negative function, I had wanted it to be assigned to the right softkey. “Close” does not have to be included as “Exit” performs the same function. But, Nokia phones add the “Close” function to the left softkey automatically. The right softkey has the function of “Back,” which takes the user back to the Disclaimer screen. This is a useless function, as most likely the user would want to just exit the application instead of being taken back a step. Thinlet automatically assigns the “Exit” function to the left softkey, since other manufactures’ mobiles use the left softkey for negative functions. To change the functions of the keys, it would mean Lauri would have to redo the structure of the application completely.

- In all the sections, the left and right softkeys have the same functions as those in the Main menu. But, the option of opening the “Myco dictionary” was added to the left softkey function. I had ideally wanted Mycology related words within the body of text in the sections to be highlighted in blue, so that a user could click on it and would be automatically taken to the word’s definition. This was impossible to implement as Thinlet only allows for regular text to be added within the content section. This proved to be a problem with the individual mushroom description areas, as some text needs to be bold or coloured in order for the user to read through it carefully. At the moment, all the text in each section looks “jumbled” together.
- The GUI of the Mushroom catalogue section is difficult to use due to the user having to go through 3 levels of navigation. To the top are tabs which indicates the language which the user can choose and an A-Z tree list at the bottom. In order for the user to change to the A-Z tree list, the user must click on the left softkey first and select “Next.” Then, in order for the user to expand the tree listing to see all the mushroom names, the user needs to click on the right arrow of the rocker key. The rocker key is usually used for navigating up, down, left, right and selecting. Since the user cannot middle click on the A-Z tree list to expand it, the user can be confused and easily deterred from loading this section. I had originally wanted the GUI to be in the same sort of fashion, with the three languages in tabs to the top of the screen where the user can select the desired language by pressing the left or right arrows on the rocker key. Then, the screen to the bottom has the list of names in the chosen language and a search, similar to the contacts list search in Nokia phones, where the user can enter in the first letter of the name, second letter, third, etc till the list narrows down the user’s search. The user can select a name on the list by pressing up or down on the rocker key and navigate to an individual mushroom description by either pressing the left softkey “Options” and choosing “Select,” or middle pressing the rocker key.

- The GUI of the Myco dictionary section can also prove to be difficult for a user to navigate through, as he or she would have to go through two levels of navigation. To the top is screen with a listing of Mycology related words and to the bottom is a screen where the user can view a word’s definition. The user can scroll down the list of words by using the up and down function of the rocker key. In order for the user to see a word’s definition, the word needs to be highlighted and the user can either press the middle of the rocker key or to click “Options” of the left softkey and select “Next.” Originally I had wanted this screen to appear in a similar view, where the words are in a box at the top and the definition would appear automatically in a box at the bottom when the user scrolls down the list of words, without the user having to press anything.

5.3.2 Smart search problems

When the cases of possible outcomes were being built, there was a problem that the data mining application Orange was taking up too much of the computer’s resources. We tried to build the complete set of cases on three different computers, in which all of them had sufficient amount of RAM (random-access memory, common computer memory used by programs to perform tasks)40, one computer had one gigabyte and the other two had two gigabytes of RAM. Despite this, the computers couldn’t complete the task of creating all the cases – it was determined that an ordinary household computer wouldn’t be able to handle this task.

Almost half of the cases were dropped in order for the decision tree to be built and implemented onto the Mycomob web server. Due to this, there is the problem that the cases that were generated only supports 15 out of the 30 questions, thus meaning there is less of a margin of error. If a user answers a question incorrectly, there is a great chance that the Smart search would give the user an incorrect identification.

The flow of the Smart search had also been affected, due to the C4.5 algorithm used for the decision tree. I had originally envisioned the Smart search to list more than one mushroom species after the user had completed answering the questions. Also, the user has the option to answer each question with only one answer per question. I wanted it to be structured where the user could select multiple answers for a single question. But, at the moment, only one mushroom species is listed and only one answer can be selected due to it being a complicated task for Lauri to configure the decision tree to accommodate to these criteria.

5.3.3 Patch tracker problems

Although there is the possibility to use the Java location API (JSR 179), in which it utilises the Bluetooth function of the mobile to communicate with a GPS unit\(^{41}\) for the Patch tracker section, it was not implemented into Mycomob. The main reason the section wasn’t implemented is due to the fact that there are no free, full coverage, high resolution aerial shots of Finland. There are Finnish sites that offer satellite imagery, such as www.igglo.fi and www.02.fi, but the resolution isn’t sufficient enough for the Patch tracker section and it only offers detailed images of big cities such as Helsinki, Tampere and Turku. The graphical maps need to be as accurate as possible in order for people to be able to save points on the map. Since mushroom patches can grow quite close to each other, with lower resolution maps, the points a user marks on the map will look too close to each other and the locations saved won’t be accurate enough.

5.3.4 Easy identification and Loading screen problems

The Easy identification and Loading screen sections were to be programmed into the Alpha version of Mycomob in early October. But, Lauri had contracted viral meningitis at the same time these two sections were to be completed and could not work on them due to his weak condition. Though, the task of implementing these sections later on will be doable, as Lauri had said that both are pretty straightforward and easy sections to program.

5.3.5 Application icon problems

Due to an unknown reason, Mycomob’s application icon appears altered on different Nokia Series 60 mobile phones. For example, on the Nokia 6680, the application icon is the correct size (29x29 pixels), but is not centred and appears displaced to the left. On Nokia N series phones, the application icon is centred, but is 10x10 pixels in size. Although an aesthetic problem, it must be corrected and will be in the future.

5.3 Open source

The term open source can be described as any application in which the source code is made openly available to users or developers, allowing them to work on, modify or learn from the coding\(^{42}\). With the majority of applications out on the market, whether Windows based, Mac or mobile related, the source code is normally kept private. I had decided to make Mycomob an open source application due to the following factors:

- I consider user feedback very important. There are many intelligent developers and users out there who can contribute ideas on how to make Mycomob better, whether by enhancing the user interface, the different sections, usability or even adding more features to the application which hadn’t been thought of previously. Users and developers have the ability to join in the on going development process of Mycomob.

- Debugging the application, or, looking for errors in the coding which could make Mycomob not function very well, would be an easier task. The more people there are to look and modify the coding, the better the functionality can be.

