The difficulties in developing useful mobile applications

Guidelines for app developers in cross media platforms

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Abstract

This thesis investigates how we can develop useful mobile applications. It is based on a development project called 'The Time Machine'. The work consisted of a literature study, an expert evaluation and a user test of the app the Time Machine. Based on these studies I conclude that the starting point for creating a useful mobile application is to find a problem, the basic concept and expressing the idea of the application in a good way for the user so he/she understands why the idea is valuable and why he/she needs it in their lives. This factor and a suitable design, according to the users needs and behaviour, are important pieces in the puzzle that answers the questions regarding a useful mobile application. The application also needs to run on a system that works well on different platforms. An appreciated application may create a domino effect with users recommending the application to friends and on websites.

Keywords: Interaction Design, Cross Media Platforms, Strategy, User Experience, Graphical User Interface (GUI)

1. Introduction

By the end of 2011, the number of mobiles had reached almost 6 billion, which is as much as 86% of the total human population (ITU, 2012). Developers today have better access to the latest technology and also better access to software, which has attracted more people to work with mobile systems and applications (Bergvall-Kåreborn & Howcroft, 2013). The extensive everyday use of these devices has led to higher demands when it comes to quality and stability. This development has also led to an increased importance of a better interaction between the user and the technology. But the mobile trends tend to shift fast and make the products last for a short time (Dutt, (2012). In 2006 75 % of the global mobile phone market was covered by Nokia, Motorola, Samsung, Siemens and Sony Ericsson (Bergvall-Kåreborn & Howcroft, 2013). However, everything changed in 2007 when Apple launched the iPhone and entered the mobile phone market. Apple released a product equipped with Internet access and also introduced Appstore for the mobile market.

The first iPhone created an extreme hype surrounding the product, which enhanced the expectations and the curiosity of the customer. Apple released their iPhone software development kit (SDK) in March 2008, which enabled third-party developers to create applications for the iPhone, the iPod touch and the iPad. Google entered the market in 2008 with their open source Android platform for mobile phone development. The shifting mobile IT-landscape has created new challenges and opportunities. A developer faces challenges such as heterogeneous devices and networks that have to deliver content and services anytime and anywhere. The new challenges have led to an increased need for a design that works smoothly with the functionality of an application (Johansson & Andersson, 2013). The amount of users with a device will probably not decrease. The landscape of devices as well as the target groups are getting wider and wider for every year (ITU, 2012). Today many users
want to have an "anytime and anywhere" system with instant access to the Internet. A modern smartphone needs to be a truly everywhere device with no restrictions, as the users have become more dependent of the devices they own (Christos, 2007).

1.1 The problem

The mobile application market has become a large market that is still growing strong. A study from 2010 reported that Apple had 300,000 applications and Android had 25,000 applications available in their respective markets. However, the same study also shows that 26% of the downloaded applications were only used once (Mobithinking Mobile Statistic, 2013).

Two years later in 2012 the Android market had increased to 700,000 applications (CNET, 2013). Everyone can learn how to create an application but it is a different matter to develop an application that will be used in a cohesive and extensive way. As noted in the 2010 study, as much as 26% of the downloaded applications are only used once. This shows that the growing mobile market has notable difficulties in getting people to continue to use the applications. This emphasizes what a difficult task it is to develop an application that will be used several times or even used at all, despite the fact that the technology is getting better and faster. There are differences in levels of success, looking at the numbers of downloads for Google’s and Apple’s most successful applications, some reported over 1 million downloads, while others reported just over 10,000. Other numbers showed some applications receiving zero downloads, which points out the unstable nature of app development. (Bergvall-Kåreborn & Howell, 2013).

Many issues constitute a challenge to a designer. Bergvall-Kåreborn and Howell (2013) analyses the experiences of mobile application developers and interviewed 60 developers from Sweden, Australia, Holland, UK and the US about their experience in practices of software development. One of the main findings from the interviews was the uncertainty of application development. The market in itself has a short life and is a highly competitive marketplace.

“There are so many apps now that’s is hard to be noticed” (Bergvall-Kåreborn & Howcroft 2013, p 8)

“If you are developing for an outdated or dying device then you’re wasting your time” (Bergvall-Kåreborn & Howcroft 2013, p. 7).

With an uncertain market it is a very difficult task to be noticed and taking a break is not an option, you can never get back in the game if you are gone for too long.

1.2 Research questions

The research questions I address in this thesis is the following:
Which aspects are important to consider in order to develop useful mobile applications?

An important part of this thesis is the development of the application ‘The Time Machine’. The work process has roughly followed this order: a literature study, an expert evaluation, user testing and finally analysis in order to come up with some conclusion, which answers my research question. The wireframe and the tree structure of the application can be found in Appendix 8.5 and 8.6.

2. Research methodology

The main focus of the research presented in this paper is in how to create an application that will be used over and over again. This means that it had to include a literature study of cross media platforms, GUI and technology solution standards. The direction of the research was fuelled by the ambition to find what's new and how the future will look like. This will hopefully help designers to create interfaces that will fit today’s users as well as future users. The development of the application The Time Machine is based on the findings of the literature study. Because of the nature of the application that was developed (see section 2.1), the literature study also included location-based services. I included location-based services in my literature study partly because The Time Machine falls into that category and partly because my lack of experience in that area. In order to develop The Time Machine I needed a clear understanding how location-based services works and how they look like. In this thesis I also identified related applications (and competition). This is an important task if you aim to become a successful developer. It is important to find original ideas, but your idea might already exist out there in some shape or form. So it is valuable to investigate existing and similar applications in order to identify the good and bad parts of them. Then you might be able to improve the implementation and to solve some of the issues of existing applications in the same category of applications. I also examined recent statistics on mobile use. This data helps to get an understanding of how the market looks today and it gives valuable insights about, for example, what kind of devices the user prefer, which sorts of applications that are popular today and the challenges for an application developer. I also studied scientific articles and papers about cohesive use, cross-platform application frameworks, design patterns, evaluation studies, users issues and related work. This has been together with my other studies, the foundation for this thesis.

2.1 The Case

The name of the application developed as a part of the research presented in this paper is ‘The Time Machine’. The wireframes and the structure is to be found in Appendix 8.5 and 8.6. The case came from the municipality of Skellefteå but it was Dan Johansson from the NIMO project (Nordic Interaction and Mobility Research Platform) that presented it to me. The task was to develop an application that illustrates and describes the history of the city of Skellefteå (nimoproject.org, 2013). The main purpose of the application is to help curious

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1 In this thesis useful is defined in a dictionary way, that is, capable of being put to use.

2 [http://www.stadsfesten.nu/](http://www.stadsfesten.nu/)
tourists or citizens to see how a building has looked throughout the years. The main target group is therefore visitors and citizens with smartphones or tablets. The application has to be turned on when the user is near buildings, parks or sculptures. The application will then find the building via GPS, and when the building is found the application will show historical images of the building on the user’s smartphone (Figure 1). The museum of Skellefteå, Nordanå, provided the images that are used in the application and the user will in this way get a sense of how the appearance of the building has changed from then until now. The application will be a part of Skellefteå municipality’s e-service platform, ‘Mitt Skellefteå’ (Figure 2). Mitt Skellefteå is an application portal that contains several county-related e-services (Skelleftea.se/app, 2013). The user adds the predefined e-services she wants to use, which are then stored in the app and easy to access. The application also contains a newsfeed on updated civil-information. It furthermore contains a section for the user to send information regarding questions and opinions. The user can send it with text, images and geographical tagging to Skellefteå municipality. Mitt Skellefteå is available on App Store and on Google Play.

