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Usability of Mobile Payment Registration

Master’s thesis

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ABSTRACT OF THE MASTER'S THESIS

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This thesis describes a study made about the usability of mobile payment registration. The domain was studied with two methods. A literature study about mobile financial services research and a study of past and present services as well as an empirical part that consisted of a usability test, questionnaire and an interview about the usage of mobile financial services.

The literature part concentrated on the definitions of usability by the ISO 9241-11 standard and by Jakob Nielsen. On the basis of these definitions the domain of mobile financial services was studied from the view point of the user, task, equipment, environment, and acceptance of the system. These aspects are important in designing a usable service.

Ticketing, banking, remote and proximity payment services were all introduced to mobile phones in the 90s. The contemporary technical solutions were not adequate to meet the needs of mobile financial services. In this decade, however mobile technologies have rapidly evolved to enable mobile services with a good user experience. In spite of technical evolution mobile services remain somewhat unfamiliar to customers. Beliefs and misconceptions dominate the thinking of customers making them slow adaptors of new technological services.

The empirical study addressed the problem of human misconceptions. The users in the usability test made a registration to a mobile music store. The interview with the users concentrated on the users' thoughts about the registration process and the mobile payment concepts.

As a result a model to design usable mobile financial services was created. When designing mobile services context of use should be taken into consideration to create a service that offers unique value for the customer.

Keywords: usability, mobile financial services, context of use, consumer acceptance

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Tässä diplomityössä esitellään tutkimus mobiilimaksamispalveluiden käytettävyydestä. Aluetta tutkittiin kahden tutkimusmenetelmän avulla: kirjallisuuskatsaus mobiilimaksamispalveluiden tutkimuksesta ja nykyisten ja menneiden palveluiden ominaisuuksista sekä empiirinen tutkimusosio sisältäen käytettävyystestin, kyselyn ja haastattelun mobiilmaksamispalveluiden käyttämisestä.

Kirjallisuuskatsaus keskittyi ISO 9241-11 standardin käytettävyyden määritelmään sekä Jakob Nielsenin määritelmään käytettävyydestä. Näiden määritelmien pohjalta mobiilimaksamispalveluiden aluetta tutkittiin käyttäjän, tehtävän, varusteiden, ympäristön sekä hyväksynnän näkökulmasta. Näiden osa-alueiden ymmärtäminen on tärkeää suunniteltaessa käytettävyydeltään hyvää palvelua.

Lippu-, pankki-, etämaksu- ja lähimaksupalvelut tuotiin matkapuhelimiin 90-luvulla. Senaikainen tekniikka ei kohdannut vielä mobiilimaksamispalveluiden vaatimuksia. Tällä vuosikymmenellä mobiiliteknologiat ovat kehittyneet niin paljon, että käyttökokemuksesta saadaan jo tarpeeksi hyvä kaupallisille sovelluksille. Teknisestä kehityksestä huolimatta mobiilimaksamispalvelut ovat tuntemattomia ihmisille. Uskomukset ja väärinymmärrykset ohjaavat ihmisten ajattelua ja hidastavat uusien palveluiden käyttöönottoa.

Empiirinen tutkimus tarttui väärinymmärrysten ja uskomusten aiheeseen. Käytettävyystestissä käyttäjät rekisteröityivät mobiiliin musiikkikauppaan sekä vastasivat haastattelussa kysymyksiin rekisteröitymisestä ja mobiilimaksamisesta.

Tutkimuksen tulosten pohjalta kehitettiin malli käyttökelpoisten mobiilimaksamispalveluiden suunnittelemikseksi. Suunnitelteasse mobiilipalveluita tulee ottaa huomioon käyttökonteksti, jotta voidaan luoda palveluita, jotka tarjoavat ainutkertaista hyötyä asiakkaalle.

Avainsanat: käytettävyys, mobiilit maksupalvelut, käyttökonteksti, asiakkaan hyväksyntä

Foreword

When I started my studies in TKK in the year 2004 I could not imagine myself writing a master's thesis and graduating. My father warned me of working and studying at the same time because it took him approximately ten years to graduate from TKK. One of the reasons it took over ten years was me. Despite my fathers advice, I studied and worked through my studies and managed to complete all the courses in four years. My thesis work, however, took one year and four months to be completed, though I could work with it full-time. Six months should be enough to write a master's thesis. The road to graduation was long and curvy, sometimes depressing, and sometimes joyful but, all in all, a great experience. A thesis completes the studies of a university student and this thesis definitely completes my studies.

The motivation to write this thesis has been two-sided: a deliverable in a multidisciplinary project and a deliverable to the university to finalise my studies. The two sides have worked very well together. The project provided the thematic area of mobile financial services and the studies in the university provided the tools to carry out the research. When reading this bear in mind the two sides this thesis has as well that writing this thesis was a learning process. That way the errors and finesses in the text might reveal something about the writer and the process.

To end, I want to thank my supervisor and boss Marko Nieminen as well as my instructor Sirpa Riihiaho for their valuable feedback. Also, I thank Petri Mannonen for co-operation in planning the empirical part and carrying out the actual tests. Thank you for all the people who were somehow related to my thesis and its progress.

Lasse Lumiaho

23.11.2009

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Acronyms

2G	Second generation mobile telecommunication systems
2.5G	
3G	Third generation mobile telecommunication systems
GPS	Global Positioning System
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GSMA	GSM Association
TKK	Helsinki University of Technology
MNO	Mobile Network Operator
MP3	MPEG-1 Audio Layer 3
MPEG	Moving Picture Experts Group
NFC	Near Field Communication
OTP	one-time-password
PoS	Point-of-Sale
RQ	Research question
SDK	Software development kit
SMS	Short Message Service
TSM	Trusted Service Manager
UCD	User-centred design
UICC	Universal Integrated Circuit Card
WAP	Wireless Application Protocol
WLAN	Wireless Local Area Network

1. Introduction

Mobile financial services have been coming for several years but for the time being very few successful services have emerged. This thesis aims to assess the usability factors that influence these services. Mobile financial services include payments, banking, and ticketing with a mobile device. Authentication is a background service for payments, banking and ticketing, but authentication services could also be offered as standalone services.

What are the three things that people carry with them all the time and check that they are with when leaving home? Keys, wallet and a mobile phone. Lose or forget to carry one of these and you will not put your mind at rest before you have it or know where it is. The reasons behind this dependency is cultural change and people's expectations. It is expected that a person can be contacted regardless of time and place.

This importance of the three items has led to the idea of converging them. Wouldn't it be nice to carry just one item instead of three? Here we face a challenge because keys, money and mobile phone have very different physical forms. Converging them will not be an easy task.

Using money, opening locks or making phone calls are simple and intuitive things that even children can do. So far, using mobile phone to make payments or gaining access has not succeeded widely apart from few exceptions. The main reasons for the lack of success are the poor usability of devices which has kept consumers sceptical, as well as service and business model complexities that have kept businesses slow to act.

Mobile devices have limitations that degrade usability. Small physical size, trivial processing power, and they communicate in low-bandwidth environments to mention few (Tarasewich 2003, p. 57). Also, business models have not been completely thought through to enable co-operation of banks, mobile network operators (MNO), credit card companies, merchants and handset manufacturers. Revenue sharing remains the biggest obstacle to successful co-operation.

1.1. Overview of mobile financial services

In this section a brief description about mobile financial services will be given. The domain is divided into ticketing, banking, remote and proximity payments. The four domains need authentication to function and its usage will be addresses as well.

Mobile payments are categorised into micro and macro payments. The limit,that separates micro and macro payments, is usually approximately 10 €. The payments are also divided into remote and proximity payments giving a matrix of mobile payments. Proximity payments are further divided into manned and unmanned Point-of-sales (PoS). (Mallat et al. 2004)

Remote micro payments are usually ring-tones, logos and the like. Also, remote micro payments include ticketing such as transit and parking. The stores for mobile phones, for example Nokia Ovi and Apple App Store, are growing remote mobile payment markets as people are downloading applications, music and other products to their mobile phones. Unmanned proximity micro payments include purchases from vending machines and self-service stations. Manned proximity micro payments consist of small purchases at kiosks, shops and fast food restaurants. (Mallat et al. 2004)

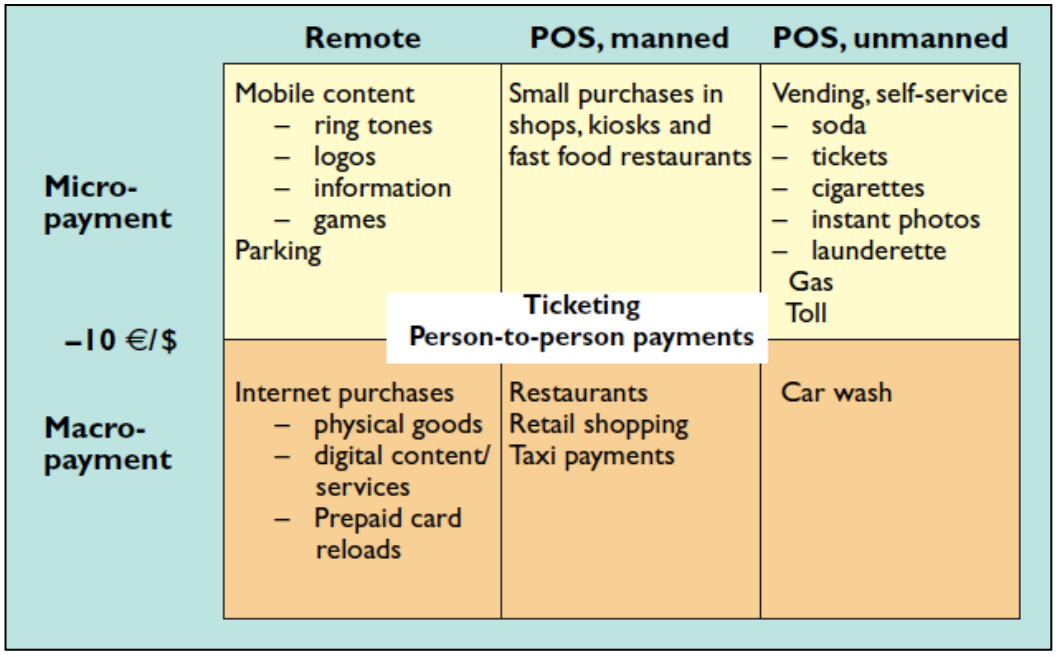

Figure 1. Mobile payments framework with examples. (Mallat et al. 2004)

Physical goods, digital content and prepaid card reloads are typical remote macro pay-

ments. Mobile proximity macro payments are the payments that are made in stores and they face competition from established payment instruments. (Mallat et al. 2004)

Mobile payments are billed usually by adding the payment to the monthly bill of the consumer's subscription (Mallat et al. 2004). Also, billing through a credit card is possible. There are some mobile credit card solutions such as the GSM Association's (GSMA) Pay-Buy-Mobile trial programme (Pay-Buy-Mobile web site) and the Sony Felica technology in Osaifu-Keitai phones (Osaifu-Keitai web site).

Mobile banking services start from automated short message service (SMS) account alerts, and account balances and transactions ending in fully functional mobile banking solutions that can be used with a browser on a mobile phone. The mobile version of the Internet bank can have the same features as the original Internet version. (Nordea mobile services)

Ticketing with mobile phones is usually considered as parking, transit or similar ticketing services. The mobile phone is used for buying and/or preserving the ticket. Simple solutions are SMS based, whereas advanced solutions use near field communication (NFC) which works by waiving the phone in front of a reader. Also, integrating ticketing applications with add-on services that exploit Internet connectivity of the mobile phone is possible for example, the top-up of public transport travel card with a mobile phone.

Authenticating the user for mobile payment provides possibilities for passage control and other authentication sensitive services (Mallat et al. 2004). Passage control, electronic identity, Internet log in services and similar services could all use the same authentication method. This raises the problem of dissenting legislation and the applicability of generic authentication systems for organisations.

In mobile financial services many stake-holders can be defined: users, merchants, MNOs, device manufacturers, banks, and credit card companies. There are other stakeholders as well but are not presented here because this thesis concentrates on the end user's point of view. Mobile financial services are so complex that a functional service should be provided in co-operation of the corporate stake-holders. The simplest services, for example buying ring tones, can be provided solely by the mobile operator but

more complex services like payments in a manned proximity retail shop should be done in co-operation. Merchants control the interaction with the customer, the network operator controls the device and provides connectivity, device manufacturers develop the phones that are used, banks offer credit cards and credit card companies develop payment methods and their protocols.

Mobile financial services are mainly targeted for all mobile phone users who are willing to use their mobile phone for specialised services. Typical users could be experimenters who want to try out new products to be on the forefront of technical development, public transportation users who want to have less cards in their wallets, or users who are utilising new services that better accommodate their needs i.e. lead-users.

1.2. Objectives and research questions

This thesis is a part of a project called Mobile Financial Services that is run together with Helsinki University of Technology (TKK), Nordea, Nokia and Tieto. The project aims to integrate different financial services into a mobile phone. The services include banking, proximity and remote payments, and ticketing. Furthermore, trust and authentication services are included because authenticating the user in the initiation phase is a critical action in payment services. In this thesis the same division is used for mobile financial services. As for definitions of terminology, mobile payment will include paying, initiating, activating and/or confirming a payment with a mobile phone but also storing and authenticating a purchase e.g. a bus ticket.

Usability is a major concern in all mobile services and there is a lack of usability driven research in the area of mobile financial services. This thesis aims to study the usability aspects of mobile financial services by doing a literature study and usability testing with users. Other aspects than usability are not covered. This research view is needed because historically mobile financial services have not achieved customer's approval and research is mainly controlled by technology related studies.

To address the subject of usability of mobile payment registration, three research questions are stated for this thesis:

Rq1 What kind of mobile financial services exist?

Mobile services are often customised for certain markets which is the case also in mobile financial services. Examples of past and present mobile banking, ticketing, proximity and remote payment services will be presented.

Rq2 What are the specialities of mobile financial services' context of use?

Mobile devices have technical restrictions but also their ubiquitous nature creates novel contexts of use and unseen social situations where financial services can be used. A study about the usability and use-context of mobile financial services will be done.

Rq3 What factors constitute the acceptability and subjective security of mobile payment registration

Subjective security and acceptability are the main reasons for using or not using a mobile financial service. Understanding how they can be addressed is vital for the introduction of mobile financial services. Making empirical studies with user testing is done to create an understanding.

In Table 1 is presented the relation of research questions and the methods used to answer the research questions.

Table 1. Methods used to answer research questions.

Research question	Method
RQ1 Present services	Literature study
RQ2 Context of use	Literature study
RQ3 Factors of acceptability	Empirical study + literature study

1.3. Structure of the thesis

This thesis consists of a literature study and an empirical study. The literature study is presented in Chapters 2 and 3. The empirical study is presented in Chapter 4 and it is followed by conclusions and discussion in Chapter 5.

In Chapter 2, overview of the past and present mobile services gives a picture of what has been and is now the state of the art of mobile financial services. Past and present services are presented to highlight what are the strengths and weaknesses of mobile financial services. The process of becoming familiar with the subject of mobile financial services all started with review of the available literature on the subject. Information was searched from sources such as the ACM digital library, IEEE Xplore and ABI/ Inform with keywords such as “mobile payment”, “mobile commerce”, and “mobile banking”. As a result, several articles about mobile payments were found. Most of the articles handled technical information such as protocols, security, and mobile payment technologies. Some of the articles, however, handled also the usability aspects of mobile payments. On the basis of keywords and sources found in the relevant articles some further research was done on the subject. After gathering enough articles to understand the pros and cons of mobile financial services the information that had been gathered was compiled into larger thematic entities. The entities were discovered from the material in the same way as an affinity diagram is constructed. The entities give a brief description of the areas that are important in mobile financial services from a usability point of view. The entities are: the user, task, equipment, and environment. The entities are the same as in the context of use of the ISO 9241-11 usability standard. Therefore, it was natural to compare the findings to the standard. This is done in chapter 3. Another widely recognised definition of usability by Jakob Nielsen was taken into account to match the findings especially on system acceptability.

Chapter 4 describes the empirical study that was carried out to address issues with acceptance. The used methodology is presented along with the results of the study. Findings of the literature review were used as the basis for the scope and target of the empirical study. The literature suggested that service acceptability and subjective security as well as usability issues were vital themes of successful introduction of mobile financial services. Therefore, the empirical study concentrated on the acceptability, perceived security and usability of a mobile financial service.