- Users using mobiles that run on a different operating system other than Symbian can debug or modify the coding so that Mycomob would have better support on these mobiles.

- The intent of Mycomob is so people can learn about mushroom identification. I also feel that people should be able to learn from Mycomob’s coding as well.

5.3.1 Contributing back to the Java community

Whilst Lauri was programming Mycomob, he was able to transfer a regular expression parser from J2SE (Java Standard Edition, used to create Java applications for computers) and convert it to be used with J2ME. This has not been done yet and is considered a contribution to the Java community – other Java developers creating mobile applications may find the expression parser useful. To

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parse means to break down programming text into smaller parts so it can be analyzed and compiled. The regular expression parser parses text in various formats, in example, URLs (Uniform Resource Locator, the address of a resource on the Internet), protocols (a set of rules that define the format of communication between systems i.e. a phone and a web server), ports (connection point) and paths (location of a file or a directory on a system).

5.4 Software licensing

Although Mycomob’s code will be publicly available, there are some restrictions that will apply to its usage. For example, I do not want people to take the coding, modify it, package it under a new name and sell it for their own personal profit. It would be heartbreaking to see all the hard work Lauri and I had done being exploited. This is why I had chosen to license Mycomob’s coding and also the database containing the mushroom related information.

Mycomob’s coding is licensed under GNU LGPL (Lesser General Public License), which was originally published in 1991 by Richard Stallman, the founder of the Free Software Foundation. GNU LGPL is a free software license, originally intended for software libraries, but can also be applied for applications. A free software license states four freedoms granted for the user:

1. The freedom of the user to run the application for any purpose
2. The freedom to study how the application works and adapt it to the user’s needs
3. The freedom to redistribute copies of the application to help the user’s "neighbour."
4. The freedom to improve the application and release improvements done by the user to the public for the community’s benefit.

In order for the four freedoms to be granted under the GNU LGPL, users must comply with three principle conditions:

1. Credit must be given to the application developers if the application is distributed.
2. If a user modifies an application’s coding, the modified application must be licensed under GNU LGPL.
3. If the application is distributed by the user, proof of the GNU LGPL must accompany the application.


The mushroom information contained on the Mycomob’s database is licensed under the Creative Commons Attribution Non-commercial Share Alike license (by-nc-sa). This license is one of six licenses released by The Creative Commons (CC), a non-profit organization founded in 2001 that is dedicated to the modification and sharing of creative works. The CC by-nc-sa license states that there are two freedoms granted for the user:

1. To copy and distribute the work (database).
2. To make derivatives of the work (database).

In order for the two freedoms to be granted under the CC by-nc-sa license, users must comply with three principle conditions:

1. Credit must be given to the database developers.
2. That the work (database) is not used for commercial purposes.
3. If the user modifies the work (database) and intends to release it, the work should be licensed under the CC by-nc-sa license.\(^{45}\)

To show that these two licenses pertain to Mycomob, the license deeds are linked from the Mycomob website, where the application will be distributed to the public.

Figure 5-5: The two images which will appear on the Mycomob website which links to the appropriate license deeds situated on the Creative Commons website.

\(^{45}\) Creative Commons. Last modified 2006, last visited 11th of October 2006. Creative Commons Deed Attribution-NonCommercial-ShareAlike 2.5. The Creative Commons. [WWW-document]. <http://creativecommons.org/licenses/by-nc-sa/2.5/>.
Chapter 6: User testing

In order to verify that an application’s flow and functionality works smoothly and correctly, user testing must be conducted before it is launched to the general public. As a rule of thumb, it is important to know that users are not designers and designers are not users. Hence, it is not advisable for people who work on an application to test the application flow and functionality themselves, but to have people who have nothing to do with the project to participate in user testing. This is due to bias, those who design and program the application will have a “blind eye” to how the application’s flow or functionality is, possibly not acknowledging any errors which might occur.

Given that I want the user interface of Mycomob to be as user friendly as possible, the ideal participants for user testing would be beginner and intermediate phone users. If a participant has advanced skills at using a mobile phone, then the user could easily learn how to navigate through a complex user interface quickly without problems. It would be a different case for a beginner or an intermediate participant. If he/she is presented with a complex user interface, it is possible that the participant will become frustrated and give up using the application if it takes a long time for the user to figure out the functionality. Testing with a target group of beginner and intermediate users will allow designers and developers of an application to seek out any usability issues that could eventually deter users from using a product.

After attending the Interface Prototyping workshop run by Kirsti Lehtimäki and Markku Reunanen in Spring of 2006, I had conducted a three day long user testing session of three main sections within Mycomob with my workshop group members, Linus Roune, Lin Xi, Björn Saunes and Viki Ölgod. The three main sections tested were the Main menu, Mushroom catalogue and Easy identification, though the Loading screen, Disclaimer and Help sections were also utilised during testing.

6.1 Low-fi paper prototyping

At the time of the Interface Prototyping workshop, the user interface of Mycomob was not programmed – it was still in its concept stage. Because of this, low-fi prototyping was the best solution to test my ideas, to make sure that it can work in theory. Low-fi prototyping includes testing the flow of an application by using simple tools, such as paper models.

6.1.1 Pre testing questionnaire

On the first day of user testing, I explained verbally and drew up flow charts for my group members of how I mentally envisioned the three sections within Mycomob. Our group came up with questions relevant to mobiles and mushroom hunting to ask the test users during the first interview. The purpose of the questions are to aid us in deciding what type of user the participant is, whether a beginner, intermediate or advanced mobile phone user or a beginner, intermediate or advanced mushroom hunter. The following questions were what we came up with:
1. Do you own a mobile phone? If so what make is it?
2. How often do you use your mobile and for what purpose?
3. What mobile phone subscription do you have, in example, do you use data transfer, GPRS?
4. Do you find it easy, intermediate or difficult to navigate through the main menu of your mobile phone?
5. What language do you have your mobile phone set to?
6. When you usually look for information, in example current events, in what way do you look for it? Do you browse the Internet, look in the encyclopaedia, watch TV?
7. In what level of mushroom hunting do you consider yourself? Beginners, intermediate or expert level?
8. Do you personally think that a mobile application could be useful for mushroom hunters to try and identify different species?