![Figure 1. How the system work (Dan Johansson).](image1)

![Figure 2. The Mitt Skellefteå platform.](image2)

2.2 User testing

What I wanted to evaluate during user testing was the degree of usability and usefulness of the Time machine. The main concerns of usability revolves around systems safety, easy to learn and easy to use (Wiberg, 2003). I also wanted to identify the functions that are the most appreciated by the users as well as to find possible interface problems. In order to get information concerning how a user thinks about and uses a mobile phone, I wanted to use a qualitative method instead of a quantitative method. When using a qualitative method you have a smaller user group and can get more detailed information from each respondent. Hence, a qualitative method was a good choice for me since I was looking for in depth data about each user’s behaviour and opinions. A low error rate is a key when trying to achieve a useful application. A method that is good at identifying future problems in the application is therefore suitable for this project. A good choice in this respect is a heuristic study, which is a type of qualitative method. A step-by-step study helps the researcher to find and gather more information about interface problems from the user and it will probably result in a better
design (Nielsen 1993). Therefore I decided to conduct a user test in form of a heuristic study. The user test was field observation based on a prototype of the application. I created a wireframe that was sent to Mikael Holmgren at Luleå University of Technology. Holmgren is a research engineer and he helped me to code the application prototype based on the wireframe I designed.

A typical evaluation report will provide a detailed description of the program implementation, data of the major program process, description of different types of participants and different kinds of participation, a description of how the program has affected participants, observed changes, outcomes and impacts and therefore provide data regarding of the program’s strengths and weaknesses as experienced by the participants. (Quinn Patton, 1987)

Before my user test I received expert feedback from Jonas Persson, interaction designer at Hello future. He is also one of the persons that designed the interface of the platform ‘Mitt Skellefteå’. Therefore he was a good choice for valuable feedback on the design of the application and the user test. The expert evaluation started off with a presentation of the wireframes, the ideas behind the application and my plan on how conduct the user testing of the application. The expert test was performed at Hello Future’s office in Skellefteå. I presented the wireframe with a projector including the features of the application and some future ideas. The presentation was an open discussion. Jonas was encouraged to interrupt and ask questions. After the open discussion I brought up other prepared questions. The questions can be found in Appendix 8.4. The questions covers the ideas, the graphic design, the Mitt Skellefteå platform and the user test. My user test started with a small survey regarding the mobile habits of the respondents. The survey gave me information on how the target group use mobile technology, and also delivered some knowledge of the user and gave a better understanding about their use of mobile applications. The survey can be found in Appendix 8.1. More information on user habits and how they think will hopefully result in a better interaction design. If you have a good knowledge of the target group you are probably better equipped to design a product custom tailored for them. In this way the learnability level will sink and the product will be more appreciated by the user (Dutt, S, 2013).

After completing the survey the participants used the application in the most realistic way possible. This part of the user testing was designed to provide a good perception of the interaction between the user and the application and of how the application was used (Quinn Patton, 1987).

During the observation of the respondents’ use of the application I had a movie camera capturing their usage step-by-step. As backup I had a second movie camera and a dictaphone. The camera was a good tool to collect most of the user actions and it was also easy to use in the interviews that followed the test. By using the camera I could get better data regarding the respondents’ actions and the usability of the application. For instance, data on how long it took to perform a task, or finding the search icon. The camera was not used to film the mobile screen. I informed the users that they were free to think aloud as they used the application. The think-aloud protocol is good choice to capture events from usage situations, and also how the users react in certain situations. It’s an efficient method when used with a small number of subjects because each of them gives rich information of the use
of the application (Wiberg, 2003). The selection of respondents was based on the target group that would use the application, that is, people in the age between 20-55 years. The user test was conducted with the help of 15 users (8 males and 7 females) from the target group that used the application in a small area in central Skellefteå. The users were, between the age of 20 and 55, with the majority living in Skellefteå. The selection of respondents was carried out with help from Per Dinborn, app manager at Skellefteå municipality. In particular, he helped me to find older users (age between 30-55). To obtain a uniform level of age categories within the target group, the respondents were selected in the following manner:

- Age: 20-30 - 5 users
- Age: 30-40 - 5 users
- Age: 40-55 - 5 users

The user test was conducted on May 14 to 16, 2013. The individual tests were estimated to last between 30-45 min per participant. The respondents first filled out the survey (Appendix 8.1) concerning their mobile habits. After that, the user received a borrowed smartphone that contained the prototype of the application. The participants used the application in the central area of Skellefteå. The map was a geolocation map that had 25 markers in the prototype. Each marker corresponds to a historical building in the city. The user was told before the test about the application concept: ‘An application that contains pictures from the past, the present and the future connected to a GPS map’. The participants used the app however they wanted during 10-15 minutes, the time depended on what tasks they did and where they went. The participants were free to choose which buildings they wanted to go to. I followed the users along the way and asked what they were thinking and at the same time trying to be as invisible as possible, so the user could feel convenient and relaxed. After the observation the user was interviewed about the Time machine and apps in general. The interview questions can be found in Appendix 8.2.

2.2.1 Some problems during the user testing
During the user testing some unplanned events occurred. The first one was that some of the respondents forgot to fill out all the questions in the survey. [F4] forgot to fill out how long she had used her phone (question number one). [F5] and [M7] forgot to fill out what application category of apps they had the most of in their phones (question number six). The reason why they missed question number six may be that it is at the bottom of the first page, and you can easily miss it if you look fast through the survey. I do not believe that the missed questions affected the end result in any significant way. Partly because the small scale of users and partly because it was only two out of fourteen question. Also, it was not part of the most important part of the user testing. The camera’s microphone didn’t work the first day of the user test, but the dictaphone was in use at the same time so this problem was easily solved. The second camera couldn’t be used because of a problem with the memory card, but I managed with one camera since I had time to transfer the material from the first camera during the breaks. The last day of user testing was quite stressful. It was seven respondents that participated that day, but unfortunately the camera missed 1-3 minutes in the end of three users’ tests. The interviews ran smoothly and were conducted without any
disturbances. What also needs to be mentioned is the prototype’s limited functionality. It didn’t have all the functions and tools from the wireframe that was created. The prototype contained a Google map with 25 markers. Every marker had at least one photo attached to it and some had a cover flow of images. The user accessed image information from a drop down button placed under the top banner above the image. The prototype application had a share button but we removed this function before the user test. It could share images through a Twitter account but when doing this user became ‘locked’ in the web browser page. It felt useless to include a function that was half working. The prototype application had a search function and also an empty archives button that contained no photos. The participant’s used a borrowed Apple iPhone 5 for the user test. This probably did not affect the result of the user testing as a majority of the respondents owned some kind of iPhone. The prototype was also planned to be tested with a Android phone for half of the participants’ but because of technical problems with the prototype that became much smaller on the screen of an Android phone this test was not conducted. It would not have made any sense to compare a well working prototype with one that did not work properly.