In chapter 5 the conclusions and discussion of the study is presented. Answers to research questions, conclusions of study, validity and credibility of study, personal experiences of the study and ideas for future research are given.

2. Examples of mobile services

This chapter presents examples of mobile financial services. Mobile banking, proximity payments, remote payments, and ticketing examples are given to represent the commercial solutions that exist or have existed. The domain and the division are the same as in the MoFS project.

No academic study was found that would have defined mobile ticketing, banking, remote and proximity payments and given examples that represent my vision of this thesis. Also, technologies that are used in mobile financial services advance fast and new services are emerging frequently. Therefore, examples of past and present services are provided here. Most of the examples are based on commercial products and their publicly available material, for example in the web, since academic research papers were not found.

2.1. Mobile banking

On-line banking solutions have been available nearly thirty years and have become widely used, at least in the western countries where the fixed Internet is widely spread. As an example of what a customer can do with a modern online banking solution overview of services by Nordea and Osuuspankki are presented here. Balance checking; browsing transactions; opening different kind of accounts; making transactions; and managing e-invoices, cards, loans, investments, and insurance is possible in the online bank if the customer wants to do so (Nordea overview of services & Osuuspankki web site).

Mobile banking solutions are being built on the base of fixed Internet banking solutions. At least in the already developed markets, the mobile channel will not replace the fixed line channel (Risikko 2009). Though this is the case in the western countries, it might not be the case in countries where fixed Internet connections and the computer base are not yet ready for widespread consumer use. The mobile phone will probably be the main channel to the Internet and, as well, to the on-line banking application.

For example, Nordea's mobile banking solution provides the same services as the Nordea's on-line bank (Nordea web site: Mobile services). It can be used with mobile phones equipped with a web browser and a fair sized display. According to Nordea, the mobile banking use will not challenge the traditional use through a fixed line but it will be a complementary channel that enhances the services offering (Risikko 2009). Another fact supporting this is the fact that the payment infrastructure and methods are highly developed in Finland so there is not an urgent need for mobile banking solutions for the Finnish market.

In Kenya, Safaricom has started a mobile banking service, M-Pesa, that enables sending money using a mobile phone to another person with or without a mobile phone. The service is targeted to those consumers who do not have access to a bank or do not have sufficient income for a bank account. A bank does not provide the service but it works very much like a remittance service. It resembles Western Union services. In the summer of 2008 it had 2.3 million registered users (Rosenberg 2008). M-Pesa has become very popular because it enables people to send money to their family members back home. There are not banks in the countryside and some people cannot open a bank account because of the high service costs. (Vodafone web site)

2.2. Mobile proximity payments

Mobile proximity payments are payment methods or solutions that are used to pay for the shopping in a store. Payment methods in proximity retail are easy and simple to use for the customer. Mobile payments, though, have not been around more than ten years. As Mallat et al. (2004) state "At the same time, mobile payments must become faster, easier, and more convenient to use, and must have low transaction fees, wide availability, and standardised technologies in order to emerge as a mainstream payment solution". So there is lot of development still to be done. Thus, the number of successful mobile payment solutions for proximity payment is very low, but growing as on-going trials will later become commercial products and services.

PayBox was a mobile payment solution that enabled customers to pay using a mobile phone in a retail store. The customer provided his telephone number to the merchant who entered it into the PayBox system. The system would call the customer who would

authorise the payment with his PayBox PIN number. PayBox restructured itself in 2003 because of several reasons including slow development of the market and lack of system providers. The system was not very cost-effective because communication was done via voice and SMS. (Karnouskos & Fokus, P. 63)

In France there is the Payez Mobile trial going on that uses NFC enabled mobile phones that have bank card technology installed in the SIM card. The payment process is very simple. All payments under 20 € do not need a PIN code authentication. First, the payment application has to be started. Waiving the phone in front of the reader or manually from the phone's menu can opens the payment application. Second, the PIN code is entered, if needed. Third, the phone is waived in front of the reader and the receipt is printed. Payez is currently in trial phase but the trial is expanding. (Payez press kit)

2.3. Remote mobile payments

Remote payment means using a mobile device to pay remotely for content or some kind of service. Historically, remote payments have included ring tones, logos and other kind of content that were suitable for the mobile phones of the late 1990s and early years of this century. Nowadays mobile phones can perform the same kind of tasks as computers, for example, play video, send and receive email, open text files and presentations. Also, the telecommunication connections have developed considerably during the last ten years from low speed General Packet Radio Service (GPRS) to high speed third generation mobile telecommunication systems (3G) and Wireless Local Area Network (WLAN) technologies. The scale of services and content that can be bought and used with a mobile phone are expanding due to these changes.

The first remote payments for mobile devices were logo and ring tone purchases. The introduction of the Wireless Application Protocol (WAP) introduced interactive services for the mobile phone. The problem was that the services were slow, not very easy to use, and the appearance was limited because of small-sized screens. For example, Jamba has been marketing its logos, ring-tones, music, applications, graphics, and videos on the Music television and is probably the best-known mobile content provider in Europe. The payments are charged on the customer's phone bill. (Jamba web site)

Apple’s Appstore for the iPhone and iPod Touch has brought more complex applications for mobile phones. The store has been a success because users have downloaded 1.5 billion applications by July 2009 (Apple press release). The Software development kit (SDK) enables constructing advanced applications. The biggest strength of the Appstore is how it makes the content available for the consumer. The applications are organised well and are easy to find. Most of the applications are very cheap (1-2 Euros). This combination makes the store very appealing for the customer to use. Also, the seamless integration with the mobile devices host program Itunes on the computer makes is important. The payments are charged to a credit card or paid with PayPal. (Apple web site)

2.4. Mobile ticketing

Mobile ticketing means acquiring, buying, validating and ordering a ticket regardless of time and place using a mobile phone. Mobile tickets can be used, for example, in mass transit; airline check-in; marketing and voucher distribution; and ticketing for performances, exhibitions and events. Mobile tickets can be purchased through different mobile channels,for example, SMS or a dedicated application, but mobile tickets can also be acquired through different channels.

In Finland mobile ticketing has not been very widely used in general but mass transit, airline check-in and event ticketing and marketing have succeeded. In the capital area customers can buy mass transit tickets by mobile phone for metro, tram, and selected train and bus line services. The service is SMS based and in 2006 the total number of sold mobile tickets exceeded 9 million in Helsinki. The service by Plusdial has also been sold to Stockholm Sweden and other European cities and they had sold 25 million tickets by the end of August 2008. In Sweden it became the most popular mobile service within only one year.

Finnair is the first airline company to provide the ability to check-in to their flights by a text message. The service is provided by a Finnish company called Bookit. The service sends an SMS containing the flight information to the customer and the customer just has to reply with a message containing the letter 'A'. Using the SMS check-in service lowers the queuing time of the customer. 75 % of Finnair's frequent fliers who have the option for SMS check-in are using the service. (Bookit web page)

In Japan Osaifu-Keitai mobile phones have integrated contactless smart cards in them. The technology is standardised as ISO 18092 (NFC) and was a standard proposal for ISO 14443 (Contactless integrated circuit cards). These smart cards can host various payment applications that would normally mean multiple plastic cards for the consumer. There are at least four mass transit systems using Osaifu-Keitai technology and more than half a dozen other ticketing applications (Osaifu-keitai website). Its strengths are the ease of use (just place the phone next to a reader), convergence of services and re-charging it in the Internet. Sony Felica that is the underlying technology is the de facto standard for contactless smart cards in Japan.

SMS based mobile ticketing services are not as convenient since SMS messages need to be read by someone for validation and deleting SMS messages can destroy a ticket because they are kept among other messages. Mobile ticketing applications that make use of NFC technology can be killer applications since storing and validating the ticket is really easy for the users. Utilising NFC technology makes the mobile phone more suiTable for ticketing services and applications. There is great potential in mobile ticketing applications if NFC is utilised broadly in mobile phones.

3. Usability of mobile financial services

In this chapter considerations of usability and acceptance of mobile financial services will be examined. At first, usability definitions are presented and the impact of usability on mobile financial services will be examined.

According to the New Oxford American dictionary, mobility means the ability to move or to be moved freely and easily. Mobility is a term often used to refer to access to information or applications from connected, portable, and networked computing devices. Mobile payments are defined as payments where some part of the transaction is made with a mobile device through a wireless network (Zmijewska 2005). Also, “any payment where a mobile device is used in order to initiate, activate and/or confirm this payment can be considered as a mobile payment” (Karnouskos & Focus 2004).

Usability is about using a product and accomplishing goals in a certain setting. Mobility means, in relation to usability, that the context is changing and assessing usability of mobile devices comes harder because the number of situations of use grow from one or two to infinite. Consider these examples:

> ***Mobile phones*** *are with users constantly and can be used regardless of time and place. A couple of decades ago phones were used only from fixed locations. This change of physical environment has also changed the social environment of talking on a phone.*
>
> ***Mobile financial services*** *enable handling financial information anywhere and anytime without the constraints of fixed communications. Selling falling stocks can be done immediately and thus investment management is more versatile and faster than ever before.*

Usability of mobile financial services is influenced by the limitations in mobile technology. Therefore, it is important to study and link together the research about mobile financial services and usability.

3.1. Usability

In this section usability definitions by Jakob Nielsen and ISO 9241-11 standard are presented. Nielsen has a practical view point that originates from usability testing in practice. The standard defines the context of use and the measures for usability. The two definitions are presented because they have different perspectives which complement each other.

3.1.1. Nielsen's definition of usability

According to Jakob Nielsen usability is a narrow sub-concept of practical acceptability compared to system acceptability, which defines whether the system successfully meets its users needs. System acceptability consists of its practical and social acceptability. Social acceptability means, for example, that a system does not gather personal information without permission or that others than you also value it. Practical acceptability consists of cost, reliability, usefulness etc. System acceptability can be low because of social acceptability even if practical acceptability is high. System acceptability is depicted in Figure 2.

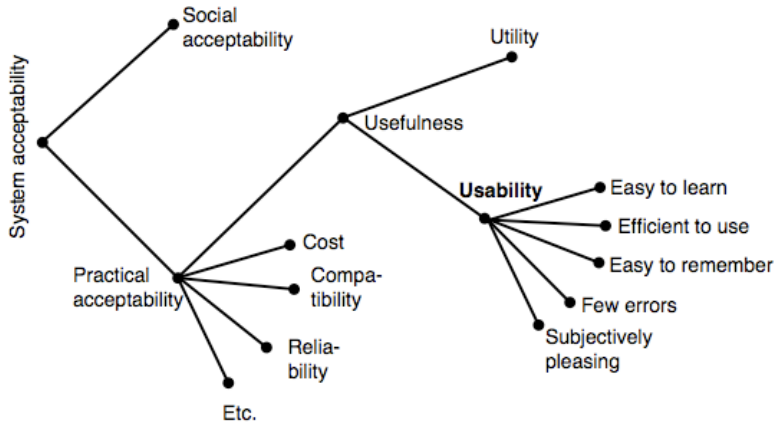

Figure 2. System acceptability based on Nielsen (1993)

Usefulness is a part of practical acceptability. A system is useful if it can be used to achieve a goal. Usability together with utility make the combination of usefulness. Utility means that the system can be used to do what is needed. Usability means how easy it is to utilise the systems resources. Finally, usability is divided into learnability, efficiency, memorability, errors and satisfaction.

Learnability is, in one sense, the most important usability attribute because users have to be able to use the system right away. The ability to use a system immediately depends on the system and its learning curve. Systems for novice users tend to have fast growing learning curves and professional systems learning curves grow slower but the final skill level is higher than systems for novice users. Learnability can be tested with novice users by measuring the time it takes them to achieve a predefined level of proficiency.

Efficiency relates to the maximum level of performance that can be achieved by an experienced user. Efficiency can be defined by measuring the user's time to complete a task and when the results do not improve the steady level of performance has been achieved. This level can be used for benchmarking other users and their level of efficiency.

The efficiency of casual use is related to memorability because memorability measures how easy it is to memorise the interaction with a system. Enhancements in learnability often improve also memorability, though there is a difference. Users can know how to use a system without remembering the correct terms or icons in the system. As a result, measuring memorability is best done by performance testing with casual users.

Users always make errors in the course of action. Some are marginal and therefore addressing their causes is not of high priority. On the other hand, some errors are catastrophic and can destroy the users' work results or prevent the user from doing his work. Catastrophic errors should be counted individually because of their importance.

Subjective satisfaction can be extremely important for entertainment or non-work systems. For entertainment systems, entertainment value is more important than speed. People's attitude towards computers should be separated from the notion of subjective satisfaction. Asking how pleasant a system is should be done after the user has used the system. Correlations between before and after test questionnaires with new systems is low (Root & Draper 1983).

Nielsen's definition of usability is very practical and sprang up from making usability testing. According to the author the goal, of the usability engineering book is "to provide concrete advice and methods that can be systematically employed to ensure a high degree of usability in the final user interface".

3.1.2. ISO 9241-11 standard – Guidance on usability

In the ISO 9241-11 standard of usability, usability is defined as a combination of targeted goals, usability measures and context of use. Context of use includes the user, task, equipment and environment. Different contexts can change the usability of a product. Although changes in usability might or might not be significant, the impact can be measured in terms of performance and satisfaction compared to accomplishment of the user's goals. The usability frame work is presented in Figure 3. (ISO-9241-11)

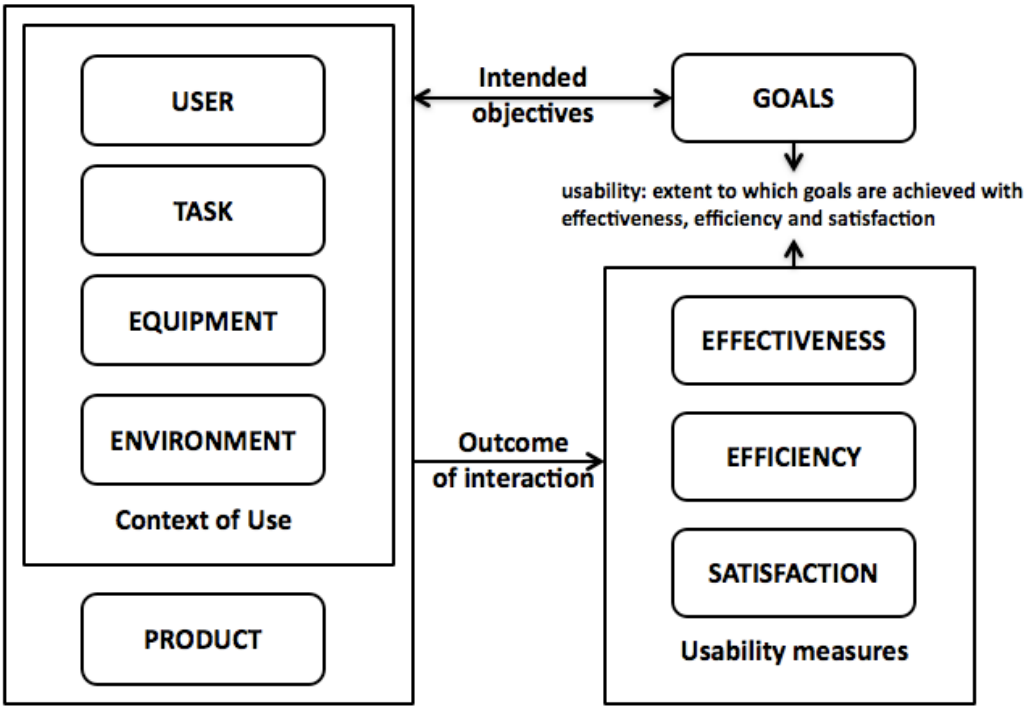

Figure 3. Usability framework (ISO-9241-11)

The goals can be separated into sub-goals, which represent the components of the overall goal. The sub-goals specify also the criterion to satisfy the goal. The overall goal is set according to the function of the system that is under attention. As an example the overall goal could be "make a mobile payment" and it could be divided into sub-goals "wave the NFC phone in front of the reader", "enter the PIN code" and "receive the receipt".