Later on the same day, we had interviewed two people, Penne Parviainen who works at the market/post office across from UIAH and Heidi Hammalisto, a student at UIAH. After we had asked them the questions, we found that both are intermediate mobile phone users who use their phones daily for making phone calls and text messaging. Penne considered himself an expert mushroom hunter and Heidi a beginner. From this, it was apparent that Penne would be an ideal tester for the Mushroom catalogue section and Heidi for the Easy identification area of Mycomob.

6.1.2 Paper prototype and the testing tasks

On the second day, we worked on the paper prototype and came up with the tasks the participants would have to complete during the testing. Due to Mycomob first being launched for phones running Symbian OS, we had printed out a large image of a Nokia 6680, a Series 60 phone and mounted it on cardboard to act as the test device. The Nokia main menu, Nokia applications folder, Mycomob loading screen, Disclaimer section, Main menu, Easy identification, Mushroom catalogue and miscellaneous screens (select, exit, help) were drawn on blue paper fitted within slits to show the changing mobile screens. We had decided that the participants must use the paper mobile prototype just like it was a real mobile. The participants would have to touch the buttons to navigate through the system. Three main buttons are used, the top left softkey usually used for selecting, the rocker key to navigate, select and take a photo and the top right softkey to exit and go back within the application.
From the data we had acquired from the participants’ first interviews, we had come up with tasks which we felt would fit with their expertise of mushroom hunting and mobile usage. The following tasks were thought up to use with Penne:

1. You are within the main menu of the phone. Click on the applications Folder. Once inside the applications folder, open up Mycomob.

2. It is your first time using Mycomob and you want to see what information the application has on Kantarelli. Find which area of the application to go into and use the appropriate area to find written description and images on Kantarelli.

3. Repeat steps from question two, except change Kantarelli with Korvasieni.

4. Imagine that you’re in a forest and you had just found a patch of mushrooms which you think might be edible but you’re not entirely too sure. Go through the Mycomob main menu, select the appropriate area to try and identify the mushrooms.

With Penne, the tasks went from using areas of the application where it matched his knowledge on hunting then to areas where it would be considered “easy” or possibly unnecessary for him to use. With Heidi, we had given her the same tasks though step four which would require her to use the easy identification area was used first and her tasks then became “harder” (steps three and four from Penne’s tasks).

6.1.3 Testing, results and post testing questionnaire

On the third day, each member of our group was given a role to play out during the user testing. I was the test leader (the person who asked the user all the task questions), Lin Xi and Björn Saunes were the “computer” (people who acted as how
the phone would function), Linus Roune operated the sound and video camera and Viki Ölgod took notes of the entire procedure.

Before the user testing, we had made sure that the prototype and video/sound were in order, that the participant felt comfortable in his/her environment, that he or she understood how to operate the paper mobile such as using the buttons and camera on the phone, instructed them that they were just testing the system none of their actions are considered “wrong” and asked their permission if they could be recorded during the testing session.

During the testing we had encouraged both participants to think out loud while performing the different tasks. Penne had done this fine without hesitation, while Heidi was hesitant to explain out loud despite being advised to before and during testing. Both users had completed the various tasks correctly and learned the navigational system of Mycomob quite quickly. Each task took approximately three to eight minutes to complete. With Penne, he had given feedback pertaining to his knowledge of mushrooms after completing each task. When the user testing was complete, I had asked the users these post-testing questions:

1. How was the experience of using the Mycomob navigation? Was it straightforward or difficult to comprehend?
2. Would this application be useful for you if you went mushroom hunting?
3. How did it feel to be able to test the application for us?
4. Was it interesting or fun to test this application?

From the results and post-testing questionnaire, both Penne and Heidi found that navigating through Mycomob was easy and straightforward. Both had said that Mycomob would be highly useful if they were out mushroom hunting, as there would be no need to carry a book with them in the forest. Neither one of them had problems using the paper prototype, though Heidi had expressed that she had some difficulties due to the fact that it didn’t have the right colours and fonts as a real mobile phone would have.
6.2 Mycomob Alpha version user testing

After the low-fi prototype user testing, I was able to draw conclusions from the results that the user interface and the general flow of the sections I had conceptualized were satisfactory. But, as the participants had tested with a paper prototype, there could be differences with how a user would interact with the application if it’s on a mobile phone. Thus, testing had to be done when a user is in the scenario of being in the wild, hunting for mushrooms with the Mycomob application on the user’s mobile phone.

The Alpha version of Mycomob had a considerable number of changes done to the user interface of some sections and the functionality of the function keys, due to restrictions with using Thinlet and XUL technology for the GUIs. Because of the changes made, the application was in need of new user testing, due to the uncertainty that the application’s flow would still be considered user friendly.

User testing of Mycomob Alpha version was performed in early October 2006, during the mushroom hunting season in Finland. The testing took half a day and was conducted in a small forest in Myllylampi, Vihti, 40 kilometres away from Helsinki. There were five testing participants involved: Juha Puuperä, Kirsty Wells, Henna Leppämäki, Topi Hirvonen and Richard Read.

6.2.1 Pre testing questionnaire

The participants were interviewed and asked the same mobile and mushroom related pre questions from the low-fi user testing. The questions were asked two days before the testing day. From the questions, I had found that the majority of the participants were intermediate mobile phone users, except for Kirsty, who was considered a beginner. All the participants owned Nokia mobile phones, ranging from Series 40 to Series 80 models. Everyone uses their mobile phones daily for calls and text messaging, while Henna and Richard had said they sometimes use their mobiles for MMS and GPRS functionalities. The majority of the participants have their mobile’s language set to English, whilst Henna has hers in Finnish. All of the participants considered themselves beginners mushroom hunters with the exception of Topi, who considered himself an intermediate hunter.

6.2.2 Testing tasks

After the data was acquired from the participants’ first interviews, I had come up with the tasks that each participant would have to perform. Although in the low-fi user testing I had set tasks for the participants depending on their mobile phone usage and mushroom hunting capabilities, in this user testing, I had decided that all users would perform the same tasks. The following tasks were what I came up with:

1. You are within the main menu of the phone. Click on the Mycomob icon to start the application.
2. After the application has started, read the Disclaimer text and chose either AGREE or DISAGREE.

3. (If the user selects AGREE) You are now within the Mycomob Main menu. Utilise the Hunting tips section.