3. Results from the research

This section presents the findings from the literature study. It included papers, books and blogs regarding interaction design, cross media platforms, strategy, user experience, graphical user interface and statistics of mobile applications.

3.1 Applications for mobile phones

Sweden is one of the leading nations and pioneers when it comes to mobile application development and the use of smartphones is well spread in the population. Statistics from 2012 says that 50% of the Swedish population owns a smartphone and that most of the smartphone users are between 18 and 29 years old (Frapps, 2012). A survey conducted by the same source identifies that there is a real problem with the general satisfaction of viewing webpages on smartphones in Sweden. Only 20% of the users say that they are satisfied or very satisfied, whereas 45% are dissatisfied or very dissatisfied. Frapps (2012) concluded, without getting into specifics, that companies that want to succeed need a strategy for mobile services. However Frapps makes one reflection that is relevant for the application that is being developed as part of this research. If your company targets a local market, in our case Skellefteå, it can be a huge competitive advantage to be visible in digital environments that smartphone users usually visit in order to find local companies or information. Frapps (2012) also reports that 40% of the users in their survey use their smartphone at least once a week to search for local information. The fact that our application will be part of Mitt Skellefteå might therefore help to popularize it and create a competitive advantage against similar applications.

Mobile Application Analytics from December 2012 shows that most app usage is spent in the gaming category (43%). The second most popular app category is social networking (26%). The third place is a tie between the categories Utilities and Entertainment with 10%. The same analysis points out that apps are taking more and more time from other activities.
Users have also to a large degree moved some activities, such as gaming, from other platforms to tablets and smartphones. (Blogfury, 2012)

Analytics from April 2013 have pointed out one important variable for developers to consider: size matters (Blogfury, 2013). Applications are run on a large number of different kinds of devices with varying screen sizes, from small phones to full-size tablets. This means that the developer must take into account how the app look and behave on different devices. The study emphasizes however that apps are most often run on devices with larger screens. While small phones (e.g. Blackberry) still represent a rather large number (16%) of the total number of device models, they only represent 7% of the active devices that use apps. What's interesting is that the opposite is true for tablets, which represent 7% of the overall number of device models but 15% of the active devices that use apps. The difference between devices, not only regarding screen sizes, poses both challenges and opportunities for developers to consider.

### 3.2 Mobile application development technologies

Mobile applications can be divided into four main categories: mobile native applications, mobile widgets, mobile web applications and HTML 5 mobile applications (Phuc Huy & VanThanh, 2012). Mobile native applications are developed to be executed on a specific device platform, for example an application that can only be run on an Apple device, supporting a certain range of operating system versions. To use the app, the user must download it from an app store and install it manually on the phone. The mobile native app can be a stand-alone app running on the mobile phone, or consist of a main component on the mobile phone communicating with network servers. Mobile widgets are applications that handle web content and perform tasks using web technologies such as HTML, CSS, JavaScript and XML. They need a so called “widget engine” to be run, thus not achieving full cross-platform capability. Mobile web applications are web based and combines the qualities of the web and mobile devices. The fact that mobile web applications are web based makes them device independent at least in theory: they are compatible with both Android and iPhone smartphones. HTML 5 mobile applications are mobile web applications that can handle and utilize more interactive technologies replacing proprietary plug-ins such as Adobe Flash, Quick Time and Java that are often used in native apps.

HTML 5 mobile applications also support the latest, more advanced, mobile technologies, for example Geolocation and Scalable Vector Graphic API’s. Some other features that HTML 5 applications support are canvas, video tags, location based-services, working offline and web workers. (Andersson & Johansson, 2012)

Currently native and HTML 5 apps seem to be the favourite paradigms for users and developers. HTML 5 is a cross-platform solution that can hook into device’s hardware to create a powerful mobile app. Native apps are also well known to access hardware features fast, but creating a native app is complicated and requires much effort from developers on any platform. Mobile widgets are still valuable but they are no longer so important for smart phones. Mobile web apps will disappear little by little and will be replaced by HTML 5 mobile apps. The choice of mobile paradigms will always rely on the style of the developer and the context of the application. (Phuc Huy & VanThanh, 2012)
3.3 Mobile navigation maps

Mobile navigation maps form a type of location-based-services (LBS), and are often considered to be a subset of context-aware services. A context-aware service is a type of service that can adapt its behaviour depending on the context and situation, for example depending on the location of the device. Location awareness is one of the key features of so called ubiquitous intelligence. Some popular LBS are emergency-, navigation-, information-, advertising-, tracking- and billing services. (Asif & Krogstie, 2012)

You-are-here (YAH) is a type of static maps that show the users’ location as symbols or icons on the map. YAH maps are normally relatively detailed when it comes to local information that can be used for orientation. YAH maps can usually point out parks, stations, and malls, ATMs or any other places and companies that the user may be interested in. A key feature of YAH maps is that they must update and have reliable information. YAH maps should provide multiple views of varying scale and provide the ability to zoom in and out. In other words, a YAH map should help the user both to orientate in the direct environment with a high degree of details and also help the user to get a sense of the larger area and the wider context. YAH maps should be designed with a clean and informative design that excludes irrelevant and disturbing information that can be misleading. This applies both to the appearance of the map as well as to the number of functions and options. (Schmid et al, 2010)

A study (Blogfury, 2013) showed that the zoom function is the central function when it comes to navigation applications. The participants in the study used the zooming function for every navigation task that they performed. The conclusion is therefore that a map service should include a zooming function since the large majority enjoys that function and likes to use it. A study by Taher and Cheverst (2011) about mobile navigation showed that 12 out of 16 participants had a tendency to rely on the device rather than on their sense of direction. The 12 persons that used their mobile navigation map stated that they already had a rough idea of the route before walking to their destination but still felt that they needed the device in order to orientate themselves (Taher & Cheverst, 2011). The fact that users are more dependent on the device than on their own sense of ability is important to consider when developing apps like the Time Machine and it also highlights how important it is to understand how the users adapt to the device in their use context. For example, The Time Machine application will be used outdoors most of the time, so the designer need to have it in mind that the interface will be in used in different weather conditions.

Students from Luleå University conducted a project related to my application. They developed a tourist application for people visiting Gammelstad church village in Luleå. The similarity of the applications is that they show images with text information from a map. The Luelå application helps the tourists to find the different sights and presents information about them. One of the strong features of the application is that it also can be used offline (Sjöberg et al, 2012). One of the big differences between my application and the application from Luelå University is the need of precision when it comes to the GPS coordinates. The application from Luleå didn't have need for an exact position and could be used during offline mode. When offline the user could only view sights that have been viewed earlier during online mode with the help of saved GPS-coordinates. A problem that follows using an
offline mode is that when the user is offline and goes outside the map, the application will only show grids on the screen.