In the ISO 9241-11 standard framework usability is the "extent to which goals are achieved with effectiveness, efficiency and satisfaction". Effectiveness, efficiency and satisfaction are the generic usability measures defined in the standard. When under con-

sideration, the usability measures should have at least one unit of measurement, preferably more than one. Because there are various contexts of use, usability measures cannot be the same in every context. The measures should represent the objectives of the involved parties and be suitable for the moment. Usability measures should also be given priorities depending on their importance for the situation. For example, when a product should be easy to use without learning, intuitive interaction with the product should be of great importance and there should not be a lot to remember.

Effectiveness is the accuracy and completeness that can be achieved e.g. at what percentage some task is completed. Efficiency is the relationship of effectiveness to the expenditure of resources. For example, how many hours of work were used to complete the task compared to another way of doing it. In some cases, the resources should be measured in relation to a specified level of effectiveness because there is not always a rival to compare to. Satisfaction is the amount of comfort and the users' attitudes towards using the product, for example, rate of voluntary use.

In the context of use, the users should be described so that their most important characteristics are clearly defined. Skills, experience, education, etc., should be described for all kinds of users that interact with the product. Different types of users should be defined separately because combining characteristics of users cannot be used to cater for variation in user needs.

Tasks are the actions carried out to accomplish a goal. Task characteristics influence the context of use because tasks can vary, for example, in both the time and effort needed. User-centred design (UCD) actions need detailed description of tasks because designing the actions succeeds only if the designer has a clear view of the tasks. Also, the tasks should be explained with the goals that are targeted. Task analysis can be used to identify the users tasks.

Equipment should be explained in detail. Different features of the system affect the usability in terms of hardware, software and other material. The main application areas and major functions give good insight into the use of the equipment.

The environment, where the actions take place should be described in terms of technical, physical, ambient, and the social and cultural environments. The technical environ-

ment describes the facilities the equipment can use. The physical environment should address workplace conditions, design and safety to give a rich description of the physical environment that affects the user. The ambient environment addresses things such as humidity and temperature. The social and cultural environment addresses, for instance, work practices, organisation and attitudes.

3.2. Mobile financial services' context of use

This section addresses the context of use of mobile financial services. User, task, equipment and environment will presented with examples related to mobile financial services. The examples have been taken from the literature study.

Mobile devices are by their very nature ubiquitous and, therefore, the context of use is changing constantly. Thus, there is not one ruling definition for the context of use of mobile payments, though one can say that the situation where the information is used is important not the device (Pascoe & Thomson 2007).

According to Vankatesh et al. (2003) by understanding the context of use the user interfaces can be designed to better accommodate and leverage user needs to create value and generate revenues. Moreover, they state that mobile devices provide ubiquitous access to Internet but the goals are not same as in a desktop environment. In a mobile context the goals are usually time or place dependent. Desktop users' needs and habits cannot be used for designing good mobile applications or web pages.

This section presents the effects of context of use to mobile payments. The context of use consists of user, task, equipment and environment. All four parts will be examined to highlight the special features that the mobile financial services context of use consists of.

3.2.1. User

There were approximately 4.3 billion mobile phone subscribers in June 2009 (GSMA webpage). Asia Pacific is the largest area with almost two billion connections trailed by western and eastern Europe which together consist of nearly a billion connections. More detailed information is in Table 2.

Since mobile phone users are located all over the world and the few mobile payment systems that exist are usually for a certain purpose (Pousttchi 2004), it is hard to define precise user groups in general for mobile financial services. That being the case, user descriptions for some of the earlier presented mobile financial services will be given.

Table 2. Mobile phone connections in the world by region. (GSMA)

	Number	Percentage
Africa	421,450,167	9.78%
Americas	477,727,711	11.08%
Asia Pacific	1,894,751,422	43.96%
Europe: Eastern	459,394,583	10.66%
Europe: Western	509,980,691	11.83%
Middle East	245,411,903	5.69%
USA/Canada	301,595,115	7.00%
World	4,310,311,592	100.00%

The Kenyan M-pesa banking service has two kind of users: money senders and receivers. The usual course of action happens between family members that are living in separate places, usually the sending party in a city and the receiving in the countryside. Money sending to home happens a couple of times per month. Money is sent back home to support parents or other family members. Earlier the money was sent via friends or family travelling home. Some users also pay bills with m-pesa but the vast majority uses it for remittance purposes (Njenga 2009). Also, it seems that people with a lower level of education compose the larger user group (Njenga 2009). (MMU website)

Young mobile phone users tend to use their phones for entertainment like taking pictures and playing (Srivastava & Selian 2004). Jamba is a provider of ring-tones, games, logos, etc. for mobile phones. It advertises its products on youth oriented channels like Music Television (MTV). Though, no statistics about Jamba's user base is available it is most likely that the users are on average under 20 years old and do not pay phone bills by themselves.

In Japan the mobile payment system Osaifu-Keitai gathers credit card, transit ticket, loyalty cards and the like into a single device. The popularity of ecash solutions is the basis for the success of mobile payment services because the consumers can use the same services with a mobile phone. Ecash solutions such as transit tickets have been successful because consumers who use them confront less commotion, which is a really bad social phenomena in Japan. The smart card based transit ticket is far more easier and faster than paper based magnetic tickets and the more people started using the smart solution the more paper ticket users wanted to change the solution they used. Less commotion appeared when they used a smart card. The mobile version has the bonus of being able to be recharged through Internet (Osaifu-Keitai web site) which makes it easier for the user. (Mainwaring et al. 2008)

In the United States of America (USA) there has been great success in the are of mobile commerce. Buying the iPhone is expensive, thus iPhone users are partly early adopters who use new technology early and are ready to invest money in the product (Macedonia 2007). But then again its revolutionary technology implementations are tempting to trendy people who might seek for the sophistication that Apple products bring to one's image. To sum up, iPhone users are ready to spend money on the device and love gadgets.

All in all, mobile financial services are used in diverse conditions by people with different backgrounds, abilities, needs, and possibilities. It is common among them that the mobile financial service they use is either used to make life easier or more enjoyable.

3.2.2. Task

Tasks are the activities undertaken to achieve a goal (ISO-9241-11). Since in this thesis mobile financial services are divided into four categories, an overview of mobile banking, ticketing, remote and proximity payment tasks will be given here.

Mobile banking tasks consist of various money transactions through a mobile phone. Balance checking, remittance or a giro transfer are standard tasks. They normally start when the user realises the need. The next step is to open the application and sign in, though balance checking is a low security level task and might, therefore, not need signing in. The following step is the action, for example, entering transfer details or check-

ing the balance. Entering transfer details should be simple and logical since it is the point where the transfer most likely will break it if wrong details for the recipient are entered. Also, when signing in, it is important that it can be done easily since people do not carry one-time-passwords (OTP) with them. Storing OTPs to the phone or an alternative log in method could make it easier to log in.

Mobile ticketing tasks can be divided into two parts: ticket buying and ticket validation. Depending on the ticket type it can be acquired through different channels and validated by different means. For example, one can buy a concert ticket from a web site and get a two-dimensional bar code as a picture to one's phone. The bar code is read at the event entrance with a bar code reader. It is critical that the consumer has an appropriate phone and can receive multimedia messages and display pictures with good enough quality. Also, the consumer should remember that the ticket is in fact stored inside his device and should not delete it with other messages. Another scenario could be purchasing a ticket for mass transportation. If the consumer has a Near Field Communication (NFC) enabled phone and can access Internet with it he can buy the ticket through the ticketing application and validate the ticket just by waiving the phone in front of a reader on a bus or at a metro station.

Remote payments are usually made to buy some kind of content such as games and ring-tones. The content is usually bought through an application like the App Store on the iPhone, by coded SMS messages or the phone's web browser from a portal like Jamba!. The task consists of finding the desired content, downloading it, and paying it. The payment usually does not happen at the same time as selecting and downloading. Credit card bills and phone bills are paid monthly. Mobile content payment is usually linked to an account and payment happens later than content distribution.

Mobile proximity payments have had various implementations from past call-a-number services to present wireless connectivity solutions. The call-a-number services were difficult to use and the present mobile proximity payment utilises the NFC capabilities of mobile phones to integrate a credit card to a mobile phone. The task is done very much like normal credit card payments. The only differences are that the credit card solution has to be started and the PIN code is typed with the mobile phones number pad, if needed.

To summarise, the tasks of mobile financial services are simple and easy to perform if the user interfaces, technology and work flow are designed to support ease of use.

3.2.3. Equipment

Mobile payments need to be done with a mobile phone using some kind of wireless data connection to enable the transaction. In this section a comparison of the available wireless technologies is given. The right choice of connection is crucial because a wireless connection method might not be suitable for all contexts. Other attributes of the mobile phone are not discussed here. The wireless connection method is the most crucial equipment factor in mobile payments. The following analysis is from a research paper written by Agnieszka Zmijewska (2005).

Mobile payment transaction technologies can be divided into cellular technologies (slow 2G and fast 2,5G and 3G), infrared, NFC, and Bluetooth. Zmijewska (2005) has used ease of use, cost, usefulness, trust, mobility, and expressiveness as factors to analyse the suitability of these technologies for mobile payment systems.

The second generation mobile phone technologies, GSM and CDMA, offer great voice and messaging services. The mobile payment systems on GSM and CDMA build on calling and messaging. The ease of use of these systems, however, is not very good. Usefulness is not very good either. Perceived trust can be good because there is not a need to transfer credit card details. Mobility and cost can be issues since calling and messaging do cost and mobile operators provide these payment services.

On the contrary, the ease of use of 2.5G and 3G networks payment systems is easy because they usually require only the press of a button and the PIN code. They are not very useful since the payment is only for digital content. Trust is perceived good since the amounts are relatively small and the PIN is used. Mobility is still an issue because mobile operators provide the services. Costs are low due to small data amounts and no cost for payment.

Infrared systems are not very easy to use because the beam works only over a short range and it has to be directed correctly. As for usefulness, infrared on mobile phones has very low use-rate but the technology enables using the mobile phone as a wallet. Infrareds characteristics that make it hard to use make it also secure. In 2004 there were

150 million mobile phones with infrared so the technology is widespread. Using infrared is very cheap because many phones support it already. There would not be any additional costs for the user.

Near field communication is very easy to use because it is used by waiving the sending part in front of the reader. What comes to usefulness, NFC can be used to accommodate the needs of a mobile wallet that combines credit cards, loyalty cards, access cards, transit tickets, et cetera. Perceived trust is high because NFC works only in short-range and validating purchases may need a PIN code. Existing smart card systems understand NFC technology. The problem in mobility is that the current mobile phones do not widely support NFC technology. Costs might be high at the moment because only a few phone models have NFC. The user might even have to buy a new phone.

Bluetooth is not as easy to use as NFC. The connection has to be manually set up. There are not any arguments supporting usefulness of Bluetooth in mobile payments. Bluetooth has a bad reputation in trust because it has been used to hijack a mobile phone. Bluetooth is widely available in mobile phones. The price of Bluetooth terminals is higher than for NFC terminals.

As a summary, NFC technology seems to be the most suitable for PoS payments because the set up process is fast and easy. For remote payments the use of a fast Internet connection is the best option. WLAN technology could be an option for fast mobile connection technologies (i.e. 3G) but is trailing behind in availability and security. Different payment scenarios need suitable technologies, i.e. one size does not fit all.

3.2.4. Environment

According to the usability standard (ISO-9241-11), the environment is the surroundings where the actions take place. Because mobile phones are ubiquitous, the user can be in trouble with differing problems because of changes in technical, physical, ambient, social, and cultural environments. Different environments have dissimilar forms because in one environment some aspects are more essential than other aspects i.e. in a public place filled with people the social and cultural environments are essential but in a solitary place they might not play a role in any way.

The technical environment of mobile financial services is mostly irrelevant for usage. Connection reliability and bandwidth are important issues and might cause a problem in areas where the infrastructure is not developed. A larger problem related to technical issues is the lack of equipment but it is not strictly an environmental issue.

The physical environment is the physical surroundings of the user. As for mobile financial services, the physical environment does not affect mobile phone usage except in the case that the physical surroundings block the mobile network signal. Ambient environment is closely linked to the physical environment, for instance, internal spaces have climate control systems. The ambient environment is not of high importance for mobile financial services. In special conditions the usage of mobile payment is highly unlikely.

The social and cultural environments have an impact on mobile financial services because other people are also present in the situations where money is used. The effect of social context is associated with the culture and how strong its influence is on people and their behaviour. For example, in Japan where culture guides human actions very strongly the usage of credit cards is low because credit card users are considered ‘not cool’ (Mainwaring 2008). The reason behind this is that other people have to wait and the clerk might struggle when operating the card reader or one might suffer indebtedness (Mainwaring 2008). Also mobile payment systems are categorised to this same category when considering the social implications of the payment method selection. Contrary to this, the social pain of losing one’s face is to gain something or get advantage. The purchase is designed to be a joyful experience for the customer: after a successful purchase the card reader glows and plays a pleasant sound. Japanese people value the experience of paying with a mobile phone because of the audio visual feedback and the bonus points they collect so much that they are willing to lose their faces in public to some extent.

The next section discusses the acceptance of mobile financial services and the special features that the mobile phone gives rise to.

3.3. Acceptance of mobile financial services

Usability is considered as a sub-concept for acceptance by Nielsen (1993) and Shackel (1991). In their concepts, usability is only one part of acceptance, which is a game of

trade-offs involving usability, costs, and the like. The standard of usability (ISO-9241-11) places acceptance inside usability measures under the concept of satisfaction. Since acceptance plays a significant role in usability definitions and mobile financial services have suffered from low acceptability, it is worthwhile to analyse and represent the earlier research about mobile financial services acceptance and related studies. The following section describes the effects of mobile financial services acceptability.

According to Pousttchi (2003) user preferences, expectations and needs are individual and linked to the user's payment systems use preferences. Pousttchi (2003) also states that therefore users have individual essential conditions for acceptance of a mobile payment system. Each user considers the criteria given in Table 3 when pondering whether to use a payment system or not.

Table 3. Essential conditions for mobile payment procedures (Pousttchi 2003)

Essential conditions
direct costs
technical requisites
confidentiality of data
convenience
acceptance points
payment scenario
method for settlement
charging time
payment service provider

The most important criteria are confidentiality of data, costs, easy handling, fast processing and coverage (Pousttchi 2003). Confidentiality of data, which is the most relevant essential condition, is affected by registration requirement and brand visibility. Brand visibility is connected to the idea of subjective security, meaning the feeling of security the consumer has when using a product (Zmijewska et al. 2004). Subjective security is affected by experiences, discussion and beliefs about the product. There is no technical solution for it. Costs include costs from changing the phone, registration fees,

and transaction costs. Speed is also relevant to mobile payments, i.e. mobile payments should not be any slower than ordinary payments. They should also be widely accepted by merchants, mobile operators and be supported by a wide range of phones.

Mobile phones can be good for certain payment services but unquestionably not the only channel (Mallat 2006). Mobile phones can offer a “good container” for multiple card-based services, for example, in Japan Sony Felica is offering financial services including payments, ticketing, access control, and membership cards. These services can be used with contactless IC chip cards but they require a different card for every service. In the mobile version of these services, they all can be bundled to a single mobile phone thus preserving space and keeping everything in one place. Clearly, the ability to use a mobile phone for payment services is not enough but there has to be something extra.

Pousttchi claims (2003) that it is not enough that the user accepts the essential conditions, but the user has to accept the so-called commensurate conditions, i.e. to gain added value for using the payment service. Moreover, the supplementary value has to be unique for the user (Pousttchi 2003). On top of that, Mainwaring et al. (2008) declare that triumphant technologies are more than gadgets to people, they are part of dreams and even loveable. All in all people tend to perceive life-easing services or technologies valuable which is increasingly important in designing mobile payment systems.

The presented analysis of acceptance was about practical acceptability excluding aspects of social acceptability. An example of social acceptability was given in Section 3.2.4.

4. Empirical study

This chapter presents the progress of the empirical study and the results from it. First, the used methodology, users, application, implementation, and analysis of the empirical study are presented. User-centred design methods are diverse and ambiguous , so it is appropriate to closely describe how the methods were used. Second, the results and analysis of the pre-test questionnaire will be given. Third, results from the interviews are presented question by question and the most crucial results from the usability point of view will be highlighted with graphs.

4.1. Methodology and implementation of the empirical study

Usability tests were conducted to test three mobile music store registration processes. The tests were carried out to study in practice what kind of difficulties users have with usage of mobile phones and to find out which aspects of the entity affect the experienced security of a mobile financial service.