4. (If the user selects AGREE) You are now within the Mycomob Main menu. Explore the ground for a mushroom you would like identified. Utilise the Easy Identification section.

5. (If the user selects AGREE) You are now within the Mycomob Main menu. Explore the ground for a mushroom you would like identified. Utilise the Smart search section.

6.2.3 Testing and results

Before user testing had commenced, I made sure that all material utilised during the testing was functioning and complete. Three Series 60 phones were used, of which two were Nokia 6680s and the other was a Nokia N71. Richard and Henna used their own phones for the testing, Richard with a Nokia 9300i Communicator (Series 80) and Henna with a Nokia 6260 (Series 60). I had made sure that all the phones had sufficient amount of battery power, had SIM cards with GPRS included in the phone subscription and had the Mycomob application preinstalled with the application shortcut within the Nokia main menu. As I was conducting the user testing myself, I had the role of asking the participants questions, documenting the participants performing the tasks by writing down notes and taking pictures and in one scenario, acted as the “computer.”

For the first task, all the participants had completed it quite quickly. As it was Kirsty’s first time using a Series 60 mobile phone, it took her more than a minute to find the button to open up the phone’s main menu. After she found the main menu, it didn’t take her long to find the Mycomob application icon.

For the second task, all the participants had understood to utilise the rocker key to scroll down the screen to read the disclaimer text. But, as the graphical user interface has an AGREE and DISAGREE button that was not tied to the left or right softkeys, each participant expressed confusion as to how to pick AGREE. The left softkey had the option of “Next” and “Exit” whilst the right softkey was labelled “Help” and if pressed, went to the Help section of the application. The participants had eventually figured out how to select the AGREE button, but after a few minutes of discussing it out loud with each other.

For the third task, all the participants found it easy to navigate from the Mycomob Main menu to the Hunting tips section. As with the Disclaimer text, each participant understood to utilise the rocker key to scroll down the screen. Each user also understood how to go back to the Mycomob Main menu from the Hunting tips section by pressing on the right softkey with the option “Back.”

As the Easy identification section was not completed prior to the user testing, I enacted how the functionality and flow of the section would be like. I asked the participants if each knew how to use the camera on the mobile phone.
After a couple of minutes of fumbling with the phone and turning on the camera function, each user had verbally given feedback of knowing how to take a photograph. As Richard’s phone did not have a camera, he did not participate in the task.

Before the users took their first photograph, I had verbally instructed them on what photographs they are to take and showed them four illustrations of how the composition of the photographs should be. I also had told them that after they took a photo, they had to each show me the photograph on their mobile screen. The first image the users took was of a mushroom within its habitat. None of the users were confused by the instructions and completed this part of the task smoothly. After the first image, three other images were taken, one of the mushroom’s cap, the fertile layer and the stem. When all the users had completed the task, I verbally informed them of what mushroom species they had picked and told them that in the application, the mushroom species name would be listed in which they could then click on the name and view its description.

![Henna Leppämäki taking a photo of a mushroom’s cap during the testing of the Easy identification section.](image)

For the fourth task, the participants had to go back into the Mycomob application since they had to utilise the camera outside of the application. As the participants understood how to navigate through the Disclaimer section after the second task, it took only a minute for all the participants to get back into the Mycomob Main menu. I had instructed each participant to spread out to find a mushroom they wanted to identify, but to stay within a close range so I could go to them if they flagged me down.

The participants then navigated into the Smart search section and all of them had flagged me when a prompt popped up asking, “Allow application Mycomob to use network and send or receive data?” I had instructed them to pick “yes” and on which Internet connection to pick. Afterwards, the participants started answering questions prompted by the Smart search. Topi had a problem with the application closing on him when he answered the first question. He then restarted the application and tried again, at which point it worked. Kirsty, Henna and Juha expressed confusion as to
what some of the answer choices mean, for example the word coniferous. Due to the fact that the Alpha version does not have the highlighted Mycology related text that gives a user the definition of a word he/she might not recognise, these three participants had difficulty in performing the task. It took a few minutes for Kirsty and Henna to perform the task, but they tried to answer each question as best as they could. Juha had given up after the third question, but decided to restart the task and completed his second attempt.

After the participants had finished answering the Smart search questions, a screen that had a button entitled “Click here to see match” appeared. Like the Disclaimer buttons, the participants had difficulty in knowing how to view the mushroom identified. Each participant took approximately a minute to find out how to view the mushroom description. The Smart search had given each participant the wrong identification. Verbal discontent and laughter was a unanimous response.

Though not a part of the official tasks given, Juha, Topi and Henna had expressed wanting to utilise the Mushroom catalogue section of Mycomob. I had originally thought that since the participants are mainly beginner and intermediate mushroom hunters, it would be difficult for them to perform a task dealing with the Mushroom catalogue. But as the three participants were eager to test this section, I allowed them to and observed how each navigated through it.

As the Mushroom catalogue is separated into three tabs with mushrooms listed in Finnish, English and Latin, the three participants were at first confused as to how to pick a desired language. Once each had figured it out, all three of them had difficulty in knowing how to expand the A-Z tree to see the list of mushroom names. After two minutes of trial and error of what possible buttons could expand the tree, Juha, Topi and Henna were able to view an individual mushroom description after figuring out that the A-Z tree could be expanded by pressing the right arrow of the rocker key.
6.2.4 Post testing questionnaire and feedback

When the four tasks were completed, I had gathered all the participants around me for an informal question and answer session in the forest. I had asked them the following questions:

1. How was the experience of using the Mycomob navigation? Was it straightforward or difficult to comprehend?
2. Was the Hunting tips, Easy Identification and Smart search sections useful for you?
3. Would you use Mycomob if you went out mushroom hunting?

With the first question, all the participants had expressed their difficulty in navigating through the Disclaimer section. Though the participants had all successfully navigated to the Main menu, each one had said the functionality of how to AGREE or DISAGREE was not straightforward. Kirsty had expressed difficulty in knowing what button to use for selecting, as she is not used to using the rocker key due to it not being on her Nokia mobile. She had also said that the wording of the left softkeys could be changed to make it clearer to the user, for example instead of “Next,” make it “Select.”

All had said navigating through the Main menu was simple. Though Topi had expressed difficulties with exiting the application via the Main menu, as the right softkey selection of “Back” took him back to the Disclaimer in which he had to click on DISAGREE to exit the application.