In my case, there is a greater need for precise GPS-coordinates. The application is built for a wider audience and will be used in a bigger area than the Luleå application. My application needs to be constantly updated with GPS-coordinates in order to perform correctly and in a precise manner. That is why an offline mode is not an option in my case. The similarity of the applications is that they have the same idea, to show images with text information. But the similarity ends here. The Time Machine has a different wireframe, design and structure of the application, and it also has more functions (search, image archives, share and download functions). A tablet probably is the best device for this app because its larger screen that makes it easier to navigate, but in reality I guess that this app will be used mostly by Android and Apple devices. One thing that designer can take advance of is that today zooming is often done as swiping on smart phones. But it is important to note that not every mobile phone out there has a touch screen also the user might not have the ability to zoom in, for example people with disabilities. It is therefore important to examine and identify the people that will use the application and on what kind of devices it will be used. The Time Machine is foremost an e-service municipality app and have a wide target group so there is a need to consider many different types of users. Hence the interface needs to have a balance so that it appears as pleasant, usable, simple and clean for all kinds users.

### 3.4 Design principles

When it comes to the application that is being developed as a part of this research it is important to achieve a high degree of usability. This will result in a better experience and an increased chance of extensive use of the application. It is also vital that the application is easy to learn. If the application is difficult to learn and has low usability the user probably will stop using the application. The application and the functions it performs should also be easy to remember. The user should not have to relearn everything when returning to use the application once again (Wiberg, 2003). As noted earlier in this paper, the application should also have a low error rate so that technical problems do not ruin the user experience. The users are not likely to return to an application if they keep experiencing errors when using it. The application should be the opposite of that: a memorable experience. A functional system that gives the user a memorable and special experience will create a group of users that appreciates the application and recommends it. It is the key to success. A good user experience as a result of a functional and well-designed system helps us to answer the big question “why?” Why this product is good and why users of this product will use it repeatedly and recommend others to use it. An easy to learn, stable, functional and above all memorable application increases the chances of having an application that will be used over and over again (Wiberg 2003).

### 3.5 Marketing issues

Bergvall-Kåreborn and Howcroft (2013) show that the new kinds of applications that are being developed today together with a changing app market, have created new problems and challenges for developers. For example, designers need to pay more attention to the
marketing strategy in order to develop a successful app. The huge number of apps available means that the app may get lost in the app sea, so resources to market the product is of great importance. Many developers use social networks such as YouTube, Twitter and blogs in order to promote their app. A blog can be a really effective way to connect to your target group. A blog can encourage users to use the app more often and also to be more active users. Creating a bond between the developer and the user can be very valuable and critical if developers want to achieve extensive use of the app, and in so having a popular app. The blog can also be an important platform to receive feedback from the users. By receiving feedback, the designer is able to tune and tailor the app for the target group after it’s release. If doing so, the designer will have an even more customized app that gives the user what she wants. Having a good platform for communicating with users also gives you the opportunity to present updates and new features for the users. Presenting updates and new features is critical for keeping the app alive. Hopefully this gets appreciated by the user and can influence the sales and the reputation of the app. If the developers do not have a good platform for communicating with the users, it can go the other way around. Those developers that have poor communication with their users suffer disadvantages and an app with good potential can be hampered by this and become a failure. The same is true if the app remains the same and never gets updated. New requirements will always come along and the users expect the product to develop and be updated to fit everything from new devices to new requirements. If the app doesn't grow it will inevitable die and the product will become obsolete. (Bergvall- Kåreborn & Howcroft, 2013)

3.6 Summary
In this chapter we have seen that the following characteristics is important to consider when trying to develop a useful mobile application.

- Know the technology – Which mobile technology fits my application best?
- Low error rate - A high error rate will ruin the experience and may lead the user to end using the app.
- Size matters - Consider the variant screen sizes (tablets, smartphones etc.)
- Clean and informative design – Keep a clear focus and exclude irrelevant information in the app.
- Know your user - What kind of persons will use the app?
- The different contexts - Understand how the users adapt the device to their use context.

4. Results from the expert evaluation and user testing
The result section will discuss results from the expert evaluation and the user testing. The main purpose of the testing was to capture the level of usability and usefulness of The Time Machine. The expert evaluation investigated the level of understanding of the application, while the user testing was conducted to capture as real use as possible.
4.1 The expert evaluation

Jonas Persson is an interaction designer and is the interface developer behind *Mitt Skellefteå*. He is also the expert user in my case. Persson is an experienced interaction designer, graphic designer and strategist, and together with his work on *Mitt Skellefteå* this makes him good choice as an expert and as a resource. The main criticism he raised was that he found it difficult to understand the image archive function (Figure 3). He questioned if this function was needed at all, and also recommended a user test with observation in order get a good sense of the usability of the archive. We also agreed on that the app icon should have blue tint, because it then fits under in the entertainment category of the *Mitt Skellefteå* platform (which is blue). He also recommended that for the image archive information windows should show the information as a drop down, as it does for the cover flow images. It gives more space for the information and also makes it easier for the user to close the window. I first presented the image marker with the image visible on the map but he recommended the image marker should go by two step, first tap the marker to see the image and to watch the cover flow you tap on the image to go further. It allows the map to look much cleaner and creates sharp contrasts between what is on the map. Sharper edge will improve the usability and look better for the user. One of the last things I asked him was if it was possible to remove the top banner of the application to get more space. He said it would be possible in the future because they are developing *Mitt Skellefteå* version 2.0 and this version will have the option for the user to choose if they want the top banner to be visible or not.

4.2 The user testing

All users were assigned an id consisting of a letter representing the user’s sex, followed by a number allocated from one and up. For example; the first female that participated was assigned [F1]. More detailed data of the survey can be found under the appendix section (Appendix 8.1-8.3). This chapter is a summary of the result from the survey and the user testing.

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<tr>
<th>1-10 apps</th>
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<th>Over 30 apps</th>
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<td>K5, K7</td>
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*Figure 3. The question: 'How many apps do you own?'

4.2.1 The usability aspect

In this section we will discuss the ideas for improvement that came up during the user testing and the interview sessions. First, some of the users wanted to see the information regarding when the photo was taken. [M6] wished a time axis on the photo. [F1] would like to have the ability pause the app when doing other things. Another comment from [F1] was it would be great with moving pictures too. Many of the respondents wanted to see pictures of how future buildings would look like, for instance sketches but also information regarding when the building is supposed to be finished. In some cases, users wanted to have the possibility to comment on future projects. They wanted to see a sketch of the project and be able to give it a thumb down or up. [K3] was one of the respondents that gave this feedback. She said that it would be a great feature if the user could comment on future buildings. Both the above ideas
could encourage more people to use the app and trigger them to use it more than once. Some of the users wished to have a ‘blip’ function. When you pass a building with a marker, the mobile could vibrate or make a sound, so that you don’t need to hold up the phone all the time when you are using the application. In some cases the Internet connection was lost during the test but after while it came back. I noticed that this was distracting and irritating for the users. [M6] commented during the interview that it would be great to access information on the marker from the map by keeping a finger or the thumb over the marker. Some users also wanted to be able to see through the camera lens, see how it would look in a street view. [M4], [F5] and [M7] thought that it would be great with a voiceover, for example too enable walking and listening through headphones, so you don’t need to hold your phone all the time. Another suggestion was also to provide stories on what happened on the location or at an event such as ‘Stadsfesten’ (Stadsfesten is one of North of Sweden biggest summer event)², like a guided history tour. This would benefit both tourists and citizens in Skellefteå. [M4] also commented that it would be great with an info text box before you start the app. [M6] wished to have a compass on the map. [M7] commented that the app should be adapted for various technological platforms. The main answer of what need or usefulness the app would give was information, curiosity and history. The answers of course varied depending on if you are interested in history or are curious about new information. Many commented that this app would fit as a tourist app and would recommend it to friends visiting Skellefteå.