The target of the user tests was not the user interfaces of the registration processes but the feeling when using them. Other parts of mobile financial services were not studied. The main goal was to discover what made the registration process more secure and what made it less secure. The registration processes were constructed in a user interface construction course by students and further development was not coming so enhancing their usability was not on the agenda. In the test session there was also a second part where the users surfed in Facebook or presented how they used the Noppa portal, which is an information channel for Helsinki University of Technology students. The second part is not included in this thesis.

Because Finnish people do not use mobile financial services in large, though almost everyone has a mobile phone, the users had to be guided into the area before starting to ask questions. Therefore a usability test session was a good method because the test is always first and the interview right after it. Also, the students were participating a course on UCD and their task was to participate a usability test session and write a re-

port about it. So the test sessions served the course and our research. The questionnaire that was filled before the tests was a good way to gather basic level information about the users because the test session time was short. Only 15-20 minutes to test and interview and approximately 10 minutes for the second part. The literature review affected the empirical study in some ways. In the interview there were questions to tackle the question of subjective security e.g. what made the user feel secure or insecure. The examples of services did not affect the interview or questionnaire creation but then again gave some understanding what could be expected as a result.

4.1.1. Users

This spring, 126 students from Helsinki University of Technology participated a basic course of user-centred product development. The test was a part of an optional exercise in the course. The students were a good choice because they study technical sciences and, therefore, are likely to use modern technologies, like mobile phones and MPEG-1 Audio Layer 3 (MP3) players, on a regular basis. Fifty-three per cent of the users that participated in the tests own and use a smart phone. Also, recruiting the users was easy and enabled a large sample with little effort. When analysing the results, 30 users' responses were randomly selected, though ensuring that they had responded in full to the pre-test questionnaire.

4.1.2. Pre-questionnaire

Prior to participating in the test session the users had to fill in a questionnaire. In the questionnaire the users had to give basic demographic information like age, sex, study program and number of credits. The questionnaire also addressed areas of electronic commerce, mobile services, Facebook and the Noppa portal.

In electronic commerce section the users had to give out details about their e-commerce experiences and habits. Usage of Internet banking, on-line credit purchases,and subjective opinion about e-commerce payments characteristics were asked. The most interesting questions for this thesis were about payments and their characteristics from the users' point of view.

In the mobile services section the users were asked about mobile phone model, selection criteria for the mobile phone, mobile phone bill payer, frequency of mobile phone use,

and use of mobile phone for payment. The questionnaire also included questions on Facebook and Noppa portal usage. The questionnaire was a prerequisite for participating the test session. The questionnaire questions can be found in appendix A.

4.1.3. Application

The registration process was done with a Nokia N95 smart phone. Here a smart phone means that one can install new programs independently whereas a multimedia phone is just capable of repeating media. The phone has a music and video players, Global Positioning System (GPS), Web browser, and a camera among other attributes. Because the registration process was done on a web site, the users were only supposed to use the Opera Mini web browser of the mobile phone's various attributes.

The tests were conducted with three different registration sites. All the sites were designed for a mobile music store registration. They gathered information that was relevant for the service to know about their customers i.e. name / user name, email address, payment information, and a password to log in. The main idea was the same in every process but there were some differences in the work flow.

Figure 4. First registration site.

The first site's appearance was made to look like an official Nokia Ovi service. The registration consisted of three different pages. In the beginning of every page there was helpful information to help the user through the registration process. On the first page

the user had to insert his email address and a password and confirm it. On the second page the user had to insert his credit card information and on the third one was a summary of the information that the user had to confirm. The first site is shown in Figure 4.

The second site starts with a simple page that has a form for all the information that is gathered from the user. Email address, password and password check, full name, address, credit card number, expire date, and check number are the required fields in the form. The site warns about missing information and checks the validity of the password. When correct information has been given, all the information is sent via email to the user and it has to be confirmed by clicking a link on the bottom of the email. The last page confirms that the profile is actually being created with the correct information. The second site is shown in Figure 5.

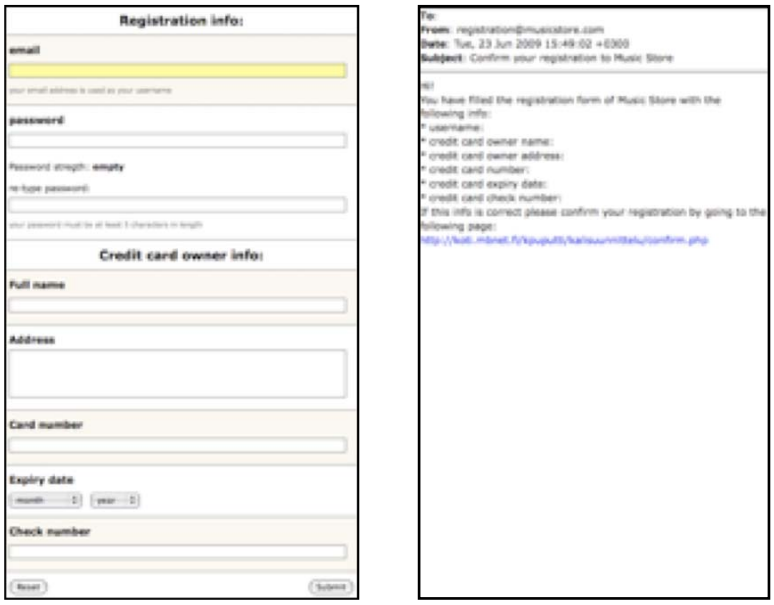

Figure 5. Second registration site.

The third site begins with a welcome page explaining why the site exists and prompts the visitor to log in or sign up. User name, full name, email address, password, and password check are given on the registration page. The next page is for payment preferences. Monthly limit and payment method are given to the service to complete the registration process. The third site is shown in Figure 6.

Because the registration sites were produced by students in a user interface construction course the sites were not functioning perfectly. The second site had password strength

check which did not work. According to it the password field was always empty. The third site gave very little information when the account was created.

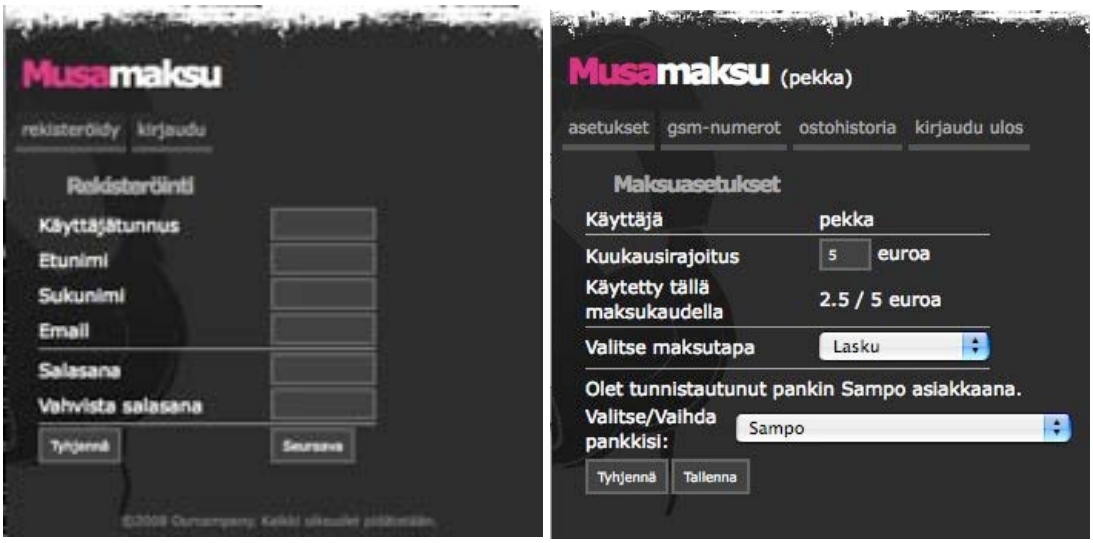

Figure 6. Third registration site.

4.1.4. Implementation

The tests were directed by the writer of this thesis and a doctoral student. The second part of the tests was a part of the doctoral student's doctoral studies and therefore he participated in conducting the tests. The tests were recorded with a video camera because they were scheduled very tightly. Thus, no notes were taken during the tests and analysis could be done afterwards. Also, because the tests were conducted by two persons and there was a considerable number of participants, making notes is better done afterwards because notes taken by only one person are more consistent than by two different persons.

Before the users came to the test session they had to fill in a questionnaire about demographics, mobile phone and mobile commerce usage, Facebook usage, and Noppa portal usage. The tests were traditional thinking aloud tests, where the user was first given a scenario. After the scenario the user had to start the Opera Mini browser. Then the user was given a task to register to a mobile music store with the provided mobile phone. The user used the mobile phone and was encouraged to think aloud when using the mobile phone.

After finishing the task the user was interviewed. The complete list of questions is provided in the next section (4.1.5 Interview). The interview after the test session lasted approximately five to eight minutes. The duration depended on how fast the user was, how much he or she had to say, and how much time was left for rest of the test session. The users filled in a survey after the interview, but it is not discussed in this thesis. After the post-survey there was the second part of the usability test. The second part was similar to the first one but the service changed to either Facebook or the student portal Noppa.

The user tests were conducted in two separate rooms. The rooms had as equipment a table, an external display for the mobile phone, two chairs, a camera, and a computer to fill in the post-surveys. One room is a proper usability laboratory with a semitransparent mirror, a control room, video system, and a soundproof door. The other is a standard office room with a soundproof door and the aforementioned equipment.

4.1.5. Interview

The interview was the most important part of the empirical study since it was the moment when the users had for sure made something related to mobile commerce. The test sessions were a good introduction for the interview because after using the registration system the users were in the right kind of mood to discuss about mobile payments and their characteristics. List of the questions is in Appendix B.

4.1.6. Analysis

Analysing the test session material started by choosing ten interview videos of every user interface to be analysed. Thus, a total of 30 interviews of the total of 126 interviews were used in this thesis. The interview videos were analysed to pick users' answers to the questions that were asked in the interview. The part of the videos where the users tested the registration sites was looked through but not in detail since the goal of the interview was to study subjective security of the sites not finding usability issues. From the test part only minor usability issues sprang up and they were non-catastrophic, i.e. they did not prevent the use of the service.

Since the questions were open or the users gave conditional answers to closed questions some interpretation had to be made. The categorising of 'Yes' and "Yes, probably" an-

swers to mean ‘Yes’, ‘No’ or ‘Maybe’ was decided by presuming what would the user’s action be in real life. So saying “Yes I will use it if it asks for a PIN code” to a question “Would you use a payment service that does not ask the user for authorisation” was considered as a ‘No’.

When the answers had been analysed the results were composed into tables. Charts were drawn based on the answers in the tables. Answers from the questionnaire were also visualised with charts.

4.2. Questionnaire

The questionnaire gathered information about demographics, electronic commerce and mobile services usage history. In the following the results from the questionnaire will be presented using charts and explaining their meaning.

4.2.1. Demographics

Demographic information was one type of information that was gathered with the questionnaire. The users are young adults and the vast majority are men.

4.2.2. Electronic commerce

The next section in the questionnaire concentrated on electronic commerce. All the users used Internet banking services, which is not unusual in Finland where Internet banking has been around for over twenty years and every day banking services at point-of-sale are chargeable and online services are almost free. Sixty per cent of the users claimed to own a credit card. Also, all the users stated having bought something over the Internet.

When asked about what payment methods the users had used for electronic commerce purchases, 100% had used their Internet bank account to pay for products online. Two-thirds had paid for online purchases after the product had arrived using an invoice, whereas 63% had used a credit card for online payments. It has to be noted that actually all kind of invoices are in practice paid using Internet banking by Finnish young adults, but with the difference that in this category the Internet banking system gets the information from the sellers web page and the user does not have to insert the details manu-

ally thanks to the integration. In Figure 7 are given all the used payment methods for electronic commerce.

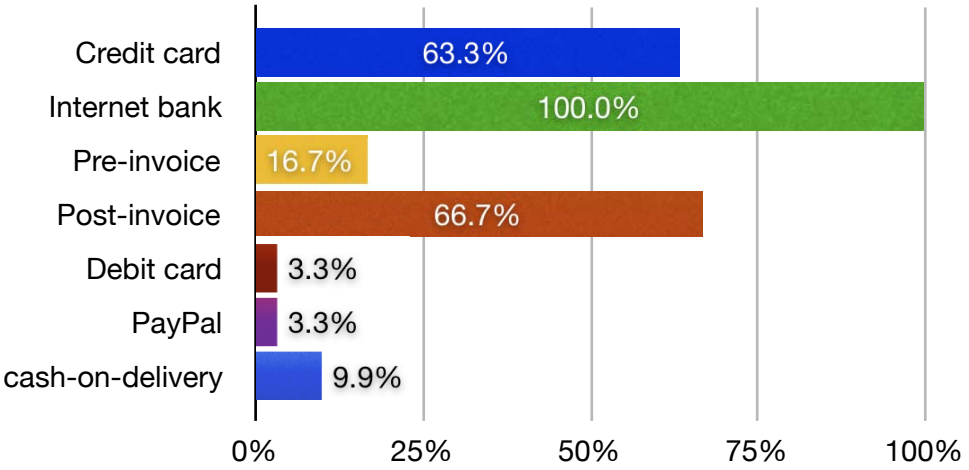

Figure 7. What payment methods had been used for e-commerce.

When asked about the easiest payment method sixteen of thirty users stated that using Internet banking is the most easiest way of paying online. For justification the users listed ease of use, quickness, familiarity of the routine, and Internet banking transactions happen immediately so the payment cannot be forgotten even by mistake. The responses reflect the habits that Finnish people have with online banking usage and with money in general; they want do it the right away, at the first moment. Credit card was the second most popular method (6 out of 30). Its advocates promoted ease of use as no log in was required. The results for easiest payment method for e-commerce are presented in Figure 8.

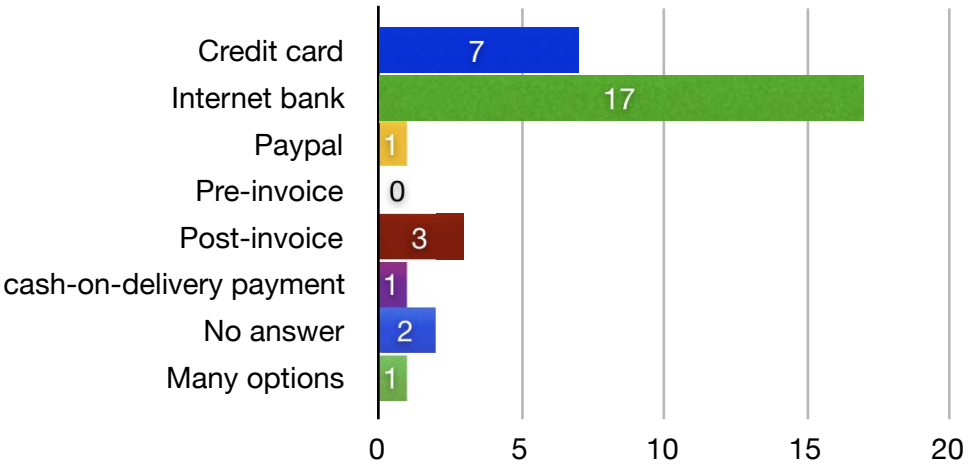

Figure 8. The easiest payment method for e-commerce.

The next question was about the safest payment method. More than half of the respondents chose an invoice that is paid after the product is received to be the safest. Most users stated that “it is almost impossible to lose money if the product is in the possession of the user when the payment is made”, “there is no need to give out personal details” or “be redirected to one’s Internet bank from a strange web site”. The second safest method of payment was Internet banking. Its strength was anonymity that it provides: personal details are only given to the bank that handles the transaction with the seller. Credit card payment was not considered as the safest method by any of the respondents. The results for safest payment method for e-commerce is presented in Figure 9.