As Topi, Juha and Henna had browsed through the Mushroom catalogue section, each had said that the navigation was confusing. Henna had suggested that the mushroom names could be listed by Family groups, as it can be easier for some to find a certain mushroom description in this fashion. All three had said that the individual mushroom descriptions were useful and the two images included for each description were helpful in identification.

With the second question, all the participants agreed that the Easy identification section would be very useful if the identification was done quickly. Kirsty had said that if the identification took longer than 10 minutes, then she would just leave the mushroom behind or take the mushroom home with her and look for the identification on the Internet.

Despite the Smart search section giving results that did not match any of the participants mushrooms in question, all the participants expressed interest in using the section if it were to work. Topi and Richard had said that it would be better if the Smart search would give multiple results instead of just one. Topi and Juha mentioned that it took their phone a long time to connect to the Smart search questions via the GPRS connection and suggested to implement a “Wait a moment…loading” screen. Juha said he didn’t know if the section was working correctly since there was nothing happening for a minute and said that application feedback of a loading screen would make him know that the application hadn’t
crashed. All participants had said that this section would be useful and as expressed by Kirsty, the Smart search section is “awesome.”

With the third question, Juha, Henna, Kirsty and Richard had said the Hunting tips section was very useful for them, as they are beginner mushroom hunters. Kirsty had said that when she saw a small brown mushroom, she remembered that the Hunting tips text said to avoid “LBMs” (“little brown mushrooms”) and she had taken its advice. Despite problems with the GUIs and general navigation of the application, all participants declared that they would definitely use Mycomob the next time they would go mushroom hunting. The participants also unanimously agreed that the theory behind the different sections of the application is better than using a mushroom hunting guidebook in the wild, as it is convenient and quick to receive identification help.

6.2.5 Minor changes inspired from user feedback

Although the majority of the navigation issues brought up by the participants can’t be changed in the Alpha version of Mycomob due to restrictions with using Thinlet for the GUIs, some issues can be resolved easily. After the user testing, Lauri and I had gone through the results and decided to change the following:

- In the Disclaimer section, when a user highlights either the AGREE or DISAGREE button, the button changes to a light colour.
- The left softkey function of “Next” has been changed to “Next item” to give a bit of clarification to the user.
Chapter 7: Mycomob the web community

The Mycomob website was created to serve as the portal for the Mycomob mobile application. From the website, people will be able to:

1. Download different versions of the Mycomob mobile application. At first, version 1 will be on the site, but as time progresses and the program is updated, more versions will be available for download.

2. Gather information on how to contribute to the application. For example, the open source code of Mycomob will be available for download.

3. Contribute any additional mushroom written information or images for the Mycomob application. Since Mycomob is only for Finnish hunters, users interested in the application from around the world can give information pertaining to mushroom hunting in their home countries. The database containing all the mushroom species information will be available for people to download.

4. Converse with people who are interested in mushroom hunting or in mushrooms in general from around the world.

7.1 Mycomob website sections

For the time being, the website is quite simple and doesn’t contain an overwhelming amount of information. It comprises of the following links/sections:

1. Home, where users can navigate to the front page of the site. Here, there will be updated news about the application or any changes to the website.

2. About, where users can find out information on those who have contributed to the application and community, as well as how the concept of Mycomob was developed.

3. Downloads, an area where users can download the mobile application as well as acquire the open source code and the database with the mushroom species. A link to licensing information and text (GNU LGPL and Creative Commons by-nc-sa) is also included in this section.

4. Community, where users can follow a link to the Mycomob bulletin board, an area where registered users can discuss various subjects, both mushroom and non-mushroom related. The bulletin board is the highlight of the Mycomob website, as it is the way the community could move forward since people can be attracted to the site by word of mouth of registered users who find the site/bulletin board informative to use. The bulletin board will essentially be the initial way for people interested in Mycomob to communicate with each other.
5. Links, an area where people can find links to mushroom, mobile and miscellaneous related websites.

6. Acknowledgements is quite similar to the section entitled the same on the Mycomob mobile application. It’s where people can view a list of contributors names as well as the photographers names. When more people contribute to the application, then their name will be listed if permission is granted.

7. Contact is where people can find contact information of the makers of Mycomob. Here, any enquiries can be made via an e-mail form.

On the footer area of the website is a link to the disclaimer section, where users can read text similar to the disclaimer section of the Mycomob application. The disclaimer section was added to the website for the same purposes, so people know that the makers of Mycomob are not responsible for the ingestion of any mushrooms he or she has hunted for.

![Figure 7-1: A screen capture of the Mycomob website, shown is the links section.](image)

**7.2 Website design and development**

Webdesign and development has been my passion and profession for over nine years. The creation of the Mycomob website was the easiest task for me to complete for the entire thesis work.
The initial design of the site was created using Adobe Photoshop. I had started on a 760x420 pixel sized document, which is the size of a website without vertical or horizontal scrolling within a browser screen in an 800x600 resolution. I first created the banner area, or, the top section of a website. In the banner area I incorporated the Mycomob logo to the left and to the right are a patch of mushrooms growing from grass with the sun and sky behind it. I drew the mushrooms in Adobe Illustrator and imported them into Photoshop.

I then created the links area, which is a very simple grey coloured bar with two thinner, lighter, grey bars below it. This grey gradient bar effect is simply for decoration. The text symbolizing the links on the links bar, is a pixel font size 10. The footer area of the website, or, the bottom section of a website, is similar in look to the links bar, except the two grey bars are the same colour as the two grey bars below the links bar. The area where content is placed is outlined with a light grey, three points in size. To the right of the entire site design is a subtle drop shadow.

After completing the design in Photoshop, I then imported the file into Adobe Image Ready. In Image Ready, I “cut” the site design into pieces and added rollovers to the links bar. A rollover is when a mouse cursor is hovered over a certain area and it changes state. In the case of the links, when a mouse cursor is hovered over it, the colour behind each individual link text changes to a dark grey. Once all the image pieces were “cut,” Image Ready automatically saved all the individual cut images into a web friendly image format (JPEG) and an HTML (Hyper Text Markup Language) file. HTML is the most popular markup language used to create web pages\(^\text{46}\).