"You have found the right person, I love history." [M1]

From my interviews I learned that a large reason why users do not appreciate an application is because they find it too difficult and hard to understand. Most of the users commented that the most important requirement for an app is that it should be simple and easy to understand.

"So you do not need to think...at all" [M7].

Based on the people I’ve interviewed, I’ve realized that it doesn’t seem to be so many spontaneous app downloads. Most users download based on recommendation from friends or websites.

- "Now I'm almost never at appstore" [M4]

Users may favour apps that are recognizable. If a developer know what the trends are and implement these, it might be easier to appreciate the app. My user testing, based on fifteen participants, showed that the younger participants had a faster learnability rate than the older participants. This is an indication that older people does not have the same habits as the younger generation. One explanation can be that the younger has grown up with more technology around them. What many participants saw as positive with apps is that they give

² http://www.stadsfesten.nu/
greater freedom and are nice tools for everyday life and that they can be great entertainment at times. Lifestyle and the user’s needs seem to play a major role when it comes to app use.

- "I download because I want it" [M3]
- "I carefully choose apps ... do not want too many apps" [M1].

If you find what the target audience is interested in you can go far. The younger respondents thought the app was a good idea but would not imagine to download the app. It however if they knew a friend who was interested in history, they would recommend the app.

"My girlfriend is interested in history, she would love this app." [M3]

Another user wouldn’t download the current version but if it had more sketches on future buildings he would be more interested in using it. Many commented that one of the biggest reasons why they use apps is that they make it more fun to wait, by using, for instance, games or social media apps when waiting for something. Another motivation factor for The Time Machine can be notifications about new pictures that have been uploaded.

One user did not understand the concept of the app. From her point of view it was only a map with photos that gave direction.

"It's called Time Machine. If the idea is that it should provide historical looks, I do not think so when I'm looking at the map..." [F5]

She viewed it more like a tourist app and nothing for her. She understood the interface but couldn’t see a need or a why she should use it. One of the problems why she might not understand the idea could be that I didn’t explain enough for her or that she also is not an active app user, as she said during the interview.

4.2.2 The time aspect
This section presents a discussion of the time the users spent on the application. Only one test subject [M6] made use of the 15 minutes that was decided as the maximum time limit for each individual test. He was also the one walking the longest distance. The other participants used the application for about 10 minutes. All the 15 participants used the app outdoors. The use time will probably depend largely on where you are and how you use the application. If you are outside and use the application while walking to several different locations, then the time frame will be much longer than if you use it indoors. The application would be most used outdoors during walks. If it is used indoors the use time will probably be quite short.

4.2.3 The information aspect
The information aspect is about the text and the images status of the application. Fourteen of the 15 of the respondents saw the application’s potential despite the narrow information it provided. At least 50 % of the test users viewed this app as seasonal app, that you would use more when its summer and have much more free time and would be more outside during the day.
"If it doesn’t come up with something new material I would use it a few times but, finally I would have gotten all the information, I would not use it again" [F5]

This is a great input. It is important not to forget to update regularly with new material for the target group or else the number of users will shrink down. This is a problem for the Time Machine. How easy will it be to keep up with new images to maintain the user's interest? I will return to this problem in the concluding chapter.

4.2.4 The design and navigation aspect
This section discusses the negative and the positive sides of how the users’ experienced the time machine’s interface. All users appreciated the map's simplicity and felt that it was easy to navigate, however, there were some who thought that some symbols were part of the map and therefore was clickable. Most of the participants commented that they want simple and easy to navigate apps.

Another problem was that when you stood too close to a marker it was not clickable, because the pointer icon that shows the user’s position came too close to the marker and overshadowed the marker. The user had to move away from the marker, so it would become clickable. There was some confusion of the function of the photo archive. Some users guessed that it contained old pictures associated with the place you were at. One possible explanation to the users’ confusion is that the photo archive was empty and disabled during the user test. [F1] wanted a Google guy icon instead of the existing you are here-icon. The majority of the testers understood and liked the icon but three users wished to have an arrow icon instead of the existing symbol, because they felt it would be more recognizable. Older users had more difficulties finding the search function compared to the younger users. But once the participants found the search function no one showed signs of not understanding how to use the function. Some of them had however problems shutting down the search function. Some of the users were positive about having the search function being discreetly hidden while some users did not appreciate this function as much. Those who liked this characteristic said that it made the map cleaner and that it gave more space for the map. The more negative users reported that they wanted to see this function all the time and that it would be much easier to use if it was visible at all times. [M7] proposed that the search function should be at the top of the screen so it is instantly useable and visible all the time. Another proposal regarding the search function was to have the markers blink if the marker matched any of the word in the search. Two other popular requests were to have the ability to see popular searches among others and also to have a category search.

Several users had problems with the back button in the cover flow. The problem was that the user easily pressed the button of the Mitt Skellefteå platform this happened because the two buttons were too close to each other and way too small for the users’ fingers. Another wish from the interview session was to have colour categories for the markers, for example sculptures as one colour and buildings as another colour. [F5] was the only one to use the plus and minus buttons in the map. The reason might be that the user is in a wheelchair and she prefers a click design rather than the swipe design of this application. Many of the users wanted to have landscape availability in the cover flow, which means that the user can hold
the smart phone horizontal to swipe the cover flow. [M6] wished to have a full view on the image. [M7] would like to be able to zoom into the picture. Many of the participants had problems with the drop-down button. It was difficult to find and too narrow for many users.

4.2.5 Junk apps
This section discuss the participants’ general view of what makes a good app and what characterizes a bad app. [M8] saw himself as more spontaneous in the beginning of his smartphones days and downloaded quite many apps and found it easy to find innovative and funny apps to try out. But nowadays he more often comes over unusable apps, “junk apps” as he calls it. The junk apps don’t work properly or don’t do what they said they would in a good way and in the end the user newer uses them again. My interviews showed that many of the users had several junk apps on their mobile phones. [M8] expressed a wish that the platform itself should be able to clean up and erase junk apps, and also make it easier to find more usable applications. But it is not always the app that is the problem. It might as well be an older mobile phone that does not support the platform or the app.