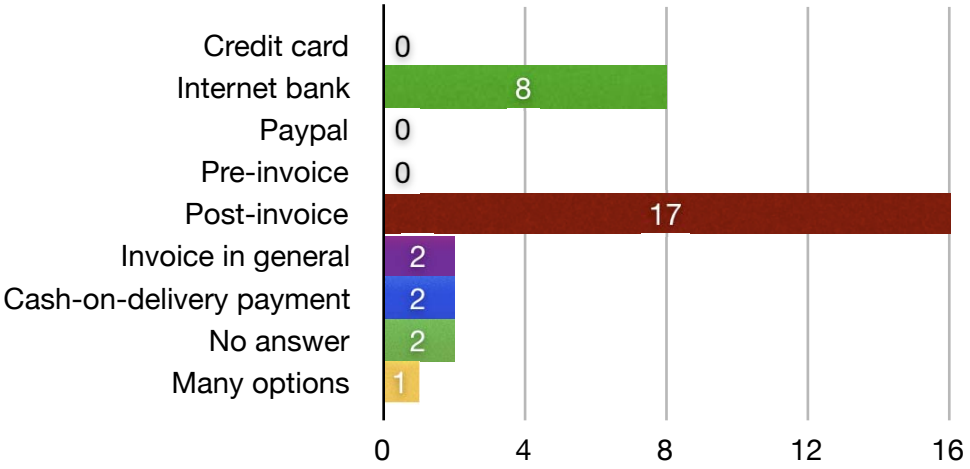

Figure 9. The safest payment method for e-commerce.

The last question regarding electronic commerce was the selection and reasoning for the best payment method. Internet banking was by far the most popular one: 14 out of 30 compared to credit card and invoice both scoring 5 out 30 votes. Internet bank was, according to the users, “easy to use” and usually “used at the time of the purchase”; the credit card’s biggest advantage was that it is always with the card holder; money and the purchase are handled carefully if paid with a post-invoice. The results for the best payment method for e-commerce are presented in Figure 10.

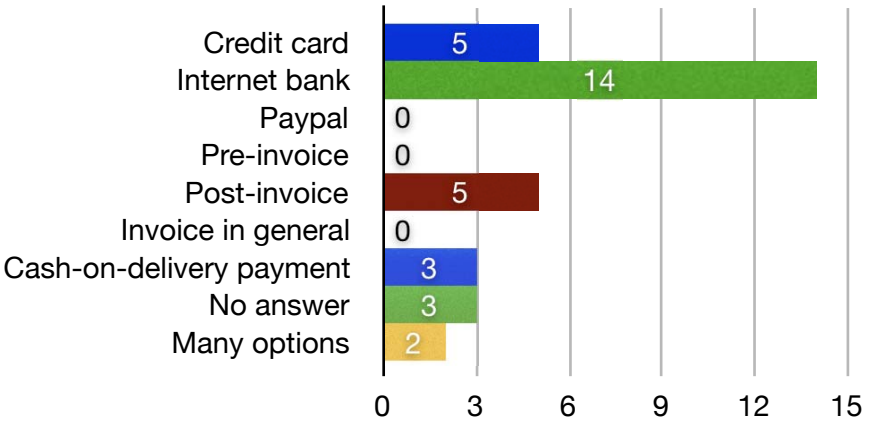

Figure 10. The best payment method for e-commerce.

Eleven of thirty users chose the same payment method to be the easiest, safest and best. Of those eleven six were for Internet banking, four for post-paid invoice, and one for cash-on-delivery payment. Thirteen of thirty users chose the same payment method for two categories. Six of them voted for Internet banking, five for credit card, and two for post-paid invoice. When comparing which one was the ruling factor when the same choice was given twice in three categories a great majority of 73% chose the easier one to be the better one. In Figure 11 is the graph about the payment method summary.

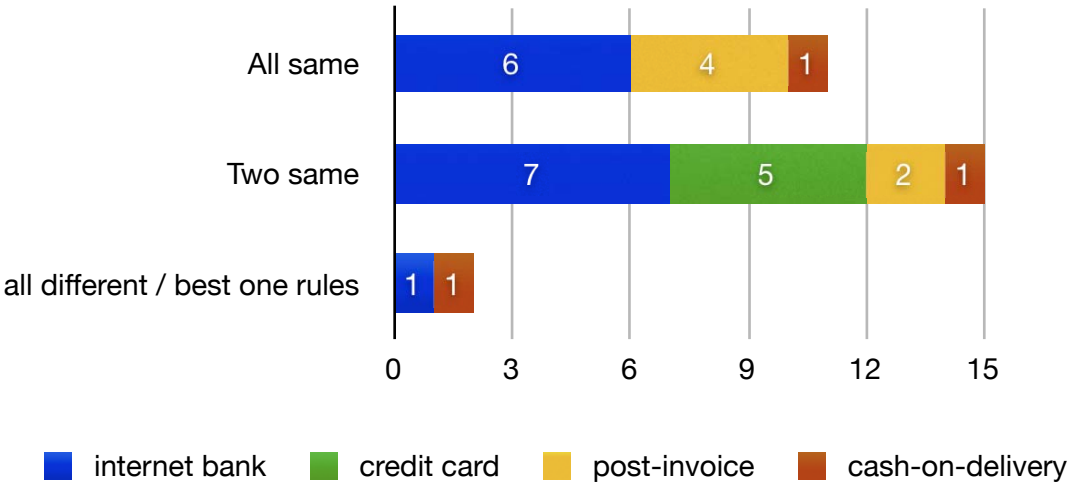

Figure 11. Summary of payment method selection.

4.2.3. Mobile services

In the mobile services section statistics about the mobile phones and their usage was gathered. Almost half of the users normally used a smartphone like an iPhone or a Nokia E-series business phone. Multimedia phones and email capable phones were both

owned by approximately a quarter of the users. More interesting is the selection criteria for their mobile phones. Seventeen users of thirty had used functionality as a selection criteria. The second most popular selection criteria was price, 10 out of 30. In Figure 12 is a graph about the selection criteria for a mobile phone.

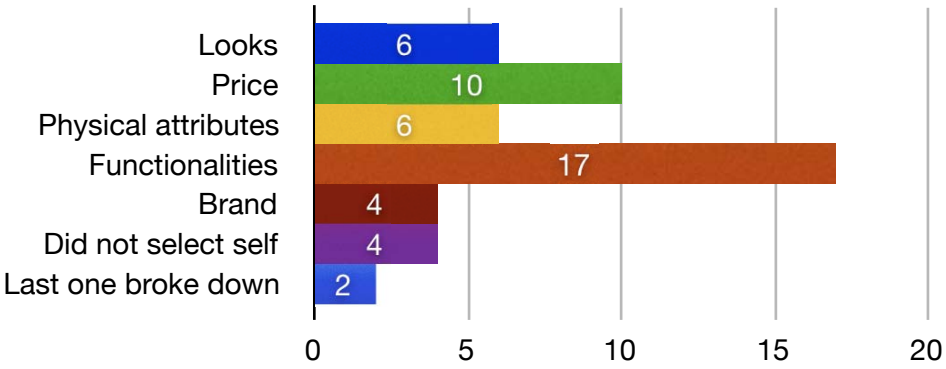

Figure 12. Mobile phone selection criteria.

Seventy percent of the users paid their mobile phone bill themselves, whereas seventeen per cent of the users had their mobile phone provided by the employer. Thirteen users' mobile phone bill was paid by someone else. When asked about mobile phone usage, 29 out of 30 users stated that they used their phone for calling and sending text messages weekly, one user did not respond. Thirteen users used their phone for taking pictures and browsing web pages. Eighteen users used their phone as a calendar. Using the mobile as a music player was relatively low since only 20% played music regularly with the phone. Only 27% used their phone to read and send email. The whole scale of responses is presented in Figure 13.

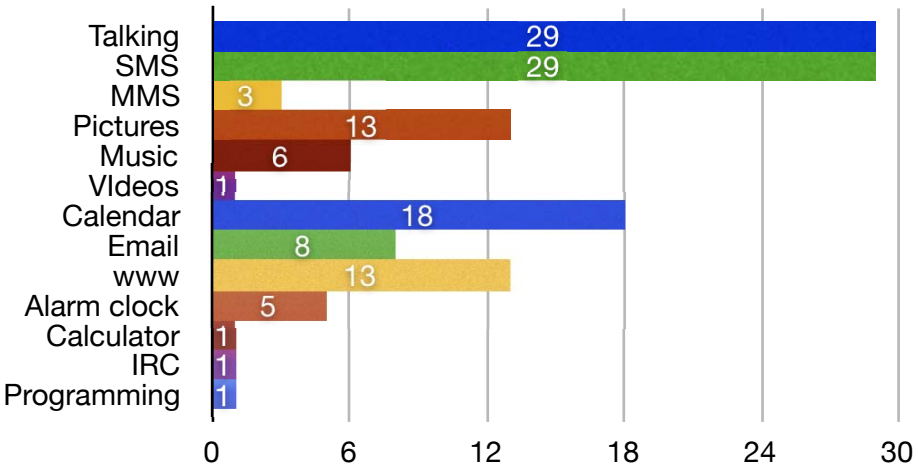

Figure 13. Mobile phone usage.

The users had some experience in making payments with a mobile phone. Ten users had bought a mass transit ticket with a mobile phone. Eighteen users had bought something from a vending machine with their mobile phones. None of the users, however, had paid for parking with a mobile phone. Two users had paid for washing clothes. The results are presented in Figure 14.

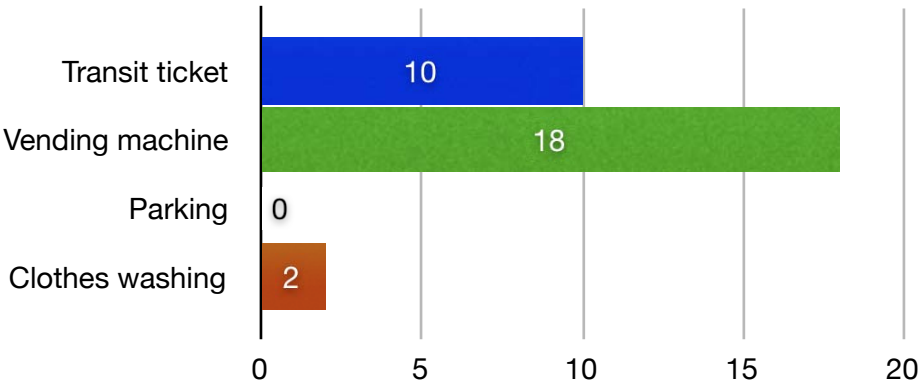

Figure 14. What users had bought with their mobile phones.

4.3. Usability test

In this section the results of the user tests are represented, excluding usability problems that were encountered since they were beyond the scope of this thesis. The results will be presented question by question for all three user interfaces and the summary. Charts and user comments will be provided when necessary. Reflecting with the results of the questionnaire will be given where appropriate.

How did the registration process differ from previous services?

The motivation for this question was to reflect on past experiences and to be an introductory question to make it easy for the user to start the interview. The question gave also some insight whether the registration sites were comparable to commercial versions or not in the minds of the users.

According to users the registration processes were generally standard processes. Some differences were, nevertheless, found:

1. They had never before made a registration with a mobile phone
2. Less detailed information was needed than is usually the case for registration

The responses to this question did not provide anything that was unexpected. Finnish people do not use mobile internet that much and the registration processes were designed to ask only for essential information not to overburden users too greatly with details that might irritate them.

Did something in the registration process feel secure or insecure?

Motivation for this question was to clarify users' thoughts about their feelings regarding security of the registration processes. The main concern among users was that their credit card information would be at risk, but only eight users out of thirty (27%) stated this. Other comments like an unencrypted connection or that the service was unknown for the users gained only two votes from thirty users. A more detailed presentation of results is contained in Figure 15.

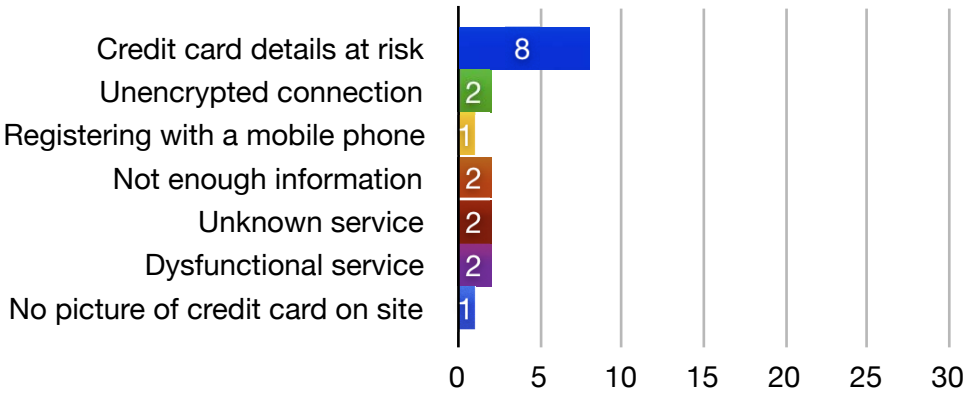

Figure 15. Sources of feeling insecure when registering.

Did the password creation feel secure?

The reason for this question was to reflect on the users' thoughts about password creation since it was a slightly different task from password creation in a desktop environment.

Due to the fact that in the first interface, which looks like an official Nokia Music Store, the password fields did not encrypt the password with stars but showed it as it was written to the user, seven out of ten user interface 'one' users stated that they felt the password creation process did not feel secure. Usually, the objectors claimed that it felt odd or it disturbed them. Some of the users of user interfaces 'two' and 'three' (5 out of 30) complained that when they were typing one could see each letter when it was typed in

but not after typing since it had become a star. The majority of users did not give an answer to this question or it was not asked because the users did not seem uneasy when selecting the password. The results for password creation security are presented in Figure 16.

Was there something in the registration process that would prevent you from using it?

The purpose of this question was to study users acceptance of the system. When the testing progressed, it was found out that this question overlapped too much with the second question “Did something in the registration process feel secure or insecure?”. The users tended to give answers very similar to the second question. The use of this question was discontinued after a couple of initial test sessions.

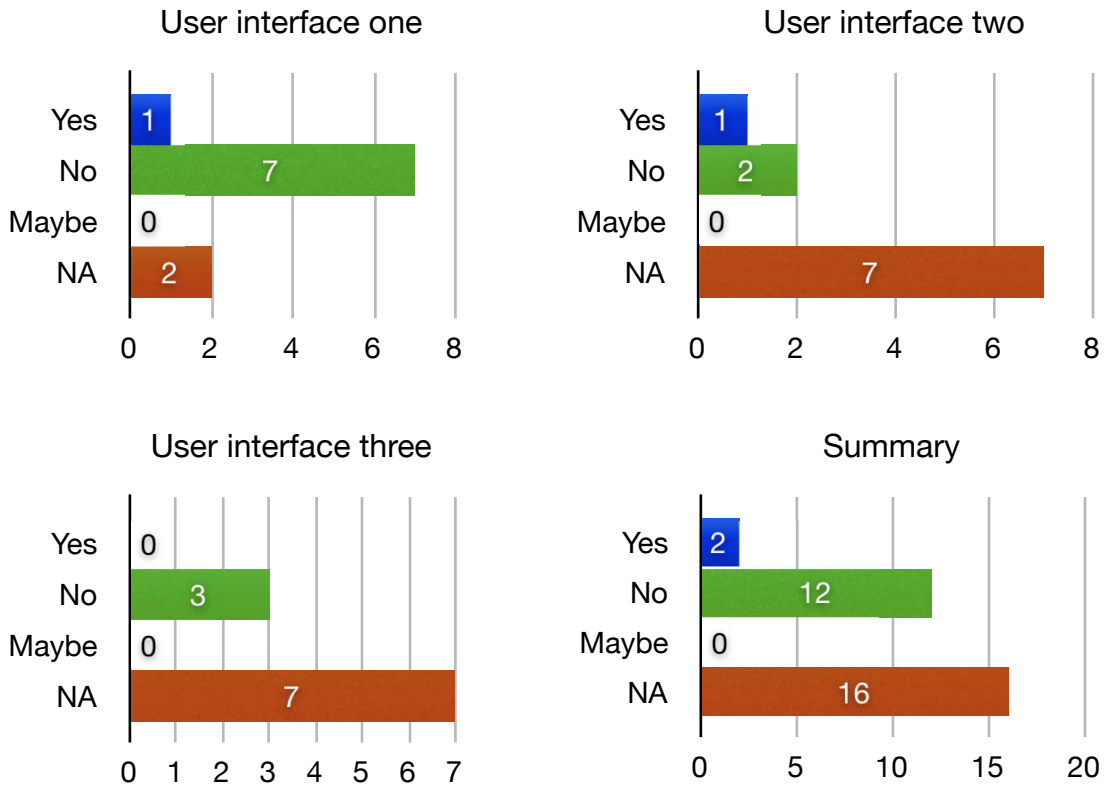

Figure 16. Password creation security.