The HTML file saved by Image Ready contained all the smaller images put into individual cells within a table and retained the same look and size as the site design I made in Photoshop. I had imported the HTML file into Macromedia Dreamweaver and cleaned up the HTML code to fit my needs. I had also incorporated CSS (Cascading Style Sheets) into the HTML files, in which the content font (Arial, Helvetica) will remain the same and any text links will automatically have a mouseover. A mouseover is essentially the same as a rollover, in which the colour of the link text changes colour as a mouse cursor hovers over it. All content in each section was added into the HTML files using Dreamweaver and images within the content were created or edited within Adobe Photoshop.

### 7.3 Domain registration and web hosting

In order to make the Mycomob application and website look official and professional, the website should be accessible on the web through its own domain name. Thankfully due to Mycomob being a unique name, it was quite easy for me to register through GoDaddy.com the domains mycomob.com, .org and .net. I had registered the three domain names for two years each. If I want to keep the domain names after two years, it will be possible to extend the domain name contract.

Web hosting is essentially where the three domain names and the website files will be kept and projected on the World Wide Web. Although it is normal to buy hosting packages through the various hosting companies that advertise themselves online, I was able to get free hosting from MindMedia, a company in the US. MindMedia hosts various mushroom related websites and had given me free hosting after explaining the concept of Mycomob to them. Some of the incentives of Mycomob’s hosting with MindMedia is unlimited bandwidth (no monetary charge dependant on how much information is downloaded or uploaded from the site), unlimited amount of email accounts and the installation of phpBB.

7.4 Mycomob’s bulletin board

phpBB (http://www.phpbb.com) is an open source bulletin board system programmed in PHP (Hypertext Preprocessor) that works in conjunction with the Mycomob web server. PHP is a server-side programming language with embedded HTML, allowing web developers to create dynamic websites, for example, PHP is commonly used to make bulletin board systems\(^47\). With phpBB, the GUI is flexible, there are many GUI templates available on the Internet that can be implemented and creating CSS files are available to change the colours and styles of the tables, rows of tables and fonts. There is the ability to create categories and forums under specific categories within phpBB. The Mycomob bulletin contains three categories, All about Mycomob, All about mushrooms and All about everything else.

The All about Mycomob category contain the following forums:

- Mycomob the mobile application, where members interested in the Mycomob can discuss with the creators or with others about its features.
- Open source Mycomob, where members can discuss or ask questions about the open source coding.
- Database contributions, where members can ask questions, give comments or submit their contributions regarding the mushroom related information of the Mycomob database.

The All about mushroom category contains the following forums:

- Mushroom hunting and identification, where members interested in mushroom hunting and need identification help can receive proper guidance.
- Cultivation! An area where members can discuss edible mushroom cultivation techniques and share their experiences.
- Cooking with mushrooms, where members can share their mushroom related recipes or enquire about how to prepare mushrooms for food.
- Gatherings and mushroom forays, where members can arrange meetings with each other such as going on mushroom hunting excursions.

The All about everything else category contains the following forums:

- Technology talk, where members can talk about anything from upcoming mobile devices to gadgets.
- Chillout lounge, a place for off topic discussion.
- General announcements and feedback, where Mycomob administrators can announce new issues regarding the community and where members can give their feedback on the bulletin board and site.

Figure 7-2: A screen capture of the Mycomob bulletin board.
Chapter 8: Project log and reflection

With any project, schedules and plans can always stray away from its projected completion date. There were times when I had thought that I would have to delay the submission of my final thesis project to Spring of 2007 and times where I thought that plans were ahead of schedule. Although the Mycomob mobile application is not complete and the functionality is not up to par, the Alpha version has been produced.

8.1 Data entry work log

I first started researching, collecting and writing all of the mushroom related content (text and images) for Mycomob in January 2006. It was the most tedious part of the project. In total, it took one and a half months of full time work to complete these tasks. The majority of the information that I collected was taken from mushroom hunting books and mushroom related websites that contained information on the 300 mushroom species commonly found in Finnish nature. Since some mushroom related websites might contain incorrect information on the individual mushroom species, I had to check each individual description with information found in the books to make sure that the information going into Mycomob is as accurate as it can be.

An additional three weeks worth of work spread out over a two month period was spent adding all the mushroom descriptions into the Microsoft Access database form that Lauri had created. I manually entered each individual mushroom species description for the Mushroom catalogue section and checked the appropriate mushroom characteristic checkboxes for the Smart search.

I spent approximately half a week resizing full sized mushroom images to 200x130 pixel sized images for the Mushroom catalogue section. I also added the names of the photographers into each individual image. In total, there were just under 600 resized images, two images per mushroom description.

8.2 Design work log

The first piece of design work that I did was the creation of the Mycomob logo. As I already had a clear idea of how it should look, creating the logo took less than half a day. This was also the case when it came to designing the website for Mycomob, it took two days to design and program. Since I had worked in a demanding and fast pace web design/development job a few years ago, I've been disciplined to design and create websites within a short time scale. On the other hand, it took me a week to configure the PHP bulletin board for the Mycomob web community and to fill in content into the Mycomob website.

When it came to designing graphics for the Mycomob mobile application such as the icons and the small mushroom characteristic thumbnails for the Smart search, I had little experience with creating small yet detailed images. I had been working for a month as an icon designer before I started working on the mobile graphics. Within
that month of working, I had learned the fundamental rules behind icon design and working within a small template. This proved to be difficult due to the limited amount of pixels you can work with. In total, it took me approximately two weeks to design and create 10 Mycomob icons and 53 Smart search illustrations.

Designing the GUI and application/sections flow of Mycomob took approximately two months to do over the span of the whole project period. I had come up with the sections comprising Mycomob before starting any sort of work. My vision of how these sections would function came to me within a day after coming up with the concept of Mycomob. Conceptualizing the user interface and flow of the application was not difficult and also took less than a day for me to realize. Some of the GUIs and the flow of the different sections that I had envisioned were not implemented into the Alpha version of Mycomob due to restrictions with using XUL and Thinlet. Creating the GUIs took quite a bit of time due to the constant design changes and checks. First I would do the XUL coding within ThinG, then push it to the phone to see if it looked acceptable on the mobile’s screen. If there were any problems, then I would have to look through the XUL file and change some of the coding. The steps were repeated until an acceptable GUI for each section was achieved.