"3 of 5 apps that I had been using have been an disappointment, but it might as well be the phone's fault, not the app." [F1]

There are apps that help you to close down apps and [F1] comment that this kind of app is what she uses the most. This shines more light on the problem: we own too many apps that we find too tiresome to control. Many of the participants was surprised to find out how many apps they owned when they answered the survey and even found it too tiresome to count them all and just roughly estimated how many they had. It is an important task for a app developer to attract users to download an app. There has to be a trigger that attracts people and the application should also fit well with the users lifestyle. But is also very important to deliver the promises that led the user to download your application in the first place, otherwise the user will quickly move on to the next application

5. Discussion and analysis
A positive result from the user testing was that most of the comments or wishes that the participants raised already exists in the wireframe that was created before designing the prototype. Some examples of the ideas of the participants’ that exist in the wireframe are street view through the camera lens, photos of future buildings and landscape swipe. Even though the prototype that the participants used was a light version compared with the full version of the application, I received a lot of positive comments on the general idea and how it could be useful for them and for others. Most of the problems that were raised during the user testing were connected to the graphic design of the application, which can easily be fixed and customized. Based on the outcome of the user testing it seems reasonable to believe that The Time Machine has a good potential to be an app that will be used extensively. The application however needs to be redesigned based on the feedback I got during my user testing and tested on a new user group. The Time Machine has good chance to be a popular app if the graphical issues that my respondents raised are solved. The participants of the user
testing in general liked the idea of the app and appreciated the clean and simple interface. It is important that you as a developer gains knowledge about the needs that your application are created to meet. Does your application solve a problem or is it a response to a demand? In this case, *The Time Machine* fulfils its purpose: it gives interesting and exciting information about Skellefteå buildings for people who lives in Skellefteå or for curious tourists. *The Time Machine* also does so in a good and fun way, which hopefully will be appreciated by its users. Designers must have a clear picture of what it is that they provide the user with. Is the app simply a time killer? Does it simplify the everyday live of the user? Does it provide an important service? You don’t need to have only one question and one answer to questions like these. A successful app often combines different needs and answers different questions. For example the app could simplify the everyday life of its users but in a way that is both exciting, fun and a great way just to beguile away the time.

But the concrete parts of the application are of course also very important. The application needs to have an interface that reflects the users’ experience of the device the application runs on. The technical part of the application is crucial and an important piece of the puzzle. It does not matter if the design is good or is built on good ideas: if the application show error messages or is slow the user probably will forget the positive aspects of the application due to the bad user experience and as a result abandon the application. As computers and smartphones become more and more popular and spread the target group gets much wider. A designer today has to realize that the main target group can contain people of all ages and they are not necessarily programmers or other data experts, as the case often was in the early days of computers. *The Time Machine* is a good example on how diverse a target group can be today. Both my research and the result of this case stresses the fact that target group of *The Time Machine* is both quite wide and diverse. The age span is, approximately between the ages 20-55, and the users come from different backgrounds and the knowledge of and experience with computers can differ a lot from one user to another. The target group that uses apps in general are in other words quite large and in order to find the target group for your specific app you need to do thorough research and analysis. And when doing the research it is important to define a target group so the target group doesn’t become too large to handle and too difficult to satisfy. With a smaller target group it is easier to customize the product according to the target group as well as maintaining a good communication with the target group and also to provide technical support. It may even be financially sound to focus on a smaller target group because today the app market has no geographical boundaries. Nowadays Designers can develop a more specific app that fits a more specific target group. The app market has become a global market that has made it easier for developers to find a large enough fan base of users. One way to find a smaller target group is to choose a more stand-alone genre. A successful example of this is the application Smart tools. This app delivers a package of help tools. It helps user to measure length, angel, tilt and level of things. This app had reached 500 000+ downloads, in June 2013. According to my findings, a designer who wants to achieve extensive use of his/her application need to spend time learning about the target group. With a good knowledge of the people who will use the application, the designer can base the design of the application on to how the target group

thinks and how they use their devices. And the application needs to be tested over and over again. It is a common and easy mistake to miss issues and problems about how the application is used in the real world when you are working at your work desk.

It may be a difficult task to get hold of your target group in order to learn more about it. For The Time Machine it was easy. One of the reasons was because it is a municipality app; The municipality already have knowledge and statistics regarding the people who live in Skellefteå city, it can help if you research statistics and blogs on what applications are popular among different users. That can be a good to learn more about your target group. My user test gave several examples of the customization to the target group that a designer should do and how good knowledge about them helps the designer to create a good and functional application. For example, several users had problems and found it difficult to find the dropdown button in The Time Machine because the button was transparent and the fact that it was sunny outside made it almost impossible to see it. The application is meant to be mostly used outside during these kinds of conditions and it is therefore important that the design reflects the circumstances in which the application will be used. Another positive result of the user test was that the purpose of use was understood by most of the users and this is a good start to achieve cohesive and extensive use. The next piece in the puzzle is to have a design that communicates why and how you should use the application. An understandable interface and a system that works on different platforms also increase the chance of success. If you are able to create an appreciated application a domino effect may be created were users recommend the application to their friends and websites might start to write about it.

I believe that my research shows that the key to developing useful applications is clear understanding and good knowledge. You need to find a problem that needs to be solved, and a good basic concept that the application will be based on. Your design should reflect this basic concept or purpose of the application but you also need to consider the people that will use your application. A clear understanding of who your target group are, how they behave and what their needs are is a crucial piece of the puzzle. But as stated before, the design needs to be supported by a functional and fully working product. If these variables are in harmony in your application the chance of success is increased and you may end up with an application that people are talking about and most of all, are using.

6. Concluding remarks

This thesis has been about mobile application development and how to develop a useful application. The extensive everyday use of devices such as smartphones and tablets has led to higher demands when it comes to quality and stability. This development has also led to an increased importance of better interaction between the user and the technology. More devices and more widespread use has also resulted in more applications on the app market. With an increasing number of devices and applications on the market it has become much more difficult to be noticed and to create something new as well as something suitable for the target group you are aiming for (ITU, 2012).
The research presented in this thesis was conducted based on the development of the application 'The Time Machine'. The work has been following a process which begun with a literature study. The next step was an expert evaluation, followed by the user testing and an ending analysis phase. The main answer to the question of this thesis, on how to develop a useful mobile application, is that one needs to learn about the users’ behaviour. As stated before, clear understanding of the problem and a solid technical solution are important, but the key to answer the thesis question is a good understanding of the behaviour of the people who will use the application. With a clear understanding about who the users are and how they behave, you can design a product that will be appreciated and customized to their needs and their preferences. So, designers need to examine and study the people that are supposed to use their applications. This knowledge and research will help designers to gain a general knowledge about the target groups’ use patterns, mobile habits and behavioural patterns. Designers can also learn which kind of platforms and devices the target group uses and customize the design based on this information. It is a difficult task to balance usability with clean and good design, but a designer who does the homework has a good chance to design a successful application. There are several questions that are not answered in this thesis and that are outside the boundaries of it. There is a need for a deeper research on how to create a simple and useful design for a specific target group as well as a need to research how the relationship between the design and the target group will look like in the future. Furthermore, there is a need for more research in the field of design thinking, both in general and for answering the question about cohesive and extensive use. This thesis does not, of course, provide a full answer but I see it as a beginning of further research.