Would you use a service if it had a registration process similar to this one?

The motivation for this question was to study users’ acceptance of the system. This question gave minimal extra information since its goal was to map the acceptance of

registering with a credit card and later a question of payment method choice was presented to the users.

Is a mobile phone as secure to use as a computer?

The motivation for this question was to find out and compare users' views about mobile phone and computer security especially when they are used to send private information over the Internet. From thirty users half stated that the mobile phone feels as secure as a computer. Forty per cent of the users did not perceive the mobile phone as secure as a computer. The most common arguments were "I do not know how my phone works", "I have not used my phone for Internet browsing", and "the situations where a mobile phone is used are fast and there is not enough time". None of the users claimed the mobile phone to be more secure than a computer, which could be true at least in some cases.

Some of the users understood that the Internet is the same for mobile phone users and computer users but still could not perceive what the differences might mean for security. The result is in line with Finnish people's mobile Internet usage which is low and the mobile Internet usage of the test users (13 out of 30). In Finland, there are not popular services in the mobile Internet area and, therefore, people do not use mobile phones for Internet browsing. The results for mobile phone subjective security measured against computer subjective security are presented in Figure 17.

How do you check that a web site is encrypted?

After a few test sessions it was clear that some users considered encryption of the page as one important security factor. Therefore, the question of how they check encryption of web pages usually was added. The motivation was to reflect on users' current Internet usage habits and to try to measure how important the encryption actually was. All the users were not asked this question because everybody did not view page encryption as a critical factor for security.

Most of those who did check the encryption said that they check that the URL has the https prefix and checked the certificate.

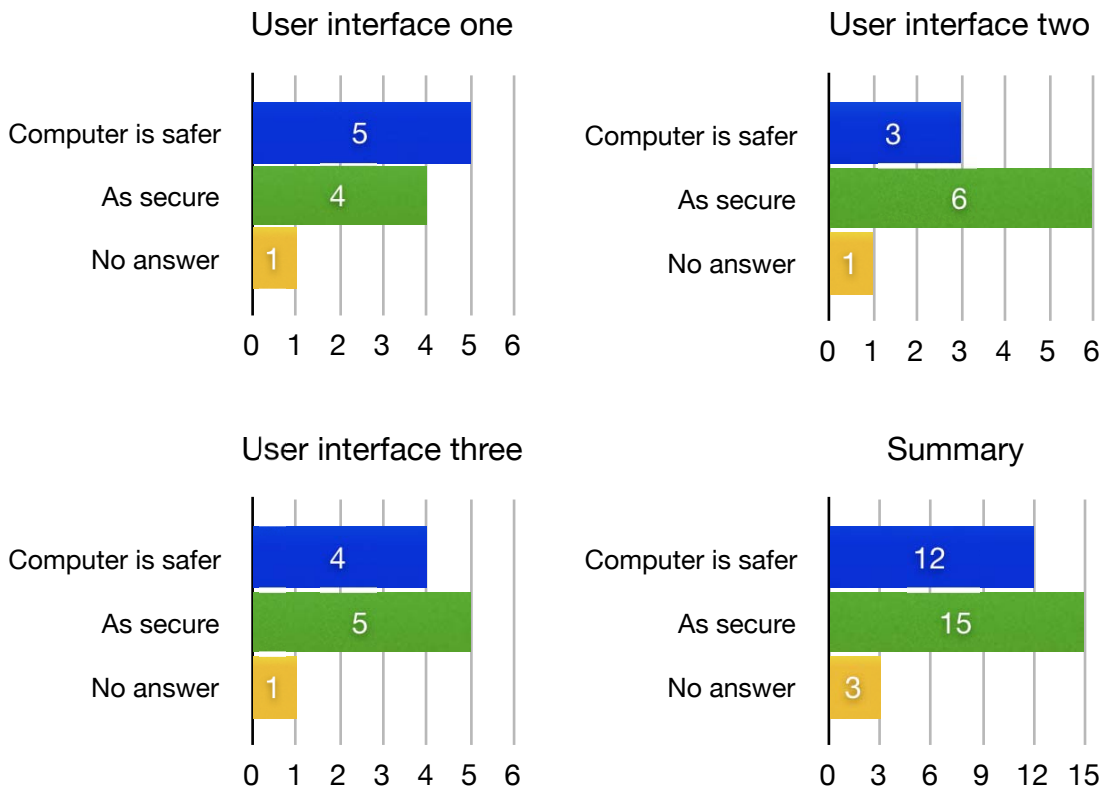

Figure 17. Mobile phone security versus computer security.

Would the registration process feel more secure if it was done with a computer?

This question was somewhat overlapping with some other security related questions and was mostly skipped. Some answers claimed that mobile phone user-interface is hard to use and that computer would be easier.

Would you choose a different payment method?

When registering with the music stores in the test sessions, the users were asked if a credit card was a good payment method or would they choose another one. In the test, however, they could not choose but had to use a credit card to register. Ten users were not asked about payment method selection. Fifty per cent of those who gave answers were in favour of Internet bank. In the questionnaire 47% voted for Internet bank.

35% of users were for credit card payment, whereas in the questionnaire only 17% per cent were in favour of credit card. The amount has doubled from the questionnaire but the sample is low and drawing conclusions from such a small sample is dangerous. 20% of the users considered invoicing as the best payment method. This differed slightly from the questionnaire where only 17% considered invoice as the best payment method.

It looks like making the registration had no or very little effect on the users thoughts about Internet payment methods. Figure 18 presents charts for the selection of mobile payment method for the three music stores.

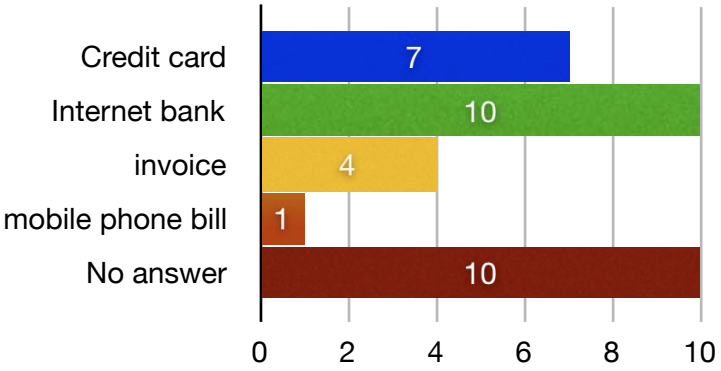

Figure 18. Selection of mobile payment method for music store.

Using a zero-click payment with a mobile phone?

Zero-click payment is a concept where, for example, a user account for a music store can be linked to a user's mobile phone. The mobile phone is a personal device and seldom used by someone other than its owner. Because there is a link between the account and the mobile phone the purchases can be made without the user entering a PIN code. Using zero-click payment would make buying easier with a mobile phone since little effort is needed to make the buy.

When the users were confronted this question their first reaction often was surprise or wondering what it would mean in practice. Only 20% were in favour of using zero-click without preliminary information. Nearly half the users could possibly use zero-click payment but claimed that additional information would be needed, for example, how the security is maintained. Clearly those users who were unsure could not perceive how the system would work as a whole. One third of the users were against the idea. Loosing mobile phone or making unintentional purchases were seen as the major threats. Figure 19 presents the acceptance of zero-click payment for every UI and a summary of the results.

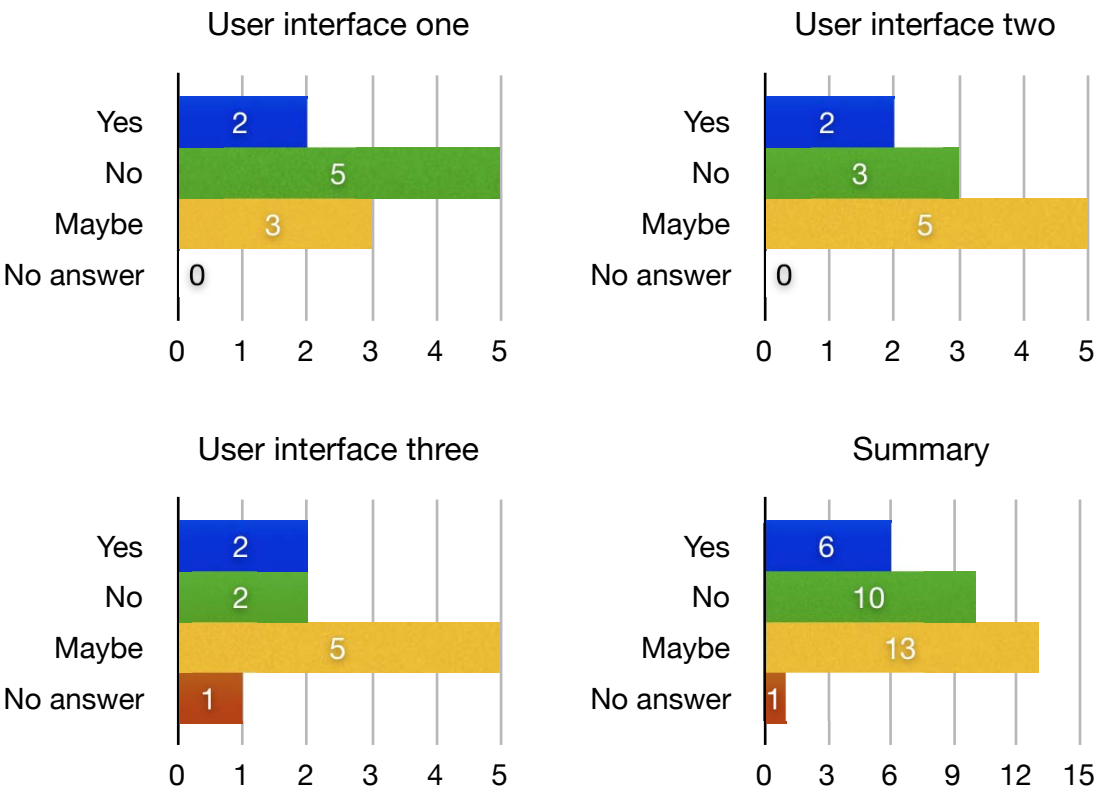

Figure 19. Acceptance of zero-click payment.

An upper limit for the zero-click

The motivation for this question was to map if an upper limit for zero-click payment would make it more favourable. The results for the upper limit for zero-click payment are presented in Figure 20. Users of user interfaces ‘two’ (4 out of 10) and ‘three’ (6 out of 10) were more positive for it than users of user interface ‘one’ (1 out of 10). On one hand, the data does not give any support that the users of user interface ‘one’ would somehow have been affected by the user interface so that they would perceive the upper limit as useless.

On the other hand, the users who were unsure of zero-click payment for user interfaces ‘two’ and ‘three’ seem to have established an opinion about the upper limit. A total of ten uncertain users has shrunk to one uncertain. Users positive for upper limit has grown from four to ten. The amount of negative users has grown from five to eight. Usually those against the idea of zero-click did not perceive the upper limit for it to be of any use or it did not have any effect on their acceptance of zero-click payment concept. It does seem, however, that users who were unsure of the upper limit mostly perceived the it as a good option.

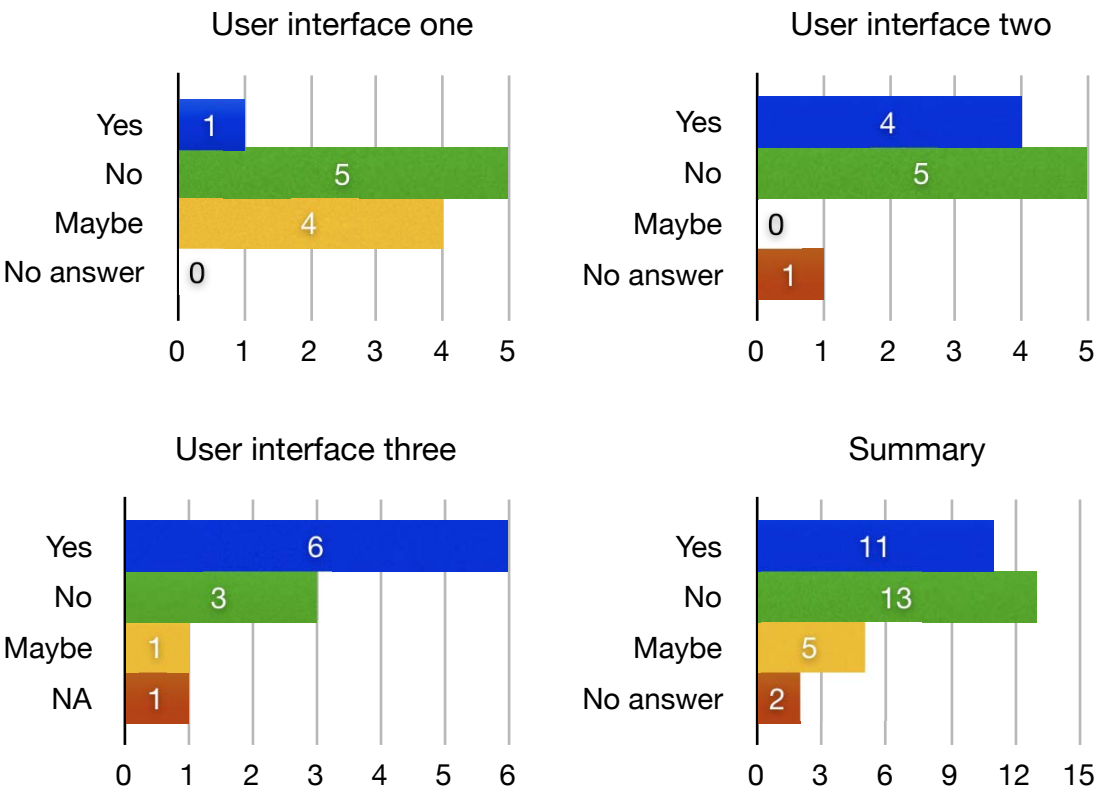

Figure 20. An upper limit for zero-click payment.

Using an identification service to pass on the registration information

Since it is a relatively troublesome process to insert registration details with a mobile phone's keyboard, the desirability of using an identification service to pass on the registration details was inquired from the participants of the tests.

When a mobile phone is used to register for a service and information details are given with a small keyboard or one that has only ten buttons for numbers and letters the input process is naturally more difficult than with full size desktop keyboard. This dilemma could be solved by using an authentication service that would send the information on the user's behalf which would make the registration smoother and faster. Nineteen out of thirty (63%) users were in favour of this kind of scenario. Using an Internet bank account was the most desired service provider. The Finnish Internet bank accounts can be used for authentication but they are not linked to any email address, credit card or address and cannot be used for this kind of service without modification. Google or Facebook accounts could already be used for this kind of service and some of the users considered them useful and worthy of trust but some would not trust them although most likely Google and Facebook know at least your email address and name, and also credit

information if you have bought anything from them. The results for using an authentication service to pass on registration information is presented in Figure 21.

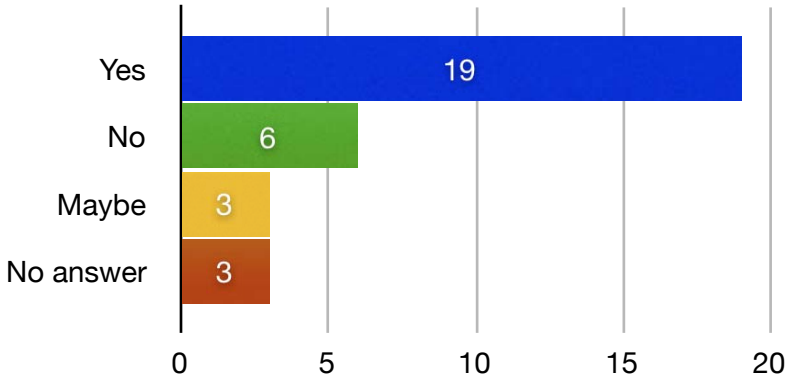

Figure 21. Use of an authentication service to pass on registration information.

What would you not buy online

Normally users would not want buy online something that needs to be fitted or seen first, for example, clothes, buying the item needs special expertise or help from a professional, for example, a house, or the source has to be reliable, for example, medicines.

Anything else

At the end of the interview the users were given a chance to speak out if they felt that something had not been covered in the interview. Nothing, however, came out.