8.3 Programming work log

The programming of Mycomob was about two months work for Lauri, spread over a five month period. The original estimated date of completion for Mycomob was the last week of August, just in time for the start of the edible mushroom season. But, due to Lauri’s own final thesis project and prior obligations, Mycomob was completed one month and three weeks behind schedule.

The first item Lauri had programmed for Mycomob was the Microsoft Access database, so that I could input in the mushroom related content as soon as possible. After we had decided to use J2ME for the programming language, Lauri researched on the best, quickest and easiest methods and J2ME development applications and libraries to use to develop each Mycomob section. There were many J2ME development applications we had found which looked promising, but the applications were either trial versions, crashed on us or ended up not being a suitable tool to use. Lauri did eventually find freeware J2ME development applications that aided the programming process.

Although Mycomob’s completion was behind schedule, the application is acceptable in my terms. Lauri had done a wonderful job despite having to juggle working on other projects and unfortunately not being able to complete some tasks after he had contracted meningitis towards the end of the project. Lauri had also taken the time to explain to me what J2ME libraries worked with each mobile functionality and corresponding section. Knowing that I am not well versed in Java programming, Lauri was patient and made sure that I understood the programming side of the project.
8.4 Work process and communication

Since Lauri and I both have full-time employment, the majority of the work we did for Mycomob was done during our spare time. For example, when we got home from work or during the weekends. Because of our busy schedules, we only met a few times in person at the Media Lab to discuss the project. Most of those meetings, however, occurred when the project first kicked-off.

Despite not meeting in person frequently, we did communicate with each other everyday for the past nine months via the Internet. We e-mailed and used chat programs such as Microsoft Messenger, Skype and IRC (Internet relay chat) to inform each other on the status of our work, send files and discuss project accomplishments and setbacks. Although an informal way of working on a project, there were some positive aspects with our method of communication. For example, we both worked in our own comfortable environment, making it less stressful for the both of us.
Chapter 9: Future developments

Mycomob has the potential to become a popular hunting and identification guide amongst current and future mushroom hunting enthusiasts. Because of this, Lauri and I have decided that we will continue to work on developing Mycomob, even though it had originally started off as my final thesis project.

Since the application is full of bugs and the GUIs in some sections need to be altered, the first task Lauri has is to debug and refine the application. Another high priority on our task list is to implement the Easy identification section and to eventually get the Patch tracker section to work. The Patch tracker section can be done when free maps are available, or, we could rethink how the section could function without the use of maps. It will take quite a bit of time to refine the application and some of Lauri’s coding can be changed completely with a better solution. If this is the case, it would mean many hours of Lauri’s hard work would be lost, but, this is all a part of the development process.

9.1 Software Development stages

As mentioned previously, Mycomob is in the Alpha version stage of its development. When an application is developed, there are various stages which define how the application has progressed and how much further development it may require. The stages are as follows:

1. Pre-Alpha, where the functionality and flow of an application is still being designed.

2. Alpha, where the application needs to be debugged but more features have been added to it. User testing usually occurs during the Alpha stage.

3. Beta, where the application has been debugged and all the features have been implemented. Beta versions of an application can be released to the general public to test for any further bugs to be found.

4. Stable stage (also known as the first version), where all the important bugs have been removed from the application and all features have been implemented successfully.\(^{48}\)

Our goal is to have the first working version of Mycomob complete by Spring of 2007. With the decision to keep Mycomob open source, Lauri and I hope to get more feedback and programming manpower from others interested in furthering the development of Mycomob. Only time will tell how long it will take for people to find out about Mycomob through the website or by word of mouth.

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9.2 Mycomob mobile application developments

I would like Mycomob to be used in different countries around the world where mushroom hunting is a popular pastime. Since Mycomob only contains information about the mushroom species commonly found in Finland, this would mean that people from other countries willing to help develop Mycomob would need to compile a list of mushroom species found specifically in their country and manipulate the Microsoft Access database form which is available for download from the Mycomob website. From this, people can add or delete any mushroom species currently on the database and save it. The database with new information can then be applied to the Mycomob mobile application and be used for that specific country.

It would also be ideal if Mycomob can be translated into different languages, making it easier for users to use Mycomob if it's in their mother tongue. Again, people from different countries would need to download the open source code of Mycomob to make any language changes. I hope that the current version of Mycomob will be translated into Finnish, since the application already caters to Finland.

Since all the mushroom information is stored and retrieved from a server, one possible improvement may be to have the database client-side, bundled within the application. Although it would make the application much bigger in size, it would mean that some sections wouldn't need to fetch information via GPRS from the Mycomob web server and processes would be much quicker. Also, if for example a person goes mushroom hunting and uses Mycomob in a forest where he or she doesn't get a very good signal, then the user cannot utilise the integral sections of Mycomob, such as the Smart search, Mushroom catalogue and the Myco dictionary.

If there are people from North America interested in utilizing and contributing to Mycomob, then there is the possibility that the Patch tracker section can be implemented for them first. Websites such as Google maps already offer free, high resolution aerial imagery for the North American continent and can be used in conjunction with a mobile GPS unit.

There is also the possibility to add new sections or expand the functionality of existing sections in Mycomob. As the participants in the Alpha version user testing had given great feedback, some of the suggestions made can be implemented into the application. For example, Henna’s idea for the Mushroom catalogue of listing the mushrooms by what Family group the mushrooms belong to. Or, Topi and Juha’s idea of implementing a loading screen for sections of Mycomob that need to retrieve data from the web server. Lauri and I will be open minded to any feedback from users who have tried the application.

9.3 Mycomob website developments

As Mycomob gains more recognition from people around the world, further information will need to be added to the website. Some of the developments I’d like to implement in the near future are:
1. To expand on the Downloads section of the website, if there are multiple versions of Mycomob available for different countries. I would like to have a graphic of the different countries of the world where users can click on their country of choice and download the localized version of Mycomob.

2. To have some of the sections of the Mycomob mobile application available in a web version, for example, the Smart search, Mushroom catalogue and Myco dictionary. A single database with all the mushroom species descriptions and images from different countries could be created. From this, users can just go to the website and view individual mushroom descriptions by searching an alphabetical list of mushroom names. A web version of the Smart search can also be implemented, as it would work on the same principles as the mobile version. The Smart search and Myco dictionary could also retrieve information from the central database.