In my opinion 'The Time Machine' may be a useful application if its further development is based on the feedback from the user test. This feedback is important to use in order for the application to become successful. 'The Time Machine' needs to stretch out more of the concepts in order to achieve long-term use of the application, but still based on the basic idea; Present images from the present, from the past and from the future. For many persons it is interesting with images of old buildings but not in the long run since they will never get updated. The old images is interesting for first time users and tourists but returning users will probably get tired of seeing the same images. What can be done to avoid this is to add news, updates and events as part of a notification function in the application. This function can provide the user with news, updates and new material via SMS messages about current buildings. Another idea that came up during the user testing was that the user could be allowed to comment or thump down or up on future buildings, for example how future buildings would look like in sketches. The user can also get information regarding when a new building will be built. Both ideas could encourage more people to use the app and trigger them to use it for a longer time. Another function that can be useful to add is a GPS-buzzer. This can be a great tool for outdoor walking, if the user pass a marker the smart phone send a vibrate, so that the user doesn’t need to hold up the mobile all the time. Also the application needs to keep up with a clean and simple interface that reflects the users’ mobile habits that may change over time as well. This application has a wide target group and it is a municipality application, so it needs to pay extra attention to that fact. What has been acknowledged in this thesis is if the app doesn’t grow and develops it will an application that
isn’t used. Updates of this application may not need to be a top priority in this case. This application can evolve to become a seasonal application with focus on the visitors of the city, and with the most usage in the summer. A tourist may just use the app during a visit in Skellefteå. And that can be okay if the app makes the visit to Skellefteå a memorable experience. It may result in the app being recommended by its users and hopefully this creates a domino effect that make others visitors use it. This can be one of the parts in making The Time Machine a useful application.

Finally I would like to point out one of the main things that I have learned during this research and the development of The Time Machines: Research is the design and the design is the research. That is the difference between becoming a success or not.
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8. Appendices
8.1 The survey for the user testing

1. Vilken mobil använder du och hur länge har du haft den?

2. Hur laddar du ner appar?
- □ App store
- □ Google play
- □ Annan väg:

3. Hur ofta brukar du ladda ner appar? (Cirka)
- □ Varje dag
- □ 1-3 per vecka
- □ 1-10 per månad
- □ Sällan eller aldrig

4. Hur många applikationer har du laddat ner till i din mobil? (Cirka)
- □ 1-10
- □ 10-20
- □ 20-30
- □ Över 30

5. Vad för sorts appar har du laddat ner? (Ange dina kategorier)
- □ Spel
- □ Musik
- □ Nyheter
- □ Sociala medier
- □ Resa
- □ Verktyg
- □ Tjänster
- □ Annan kategori:

6. Vilken av kategorierna har du flest av och hur många? (Cirka)

- Rekommendation
- Nykomlingar
- Annan Orsak:
- Kategori
- Topp appar

8. Vilken mobil applikation använder du mest, hur ofta och varför?

8.1 Hur länge använder du din mest använda app vid varje tillfälle?

- 1-3 min
- 5-10 min
- Minst 20 min

9. Vilken är den sämsta app du har använt? Varför?

9.1 Hur länge använde du appen?

- 1-3 min
- 5-10 min
- Minst 20 min

10. Hur många appar har du raderat från den mobil du använder idag?

11. Använder du Mitt Skellefteå?
12. Hur fann du Mitt Skellefteå?

13. Vilka tjänstappar använder du? Varför?

14. Hur ofta använder du MittSkellefteå?

☐ Varje dag  ☐ 1-3 per vecka  ☐ 1-10 per månad  ☐ Aldrig

Tack för svaren!
8.2 Interview questions for the user testing

Användartest- 15 användare (Kvalitativ metod)

Varför- Hur navigerar använderna i applikationen?
- Användartest- 30-45 min.
  - Enkät: 5-min min.
  - Prototyp: 10-15 min
  - Intervju: 10-15 min.

Behöver: Diktafon, canon+2
Lånad mobil.
Tidsram- 2-3 dagar, 15 användare.

Förslag på uppdelning-
  5 användare mellan 15-30. Dag 1
  5 användare mellan 35-40. Dag 2
  5 användare mellan 45-55. Dag 3

Intervjufrågor efter testet.
- Varför laddar du ner appar?
  - Vad är de som är negativt med appar?
  - Vad är de som är postivt med appar?

- Nämnn dem tre viktigaste punkterna en app behöver för dig?

- Vad för sorts krav ställer du när du laddar ner appar?
  - Vad får dig att vilja använda en app fler gånger?

- Vad för nytta skulle tidsmaskinen ge dig?
  - Vad skulle den kunna ge dig?

- Vad ser du för postivt på den här appen?
- Vad behöver förbättras?
- Vad för sorts funktioner skulle du vilja ha i den här appen?
- Vad skulle få dig vilja använda denna app fler än en gång?
  - Hur många gånger skulle du använda appen i vardagen?
- I vilka situationer tror du skulle tänka dig använda appen?
  - På bussen, hemma, promenader?
- Har du andra synpunkter om tidsmaskinen?

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### 8.3 Summary of result from the user survey

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>k1</td>
<td>HTC Desire</td>
<td>2.5 years</td>
<td>Google Play</td>
<td>1-2 times</td>
<td>Tools &amp; social media</td>
<td>Social media ca 3 it</td>
</tr>
<tr>
<td>M1</td>
<td>iPhone</td>
<td>2 years</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Games</td>
<td>18 it</td>
</tr>
<tr>
<td>M2</td>
<td>iPhone 6+</td>
<td>1 year</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except music, also municipality &amp; state apps.</td>
<td>3.5 games 3 tools 5 news 4 services</td>
</tr>
<tr>
<td>M3</td>
<td>iPhone 6</td>
<td>2 years</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked.</td>
<td>Games</td>
</tr>
<tr>
<td>M4</td>
<td>iPhone 6</td>
<td>2 years</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Games, news, social media, tools, services.</td>
<td>3.5 games 3 tools 5 news 4 services</td>
</tr>
<tr>
<td>M5</td>
<td>Samsung Galaxy S5</td>
<td>1-2 years</td>
<td>Google Play</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games</td>
</tr>
<tr>
<td>k5</td>
<td>Nokia 5 smartphone previously had a nokia phone - Sony Xperia</td>
<td>Node 2 years Sony Xperia 0.5 year</td>
<td>App Store (Special)</td>
<td>1-2 times</td>
<td>Games, Social media, Tools</td>
<td>Games, 5 it</td>
</tr>
<tr>
<td>k6</td>
<td>iPhone 6+</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked - Also try to follow restaurants.</td>
<td>Social media, 3 it. News &amp; Tools 5</td>
</tr>
<tr>
<td>k7</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Services 7 it</td>
</tr>
<tr>
<td>k8</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 50 it</td>
</tr>
<tr>
<td>k9</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 30 it</td>
</tr>
<tr>
<td>k10</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 30 it</td>
</tr>
<tr>
<td>k11</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 30 it</td>
</tr>
<tr>
<td>k12</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 30 it</td>
</tr>
<tr>
<td>k13</td>
<td>iPhone 6</td>
<td>-</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel.</td>
<td>Games, 30 it</td>
</tr>
<tr>
<td>k14</td>
<td>iPhone 6</td>
<td>1 year</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Games, news, social media, services.</td>
<td>Services, 10 it</td>
</tr>
<tr>
<td>k15</td>
<td>iPhone 6</td>
<td>1 year</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel &amp; News.</td>
<td>Games, ca 20 it</td>
</tr>
<tr>
<td>k16</td>
<td>iPhone 6</td>
<td>1 year</td>
<td>App Store</td>
<td>1-2 times</td>
<td>Everything checked except travel &amp; News.</td>
<td>Games, ca 20 it</td>
</tr>
</tbody>
</table>