5. Conclusions and discussion

This thesis project aimed at studying the usability of mobile financial services since there is a noticeable lack of user-centred research in this area. The aim was to study the use context of mobile financial services and its impact on the usage of similar services. Also, the study aims to give a foundation for further research in the same field.

The theoretical study parts of this thesis were the initial step to understand the nature of mobile financial services. An empirical study was made to consolidate or abolish hypotheses. Some problems arose before the empirical study that affected it. A more detailed overview of the results credibility is given in Section 5.2. Before that answers to the research questions and ideas for introducing usable mobile financial services will be given.

5.1. Answers to research questions

Literature and empirical studies were made to answer the three first questions and the main question's answer is a combination of conclusion made on the basis of the three first research questions. RQ1 and RQ2 were answered on the basis of literature and RQ3 on the basis of literature and empirical study.

Rq1 What kind of mobile financial services exist?

The motivation for this question was to map the different services that exist or have existed. Positive and negative attributes of the services were highlighted to give examples of good and bad service design decisions. The following conclusions were made about mobile banking, ticketing, and payments services :

> Mobile banking services are vary in different locations. In developing countries the services are in high usage and probably the only channel to banking services. In developed countries mobile banking services are just add-on services to Internet banking services. Mobile banking services and the like seem to excel in circumstances where the traditional ways of banking are not properly avail-

able. Where sufficient banking solutions exist through other channels mobile banking is a secondary channel.

Mobile proximity payments are starting to resemble traditional card payments. The services have shifted from call services to integrated NFC credit card solutions. Mobile proximity payments need to be at least as good as traditional payment types like cash and card payments. They cannot create extra fees for the user or need additional effort to be carried out.

Remote mobile payments typically result from digital content that can be consumed with the mobile phone itself i.e. logos, games, and music. The success seems to be somewhat dependent on the distribution channel. A centralised portal for content is an easy and convenient way for the users.

Mobile ticketing applications that make use of NFC technology can be killer applications since storing and validating the ticket can be made really easy for the users. SMS based services are not as convenient since SMS messages need to be read by someone for validation and deleting SMS messages can destroy a ticket because the tickets are kept among other messages. Also, the Internet connection that mobile phones have enables better experiences of use, such as automatic top-up. There is great potential in mobile ticketing applications.

Rq2 What are the specialities of mobile financial services' context of use?

This was a question that was answered by means of a literature study. The format for context of use was taken from the standard of usability. Literature about user, task, equipment and environment was used to present the specialities of each part of the use context. The following observations about context of use were made:

Mobile financial services are used in diverse conditions by people with different backgrounds, abilities, needs, and possibilities. It is common among them that the mobile financial service they use is used to make life easier and/or more enjoyable.

Tasks of mobile financial services are simple and are easy to perform if user interfaces, technology and work flow are designed to support ease of use.

NFC technology seems to be the most suitable for PoS payments because the set up process is fast and easy. For remote payments the use of a fast Internet connection is the best option. WLAN technology could be an option for fast mobile connection technologies (i.e. 3G) but is trailing behind in availability and security. Different payment scenarios need suitable connection technologies, i.e. one technology does not fit all scenarios.

Technical, social and cultural environments are important aspects of environment that need to be considered when designing the service. Cultural and social aspects can affect tremendously on the acceptance of the service.

Detailed presentations of, for example, users could not be provided since the usability framework is used to assess usability of one particular system. Therefore, user groups should be defined separately for mobile banking, payments, and ticketing as was done in section 3.2.1.

Rq3 What factors constitute the acceptability and subjective security of mobile payment registration?

According to literature, the acceptance of mobile financial services is a two-step process. First, the user has to accept the essential conditions to be able to use the system. The literature suggested that confidentiality of data, costs, easy handling, fast processing and coverage are key issues. The empirical study studied the users' subjective security which is a part of data confidentiality. According to the empirical study some people are afraid that their credit card details could be stolen. Also, nearly half of the users thought that a computer is safer than a mobile phone. Authorising the mobile phone to authenticate the user was not seen favourable by most of the users. It seems that the people who took part in the study are not familiar enough with their mobile phones to trust them fully in financial matters. One user stated for example that "I do not know how my phone works" meaning that the mobile phone is not familiar to him technology wise. There is an egg-hen problem in mobile financial services. Because there are no good services there are also no consumers willing to for them and vice versa. This problem can only be overcome with killer services.

Second, the user has to gain some additional value that is unique for the user: like converging loyalty cards to mobile phone makes their management easier and more fun if hedonistic feedback is used. The empirical study did not assess the additional value aspects of mobile financial services.

5.2. Designing a usable mobile financial service

As a result of the literature and empirical studies, a model to design mobile financial services that are highly acceptable was to be constructed. To construct the model, understanding the implications of context of use and factors that influence consumers' acceptance had to be fully comprehended and integrated carefully.

First, a study of past mobile financial services revealed that often failed services were designed because mobile payments were seen as a fascinating business opportunity and contemporary technology was used without considering how suitable it was for the task. The outcome of this action was that services which were powered by suitable technology survived, for instance, SMS tickets for mass transit. The potential that mobile financial services had in the late 90s was not fulfilled since proper research about user needs, available technology, the task itself and the environment was not carried out or their meaning was not understood correctly.

In order to design a mobile service that is successful and highly accepted by consumers, the design process has to take into consideration the elements of the context of use. Knowing the elements of context of use makes designing the application and business model from a user-centred view easier and, thus, the acceptance of the users more likely. Figure 22 presents the model for designing usable mobile financial services.

User profiles need to be studied in detail. People in different areas have divergent skills, perceptions and needs. As for mobile financial services, there are some main groups that can be categorised: people living in countries of undeveloped infrastructure and markets, entertainment seekers who use the mobile phone to amuse themselves, and hands-on benefit craving users. People living in countries of low infrastructure are using mobile financial services because they are affordable and easy to use solutions compared to other alternatives. The services that they use are somewhat novel to them. Entertainment seekers use mobile financial services to amuse themselves when on the go. Also,

for them using the mobile phone for entertainment reasons could be image related. Hands-on benefit is something that reduces workload, makes life easier, as well as reduces time that is used to manage things. The benefit for the users is something that makes them give up an old but similar service. To plan the business model one has to know what the consumers are willing and able to pay for.

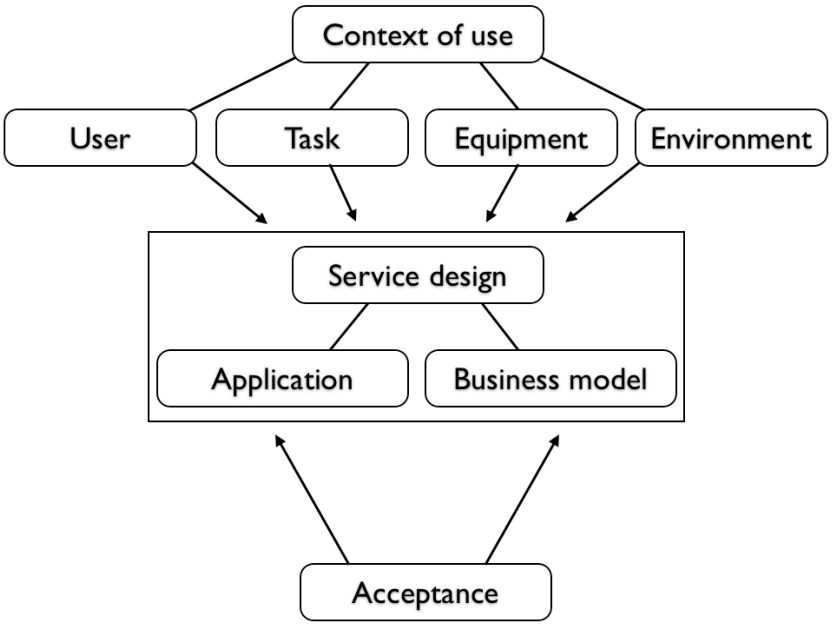

Figure 22. Model for designing usable services.

In the model a task presents the steps that the user needs to take to reach the desired goal. The task is always compared to an existing way of doing the same thing. For example, sending money in Kenya used to happen with the help of friends, by bus or remittances before the M-Pesa mobile money sending service arrived and is now the de facto standard for money sending in Kenya. In Finland people are used to manage their bank accounts through a web page and the introduction of managing bank accounts through a mobile phone is not popular since desktop environment works very well and there is seldom a need to do bank transactions in a hurry. As a conclusion, the tasks have to be simple, fast and easy to perform when compared to existing ways. The reference junction is set by the existing services. Also, the task has to deliver what the service's value proposal offers.

The task is supported by the technology that is used to build the service. Therefore, the technology has to be chosen so that it will not deteriorate quality of service but, in fact,

boost the performance of the system. People tend to resist change and this applies also to making people purchase new equipment to carry out basic tasks. Use of existing equipment and payment methods should be promoted. The choice of equipment has also to be considered when planning the business model, for example, what kind of fees does choice of credit card payment mean. Credit cards, for example, are good for large payments because payment fees might be a couple of US dollars. The payment method should, therefore, be selected to match the nature of the payment.

Environmental issues have smaller and larger implications depending on the nature of the culture and organisation that is using the service. However, technical, social and cultural environments should be studied in detail to address, if needed, the specialities that they introduce.

As for considering what things affect the acceptance of mobile financial services, the value that is provided for the user has to be unique. The mobile phone is not a primary choice for payments and its usage as a wallet conflicts with people's conception of payment media and mobile phone usage. Therefore, the value that the mobile financial service provides has to be unique to surpass the barriers for acceptance. Also, earlier uses of mobile financial services should be taken into account. Last but not least, the users should be able to love the technology that they use if it is going to be considered as a success. Feedback that embraces hedonistic feelings are essential to make users love the device or service that they are using. Convergence of payment and communication media is one way to promote acceptance. On one hand, converging increases the number of applications that can be used for one task and creating more reliable ways to do things. On the other hand, convergence enables the carrying of less equipment and makes life easier that way.

5.3. Validity and credibility of the study

Since mobile financial services is a young field there is not much research about it. Therefore, getting to know the thematic area had to be done by studying any relevant articles about mobility. The good side of this is that one gets to know a larger spectrum of research. The downside is that there is a lack of specific information about the domain.

The change of application right before the testing started was unnecessary. But then again could not be prevented since the change came without a warning. On one hand, preparation of the interview could have been better, though it is hard to know before hand what answers users will give. On the other hand, in an interview questions can be asked even if they were not planned before hand.

Much of the research is based on literature. The literature about mobile payments is aged between zero and ten years. In that time mobile technology has advanced in great steps and the validity of these studies could have been compromised because of that development. On the other hand, so little research is done about mobile payments that it would have been hard to do a literature study with no more than two year old literature.

The study was carried out in Finland with Finnish university students. Finnish people have their own paying habits since online payments are dominated by Internet banking usage and mobile phones are not mainly bought from the network operator but from a store. The sample used was thirty which is adequate for a master's thesis, although the people who attended were students of technical sciences.

The system that was used in the tests was not a payment solution but a registration process to a music store. Due to problems in the project the intended payment solution was not available for use because one project party withdraw from the project only one week prior to the start of testing. Therefore there was a hurry to find an alternative solution that would be suitable for studying mobile payments. The preparation period before the tests was short and did affect the set-up of the study. The registration sites are not proper financial services but only a part of one and did not serve their purpose for the study completely.

Change of the system to be tested also changed the nature of the study. In the first version the aim was to make usability testing for the application and address some other issues like does the usage feel secure. Because the project partner pulled out there was no client and the study transformed into a research project seeking information that could be generalised. The test of using three registration sites is not a good way to do it. The fit between the aim of the study and methods was not favourable.

Concepts (zero-click and authentication service) that were used in the interview were neither used nor shown to the users but only explained. Their replies to questions regarding them were based most likely on intuition and guesses. Making conclusions based on those answers could lead to a wrong result.

5.4. Ideas for further research

Consumers in developed countries have already good services that are supported by well established infrastructure. The need for mobile financial services is therefore minimal. The interesting question is that are there any hidden needs or areas where mobile financial services could enhance people's lives. Also, defining the attribute that triggers acceptance could be further defined from the results of this study.

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6. Appendix A: Questionnaire questions

1. Opiskelijanumero? (student id)

2. Tutkinto-ohjelma? (study program)

3. Tämän hetkinen opintopisteiden määrä (amount of credits)

4. Sukupuoli (sex)

5. Ikä (age)

6. Käytätkö verkkopankkia (do you use internet bank)

7. Omistatko luottokortin (do you own a credti card)

8. Oletko ostanut jotain tuotteita tai palveluita verkkopalveluiden kautta (esim. Amazon.com, eBay, netanttila, verkkokauppa.com, huuto .net jne.)? (have bought any products or services from internet e.g. Amazon.com ,eBay, netanttila, verkkokauppa.com, huuto.net jne)

9. Oletko maksanut verkko-ostoksesi? (have you paid using)
   Luottokortilla (by credit card)
   Pankkitunnuksilla tilausta tehdessä (by using internet bank when making the order)
   Laskulla ennen tuotteiden saamista (by invoice before receiving the product)
   Laskulla tuotteiden saamisen jälkeen (by invoice after getting the product)

10. Mikä tavoista on mielestäsi helpoin ja miksi? (which one is the easiest and why)

11. Mikä tavoista on mielestäsi turvallisin ja miksi? (which one is the safest and why)

12. Mikä tavoista on mielestäsi paras ja miksi? (which one is the best and why)

13. Millaisen kännykän omistat? (what kind of mobile phone do you use)
   En omista kännykkää (no mobile phone)
   Peruspuhelin ilman lisäominaisuuksia kuten kamera, sähköposti ja Internet-yhteys (basic phone)
   Multimediapuhelin (multimedia phone)
   Puhelin, jolla voin lukea sähköpostini ja selata wap-sivuja (phone that enables email and wap pages browsing)

Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia) (smart phone, ability to install applications)

14. Millä perusteella olet valinnut nykyisen puhelimesi? (on what ground did you select your current phone)

15. Mikä on nykyisen puhelimesi merkki ja malli ? (esim. Nokia N96, Sony Ericsson XPERIA. Jos käytät useampaa, voit listata ne kaikki. Laita ensimmäiseksi se, jota käytät eniten.) (Brand and model of your current phone. If you have more that one list first the one that you use most often)

16. Kuka maksaa puhelinlaskusi? (who pays your phone bill)

17. Käytän kännykkää viikoittain (I use my mobile phone weekly to...)

Puhumiseen (talk)

Tekstiviesteihin (send SMS messages)

Multimediaviesteihin (send MMS messages)

Valokuvien ottamiseen (taking pictures)

Musiikin kuunteluun (listening to music)

Videoiden katseluun (watching videos)

Kalenterina (make calendar markings)(

Sähköpostien lukemiseen ja lähettämiseen (read and send email)

www-selailuun (browse the web)

Muuhun: _____ (other things)

18. Olen maksanut puhelimellani (I have used my phone to pay for)

HKL:n kertalipun (single ticket for public transport)

Juoma- tai välipala-automaatin ostoksen (a drink or snack from a vending machine)

Pysäköinnin (parking)

Jotain muuta: _____ (input field at the end of the choice) (anything else)

19. Olen valmis osallistumaan 1-2h kestoiseen jatkohaastatteluun myöhemmin keväällä (touko-kesäkuu). Haastatteluihin osallistumisesta saa palkkioksi finnkinon elokuvalipun. (I am ready to participate a one to two hour follow-up interview later this spring)

20. Sähköpostiosoite, josta minut tavoittaa mahdollista jatkohaastattelua varten: (email address where I can be reached for the follow-up interview:)

Appendix B: Interview questions

1	Q: How did the registration process differ from earlier services (that the user has used)? M: Reflecting on past experiences and an introductory question.
2	Q: Did something in the registration process feel secure or insecure? M: Clarify users' thoughts about feel of security.
3	Q: Did the password creation feel secure? M: Reflecting users' thoughts about password creation since it is a slightly different task from desktop environment.
4	Q: Was there something in the registration process that would prevent you from using it? M: Studying users acceptance of the system.
5	Q: Would you use a service if it had a registration process similar to this one? M: Studying users acceptance of the system.
6	Q: Is mobile phone as secure to use as a computer? M: Map users view of mobile phone security versus computer security.
7	Q: How do you check that a web site is encrypted? M: Trying to reflect on users' current Internet habits.
8	Q: Would the registration process feel more secure if it was done with a computer? M: Does the computer feel more secure than a mobile phone or vice versa.
9	Q: Would you choose a different payment method?