3. To have a Java demo of the mobile application available for users to try out on the website. This would give an insight to prospective users on how to navigate through the application and to see its functionality. It could also possibly encourage people to upgrade their mobile phone to a smart phone if their current phone cannot accommodate Mycomob.

4. To expand the Mycomob web community by implementing an IRC (Internet relay chat) server. This would allow people interested in mushrooms to chat to each other in real time.

5. To have advertisements of mushroom related stores on the site, for example, stores that sell mushroom cultivation equipment. Companies can buy advertisement space on the site, such as a graphical banner that will appear on the front page or on the main menu of the web community’s forum. Users can then click on the graphical banner and will be redirected to the company’s site automatically. This will be beneficial for these companies as it can generate revenue for them. It will also benefit Mycomob, the money made from advertisements on the site can be used for paying for web hosting, since at the moment, hosting is free. Or, the money can be used to pay moderators on the web community who give identification help on a regular basis.

6. To eventually make the website mobile friendly, so people can download the Mycomob application directly to their phone to install it, instead of downloading the application to their computer and pushing it to their phone via Bluetooth. It will also make more sense to make the website mobile friendly since the website evolves around the Mycomob mobile application.

9.4 Mycomob: not just for mushrooms

I have observed that many of the Finnish people that I’ve encountered who enjoy hunting for mushrooms also enjoy other nature related activities, such as picking berries from bushes or the forest floor when they are in season. Just like
mushrooms, there are many types of berries in the countryside that are either edible or inedible.

Although the data in the Mycomob mobile application pertains to just mushrooms, the application’s framework (or skeleton) can accommodate to any type of information. For example, if the database had instead information on berry species, the application can be used to then help people identify berries. Each section can remain functionally the same, just the content and some user interface elements, such as icons, need to be manipulated to whatever the theme of the application is. In the case of the example I gave, Mycomob could then be known as Berrymob.

Since there are thousands of species of plants and animals which can be found in nature, I have come up with the idea of making a “modified” version of Mycomob. This “modified” version will aid people in identifying not just mushrooms, but anything pertaining to nature - from the different species of birds to edible plants found in a specific area or country. For example, the Patch Tracker idea for Mycomob could be used for this application, especially for bird watchers. As bird watchers like to mark on maps where they have observed a particular bird species, then the Patch tracker idea can be beneficial for this purpose.

![Figure 9-1: Example of different species of tits and chickadees, which bird watcher enthusiasts tend to observe. Bird species information can be used with the Mycomob application framework and database.](image)

Not only is the mobile application’s framework flexible for categorizing and identifying, but the web community to accompany the application can also accommodate to any theme.
Chapter 10: Conclusion

A year has passed since the Media Lab kick off in Ruotsipyhätää where I first conjured up the concept for Mycomob during a nature walk. Since then, the Alpha version of the Mycomob mobile application and web community have been realized.

During the production of the Mycomob mobile application, I have designed and created all the graphical components such as the icons. From this, I was able to acquire new skills and knowledge in designing graphics specifically for mobile devices. I also designed the general flow and functionality of all the sections within Mycomob which allowed me to put in practice my interaction and usability design knowledge. It was concluded from the results of the low-fi prototype user testing that all types of mobile phone users, whether beginner, intermediate or advance could easily utilise and navigate through the application. Though the flow and functionality of some sections in the Alpha version of Mycomob were changed from how I originally conceptualized them, these sections can be improved in the future.

As an extra bonus, I was able to expand my knowledge with the different types of technologies available to create mobile applications with. Although Lauri programmed the entire application in J2ME, I offered my assistance by helping Lauri code some of the user interfaces in XUL. Lauri has also gained knowledge and proven his programming expertise during the development of Mycomob by creating the complex Smart search section and contributing back to the J2ME community.

I demonstrated some of my previously acquired knowledge in the area of web design and development after I created the Mycomob website and bulletin board. Though the user interface of the website is quite simple in design, the navigation is easy for users to follow and get information from, indicating that the design is effective and efficient.

From a mushroom enthusiast’s perspective, the Mycomob mobile application proved to be a success in being a revolutionary way to identify mushrooms. Participants who tested the application reported it was easier and more useful to use Mycomob and a mobile phone than consulting a mushroom hunting book in the wild whilst hunting for mushrooms. Although the Easy identification section proved to be ineffective due to it not being implemented at the time, when the participants had tested the flow and functionality by completing tasks related to the section, participants had responded that it has the potential to be a great service. It is possible for the Easy Identification to be implemented into Mycomob in the future and there is potential for people to volunteer and give identification help from around the world. Thus, Mycomob has demonstrated that harnessing the different capabilities of a smart phone can indeed revolutionize mushroom identification.

Many mobile phone companies such as Nokia, Sony Ericsson and Samsung have announced the forthcoming release of numerous smart phones with even more advanced features than those from just a year ago. An example is the Nokia N95 to be released for the first quarter of 2007. The N95 features an integrated GPS unit, a 2.6 inch VGA screen that supports 16 million colours, Wireless LAN (wireless Internet connection), an integrated five megapixel auto focus camera, 160 megabytes of internal memory, expandable memory up to four gigabytes and other
exciting specifications\textsuperscript{49}. The N95 illustrates very well just how rapidly mobile phone technology is advancing. Enhanced performance and functionality on future phone models, will clearly provide the possibility for enhanced performance and functionality within the future versions of Mycomob. For example, all mushroom information can easily be kept client side for faster results through the Smart search, Mushroom catalogue and Myco dictionary. Images taken for Easy identification will have better colours and details further aiding mushroom hunting experts with identifications.

\begin{figure}[h]
\centering
\includegraphics[width=0.8\textwidth]{nokia_n95.jpg}
\caption{An image of the Nokia N95 to be released on the 1\textsuperscript{st} quarter of 2007. Photo courtesy of Nokia.}
\end{figure}

In general, I’m quite happy with the outcome of Mycomob thus far, although the application is still in its development stage and needs to be debugged. The process of creating my final thesis project proved to be educational and enjoyable. I look forward to furthering the development of the Mycomob mobile application (with Lauri and others interested in contributing) as well as the website and bulletin board. Hopefully mushroom enthusiasts from Finland and around the world will find Mycomob a beneficial and knowledgeable tool to utilise.

References


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Bibliography