### 7. How do you download? (rank)

<table>
<thead>
<tr>
<th>k1</th>
<th>1.Recommendation 3. Category 3. Newcomers</th>
</tr>
</thead>
<tbody>
<tr>
<td>k2</td>
<td>1. Top apps 2. Other causes: App of the week that is chosen from the week 3. Recommendation</td>
</tr>
<tr>
<td>k3</td>
<td>2. Recommendation 2. Top apps 3. Category. Test difference if they are ok.</td>
</tr>
</tbody>
</table>

### 8.4.1 The most used app and how often? Why?

<table>
<thead>
<tr>
<th>k1</th>
<th>Facebook: check messages.</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1</td>
<td>Spotify: 2-3 days, for listening to music. Always has a cache that only strike, the Internet</td>
</tr>
<tr>
<td>m2</td>
<td>Netflix: check messages.</td>
</tr>
<tr>
<td>k2</td>
<td>Apps that contain a lot of ads, or games</td>
</tr>
<tr>
<td>k3</td>
<td>WhatsApp: will send text messages, every day, often.</td>
</tr>
<tr>
<td>k4</td>
<td>Instagram: take a lot of photos and share it with others, not use much of all them.</td>
</tr>
<tr>
<td>k5</td>
<td>Have tested a lot of apps that had them.</td>
</tr>
<tr>
<td>k6</td>
<td>Trust. How to order, groceries, rentals.</td>
</tr>
<tr>
<td>k7</td>
<td>Facebook: problems with the account when she logged in via computer.</td>
</tr>
<tr>
<td>k8</td>
<td>A game that latched all the time.</td>
</tr>
<tr>
<td>k9</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k10</td>
<td>Amazon: can't use so many apps, not tied in any app.</td>
</tr>
<tr>
<td>k11</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k12</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k13</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k14</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
</tbody>
</table>

### 9. Worst app?

<table>
<thead>
<tr>
<th>k1</th>
<th>a compass that only strike, the Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1</td>
<td>Wild horses: he never used it.</td>
</tr>
<tr>
<td>m2</td>
<td>Boring games: he never used it.</td>
</tr>
<tr>
<td>k2</td>
<td>Have tested a lot of apps that had them.</td>
</tr>
<tr>
<td>k3</td>
<td>Facebook: problems with the account when she logged in via computer.</td>
</tr>
<tr>
<td>k4</td>
<td>A game that latched all the time.</td>
</tr>
<tr>
<td>k5</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k6</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k7</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k8</td>
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</tr>
<tr>
<td>k9</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k10</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k11</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
<tr>
<td>k12</td>
<td>Can't use as many apps, not tied in any app.</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>k1</th>
<th>5-7 it</th>
</tr>
</thead>
<tbody>
<tr>
<td>k2</td>
<td>1-2 times</td>
</tr>
<tr>
<td>k3</td>
<td>Tip from the site</td>
</tr>
<tr>
<td>k4</td>
<td>My mom</td>
</tr>
<tr>
<td>k5</td>
<td>Tip from the every restaurant</td>
</tr>
<tr>
<td>k6</td>
<td>Was in the project group</td>
</tr>
<tr>
<td>k7</td>
<td>Tip from Per Olsen</td>
</tr>
<tr>
<td>m1</td>
<td>Contacts, a list, calendar, Tripit</td>
</tr>
<tr>
<td>m2</td>
<td>Waste separation, user portal</td>
</tr>
<tr>
<td>m3</td>
<td>None</td>
</tr>
<tr>
<td>m4</td>
<td>0 of 100 it</td>
</tr>
<tr>
<td>m5</td>
<td>I ordered it (MitteSkellefteå)</td>
</tr>
<tr>
<td>m6</td>
<td>It is as a display purposes, opening hours, share your thoughts functions is good. School/Othkarak</td>
</tr>
<tr>
<td>k1</td>
<td>None</td>
</tr>
<tr>
<td>k2</td>
<td>Yes</td>
</tr>
<tr>
<td>k3</td>
<td>I'm not sure</td>
</tr>
<tr>
<td>k4</td>
<td>Received not been answered it</td>
</tr>
<tr>
<td>k5</td>
<td>For working on Skellefteå municipality's IT department</td>
</tr>
<tr>
<td>k6</td>
<td>I'm sure</td>
</tr>
<tr>
<td>k7</td>
<td>Yes</td>
</tr>
<tr>
<td>k8</td>
<td>Through my husband</td>
</tr>
</tbody>
</table>

### 14. How often?

<table>
<thead>
<tr>
<th>k1</th>
<th>Protist</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1</td>
<td>1-2 times</td>
</tr>
<tr>
<td>m2</td>
<td>1-2 times</td>
</tr>
<tr>
<td>m3</td>
<td>1-2 times</td>
</tr>
<tr>
<td>m4</td>
<td>1-2 times</td>
</tr>
<tr>
<td>m5</td>
<td>1-2 times</td>
</tr>
<tr>
<td>m6</td>
<td>1-2 times</td>
</tr>
<tr>
<td>k1</td>
<td>I'm sure</td>
</tr>
<tr>
<td>k2</td>
<td>Yes</td>
</tr>
<tr>
<td>k3</td>
<td>Through my husband</td>
</tr>
</tbody>
</table>

---

8.3 Summary of result from the user survey
8.4 Interview questions expert evaluation

Frågor Jonas 15 april 2013
----Wireframe----Level of usability.
- Bild i markören eller knapp?
- Hur många steg borde man ha till markören?
  - Hur ska man på de bästa sätt få fram en bild?
- Val av pilar?
- Annan färg på kompass ikonen?
- Är de något som saknas?
- Andra knapp jag borde tänka på?
- Vad ska jag tänka på när jag gör användarstatus?
- Förslag på hur man kan stänga ner en bild? (bildarkiv)
- Backbutton?- bildarkiv?
- Behövs de ngt mer än text i info fältet?

-----------------------
Möte Jonas-14 april.
Han kommenterar att han hade svårt att se bild arkivets möjligheter, varför man behöver använda funktionen.
Rekommenderar användarstatus med observation där man följer användaren. App ikonen borde vara i en blå nyans, nöje färg.
Ett val skulle vara till bildarkivet att information visas som bildspelet, som en rullgardin. Mer info, större utrymme och även enklare för användaren att stänga ner fönstret. Markören borde gå två steg för att göra de enklare att se markörerna, bild gör de svårt för användaren att se kartan. Top bannern kommer i framtiden kunna flyttas upp för mer utrymme för kartan.
8.5 Tree structure, The Time machine
8.6 Wireframe, The Time Machine