	M: Users’ payment method preference for the specific service.
10	Q: Would you use a zero-click payment with a mobile phone? M: Users’ attitudes towards a payment method where no visual authentication is used.
11	Q: An upper limit for the zero-click? M: Would an upper limit for zero-click payment make it more favourable.
12	Q: Would you use an identification service to pass on the registration information? M: Since it is a relatively troublesome process to insert registration details with a mobile phones keyboard, the desirability to use an identification service to pass on the registration details was inquired.
13	Q: What would you never buy online? M: Mapping users’ online buying preferences.
14	Q: Anything else? M: The user can say if something was not covered in the interview.

7. Appendix C: Questionnaire answers

Tutkinto-ohjelma:	Tämän hetkinen opin-topisteiden määrä	Suku-puoli	Ikä	Käytätkö verkkopankkia	Omistatko luottokortin	Oletko ostanut jotain tuotteita tai palveluita verkkopalveluiden kautta (esim. Amazon.com, eBay, netanttila, verkkokauppa.com, huuto.net jne.)?
TLT	100-139	mies	26-30	Kyllä	Kyllä	Kyllä
TLT	140-179	mies	yli 35	Kyllä	Kyllä	Kyllä
TU	180-220	mies	26-30	Kyllä	Kyllä	Kyllä
TIK	yli 220	mies	20-25	Kyllä	Kyllä	Kyllä
Tik	100-139	mies	20-25	Kyllä	Ei	Kyllä
INF	140-179	nainen	20-25	Kyllä	Kyllä	Kyllä
TIK	140-179	mies	20-25	Kyllä	Ei	Kyllä
TIK	140-179	mies	20-25	Kyllä	Kyllä	Kyllä
Informaa-tioverkostot	60-99	mies	20-25	Kyllä	Kyllä	Kyllä
TLT	yli 220	mies	20-25	Kyllä	Kyllä	Kyllä

Oletko maksanut verkko-ostoksesi? Luottokortilla	Pankkitunnuksilla tilausta tehdessä	Laskulla ennen tuotteiden saamista	Laskulla tuotteiden saamisen jälkeen	Muuten, miten?
1	1		1	
1	1	1	1	
1	1		1	
1	1		1	
1	1		1	PayPal:illa (joka käyttää debit-korttia)
1	1			
1	1			Postiennakolla
1	1			
1	1		1	
1	1			Postiennakolla.

Mikä tavoista on mielestäsi helpoin ja miksi?	Mikä tavoista on mielestäsi turvallisin ja miksi?	Mikä tavoista on mielestäsi paras ja miksi?l
Helpoin on maksaa pankkitunnuksilla tilausta tehdessä, koska maksu ohjautuu suoraan oikealla viitteellä saajalle. Itselle jää vain omien tietojen täyttö. Koska käytän oikeastaan vain verkkopankkia, niin se on minulle luonnollisin tapa..	Laskulla tuotteiden saamisen jälkeen, koska silloin ei tarvitse maksaa ennen kuin on nähnyt tuotteen. Myöskään luottokortin numeroa tai muita tietoja ei tarvitse antaa eteenpäin	Laskulla tuotteiden saamisen jälkeen, koska tuotteen näkee ennen maksua.
Luottokortin käyttö, helpoin ja suoraviivaisin tapa. Syötetään ainoastaan luottokortin numero ja varmistustunnus ja se on siinä.	Laskulla tuotteiden saamisen jälkeen. Ei ole pelkoa luottokortin numeron joutumisesta vääriin käsiin, eikä pelkoa, että tavara jäisi tulematta. Lisäksi jos tuote ei vastaa kuvaustaan, sen voi lähettää takaisin maksamatta laskua, eikä tarvitse miettiä saako rahojaan takaisin.	Pankkitunnusten käyttö tilauksen aikana. Helppo ja luotettava tapa. Toivoisin sen vaan laajenevan kansainväliseen käyttöön.
Pankkitunnuksilla maksu. Varmaankin tottumiskysymys.	Laskulla jälkeen päin. Tuote on varmasti saatu ennen maksamista, ja pidän verkkopankilla maksamista suhteellisen turvallisena.	Pankkitunnuksilla maksu tilausta tehdessä. Ei tarvitse odotella laskua jälkikäteen. Omat velvollisuudet transaktiosta suoritettu heti. Tuotteen voi saada nopeammin, jos maksaa saman tien
Luottokortti. Ei tarvi ottaa kun kortti lompakosta ja näpyttää.	Laskulla tuotteiden saamisen jälkeen koska siinä ei luovuteta mitään arkaluontaista tietoa.	Luottokortti koska nopein.
PayPal, jossa ei tarvitse kuin syöttää käyttäjänimi ja salasana ja hyväksyä maksu.	Pankkitunnuksilla maksaminen, jolloin pankki- tai korttitietoja ei tarvitse antaa kolmannelle osapuolelle ja vaihtuvat salasanat ovat melko vahva suojaus.	Verkkopankki turvallisuuden ja helppokäyttöisyyden kompromissina.
Maksaminen heti verkkopankissa. Verkkopankin ulkoasu ja toiminnot ovat minulle valmiiksi tutut, toisin kuin eri palveluissa vaihtelevat 'laita tähän luottokorttisi numero ja yhteystietosi' -näkymät.	Verkkopankkimaksaminen tuntuu ehdottomasti turvallisimmalta. Jälleen; verkkopankki on ympäristönä minulle tuttu ja siten tuntuu, että huomaisin helpommin siitä, jos jokin olisi pielessä (esim. joku koittaisi onkia salasanojani näköissivulla), kun taas pelkkä luottokortin numeron kirjoittaminen geneeriseen tekstikenttään jättää aina epäilyksen siitä, että mihin se nyt tarkalleen tulee lähetettyä ja kuinka paljon siltä tililtä tarkalleen lähtee. Ehkä verkkopankissa tuntuu turvallisimmalta sekin, että rahan siirtymisen tililtä nimenomaan näkee välittömästi ja konkreettisesti.	Verkkopankki edellä mainituista syistä. Lisäksi en tykkää maksaa luotolla ellei ole ihan pakko, koska korot on aika isoja menoja opiskelijabudjetille.
Postiennakko. Tarvitsee vain noutaa paketti postista ja suorittaa maksu siellä.	Postiennakko. Ei ainakaan menetä rahojaan tietoturvaongelmien takia.	Postiennakko. Helppo ja yksinkertainen

Millaisen kännykän omistat?	Millä perusteella olet valinnut nykyisen puhelimesi?	Mikä on nykyisen puhelimesi merkki ja malli ? (esim. Nokia N96, Sony Ericsson XPERIA. Jos käytät useampaa, voit listata ne kaikki. Laita ensimmäiseksi se, jota käytät eniten.)
Puhelin, jolla voin lukea sähköpostini ja selata WAP-sivuja	Hinta-laatu-suhde. Kytkypuhelimena sopivan hintainen ja tarpeeksi ominaisuuksia.	Nokia 6280
Puhelin, jolla voin lukea sähköpostini ja selata WAP-sivuja	Luotettava business-puhelin	Nokia 6230
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Edellinen katosi noin pari viikkoa sitten, ja tämä on veljeni vanha puhelin.	Samsung, mallia en edes tiedä :)
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Tarvitsin kaikenlaisia ominaisuuksia	Nokia N95
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Melko halpa hinta ja työhön (ohjelmistokehitys matkapuhelimiin) sopiva käyttöjärjestelmä ja ominaisuudet.	Nokia 6120 classic. Työssä testikäytössä myös Nokia N95 ja Nokia N95 8GB
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Sain sen isältäni, joka vaihtoi jo uudempaan malliin eikä enää tarvitse sitä. Sain puhelimen käyttööni alunperin kun matkustin Uuteen-Seelantiin vaeltamaan ja tarvitsin puhelimen, johon sain karttasovelluksen ja paikannuksen.	Nokia E61i
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Työsuhdepuhelin.	Nokia E71.
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Sain sen työnantajalta	Nokian 6120 Classic

Kuka maksaa puhelin-laskusi?			Käytän kännykkää viikoittain					
Minä itse	Työnanta-jani	Joku muu	Puhumiseen	Tekstiviesteihin	Multimediaviesteihin	Valokuvien ottamiseen	Musiikin kuunteluun	Videoiden katseluun
1			1	1				
	1		1	1				
1			1	1				
	1		1	1				
1	1		1	1			1	
1			1	1		1		
	1		1	1		1		
1			1	1				
1			1	1		1		

Kalen-terina	Sähköpostien lukemiseen ja lähettämiseen	www-selailuun	Muuhun:	Olen maksanut puhelimellani HKL:n kertalipun	Juoma- tai välipala-automaatin ostoksen	Pysäköinnin
1					1	
1			herätyskello			
				1	1	
1	1	1			1	
1	1	1	Ohjelmistokehityk-seen	1		
1		1			1	
1	1	1		1	1	
	1	1				
		1	Herätyskello ja muistutukset	1	1	

Jotain muuta	Olen valmis osallistumaan 1-2h kestoiseen jatkohaastatteluun myöhemmin keväällä (touko-kesäkuu). Haastatteluihin osallistumisesta saa palkkioksi Finnkinon elokuvalipun.
	Kyllä
	Kyllä
	Ei
	Ei
	Ei
	Ei
	Ei
	Ei
	Kyllä

Tutkinto-ohjelma:	Tämän hetkinen opin-topisteiden määrä	Suku-puoli	Ikä	Käytätkö verkkopankkia	Omistatko luottokortin	Oletko ostanut jotain tuotteita tai palveluita verkkopalveluiden kautta (esim. Amazon.com, eBay, netanttila, verkkokauppa.com, huuto.net jne.)?
Tlt	60-99	mies	20-25	Kyllä	Kyllä	Kyllä
TLT	140-179	mies	20-25	Kyllä	Kyllä	Kyllä
TLT	140-179	nainen	20-25	Kyllä	Kyllä	Kyllä
Tik	180-220	mies	20-25	Kyllä	Ei	Kyllä
TLT	140-179	mies	20-25	Kyllä	Kyllä	Kyllä
TLT	100-139	mies	20-25	Kyllä	Kyllä	Kyllä
TLT	alle 60	mies	20-25	Kyllä	Kyllä	Kyllä
Informaa-tioverkostot	60-99	mies	20-25	Kyllä	Ei	Kyllä
TIK	60-99	nainen	20-25	Kyllä	Ei	Kyllä

Oletko maksanut verkko-ostoksesi? Luottokortilla	Pankkitunnuksilla tilausta tehdessä	Laskulla ennen tuotteiden saamista	Laskulla tuotteiden saamisen jälkeen	Muuten, miten?
1	1	1	1	
	1		1	
1	1			
	1		1	
	1	1	1	
1	1	1	1	
	1		1	
1	1		1	
	1	1		

Mikä tavoista on mielestäsi helpoin ja miksi?	Mikä tavoista on mielestäsi turvallisin ja miksi?	Mikä tavoista on mielestäsi paras ja miksi?l
Pankkitunnuksilla varmennus, selkein ja nopein tapa	Laskulla tuotteiden saamisen jälkeen, silloin voi varmistua tuotteen kunnosta ja että tuotteen on todellakin saanut. Luottokortilla etukäteen maksettu tuote lisää aina hieman epävarmuutta siitä että saapuuko tuote vai ei, onko kyseessä huijaus.	Postiennakko, maksu postill, toisin sanoen laskulla tuotteiden saamisen jälkeen
Laskulla tuotteiden saamisen jälkeen, koska tällöin ei tarvitse miettiä rahojen menetystä jos tuotetta ei tulekaan	Laskulla tuotteiden saamisen jälkeen, koska tällöin ei tarvitse miettiä rahojen menetystä jos tuotetta ei tulekaan	Laskulla tuotteiden saamisen jälkeen, koska tällöin ei tarvitse miettiä rahojen menetystä jos tuotetta ei tulekaan
pankkitunnuksilla koska silloin ei tulee laskua myöhemmin joka pitää maksaa	pankkitunnuksilla on turvallisin koska siellä tarvitaan sisäänkirjoitus tunnukset sekä vahvistuskoodeja.	Taas pitää sanoa että verkkopankki on paras, se on tehokas ja siellä on kaikki tehdyt ostokset luettavana.
Lasku tuotteiden saamisen jälkeen. Ei tarvitse nähdä vaivaa laskun maksamiseen etukäteen.	Lasku tuotteiden saamisen jälkeen. Rahat annetaan vasta sitten kun on varmasti saanut oikean tuotteen.	Lasku tuotteiden saamisen jälkeen. Se on helpoin ja turvallisin.
Pankkitunnukset. Rutiininomaisin.	Sama - verkkon kautta ei laiteta muita numeroita kuin istuntokohtainen salasana.	Sama - ei tarvita mitään ylimääräistä, verkkopankki on joka tapauksessa käytössä.
Luottokortti ilman verified by visa -palvelua, maksu hyväksytään heti ja tarvittavan tiedon määrä on vähäinen. Ei tarvitse välttämättä mukana olevia kortteja, muistan tarvittavat tiedot ulkoa.	Laskulla tuotteiden saamisen jälkeen. Tällöin vältyn mahdollisista tuotteeseen tai toimitusaikaan liittyviltä ongelmilta ja voin maksaa tuotteen vasta todettuani sen kuvausta vastaavaksi.	Luottokortti helppoutensa ja luottokunnan tarjoaman suojan takia.
Pankkitunnuksilla tilausta tehdessä	Laskulla tuotteiden saamisen jälkeen, tuote ei ainakaan jää saamatta	
Pankkitunnuksilla maksaminen saman tien. Saa maksun nopeasti pois alta. Toimii varmasti.	Lasku jälkeenpäin on kiva, varsinkin jos ei luota myyjään täysin. Esim. CDON.com:sta voi tilata levyjä pelkillä käyttäjätunnuksilla. Tämä helpotta tilanteissa, joissa myydään ei oota.	Pankkitunnuksilla maksaminen ja jälikäteinen lasku ovat parhaita. Lasku voittaa tilanteissa, joissa saan tuotteen vasta jonkin ajan päästä, enkä maksa siis tyhjästä. Pankkitunnuksilla maksaminen on kiva jos saa suoraan jotain takaisin, esim. tunnukset konserttilippujen lunastamiseksi tai pääsee vaikka suoraan johonkin sisältöön verkossa.

Millaisen kännykän omistat?	Millä perusteella olet valinnut nykyisen puhelimesi?	Mikä on nykyisen puhelimesi merkki ja malli ? (esim. Nokia N96, Sony Ericsson XPERIA. Jos käytät useampaa, voit listata ne kaikki. Laita ensimmäiseksi se, jota käytät eniten.)	Kuka maksaa puhelinlaskusi? Minä itse
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Soitin, kamera 5Mpix, iso näyttö, 3,5mm audio plugi, puhelin on minulle vähän gadget tyyppinen	Nokia N95	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Vanhalla puhelimella ei pystynyt selailla nettiä, halusin puhelimen jossa olisi tämä toiminto ja lisäksi kamera.	Nokia E65	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	halusin musiikkipuhelin mutta sain samalla älypuhelin. en toki käytä kaikki toimintoja jotka ovat käytettävissä.	sony ericsson W890i	
Multimediapuhelin	Vaikutti sopivalta minun tarpeisiin.	Siemens C65	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Kosketusnäyttö on cool.	Nokia 5800 XpressMusic	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	QWERTY-näppäimistö, suuri näyttö ja hyvät tekniset ominaisuudet (ei tärkeysjärjestyksessä)	Nokia E90	1
Puhelin, jolla voin lukea sähköpostini ja selata wap-sivuja	malli oli sopivan halpa ja yksinkertainen	nokia 6330	
Peruspuhelin ilman lisäominaisuuksia kuten kamera, sähköposti ja Internet-yhteys	Ohut. Erilainen. Perustoiminnot löytyy.	Samsung SGH-Z150	
Multimediapuhelin	Käytettävyyden ja ulkonäön mukaan. Puhelimeni on pinkki ja sen kansi avautuu vasemmalle tai oikealle kiertäen.	Nokia 7373.	1

Työnantajani	Joku muu	Käytän kännykkää viikoittain Puhumiseen	Tekstiviesteihin	Multimediaviesteihin	Valokuvien ottamiseen	Musiikin kuunteluun	Videoiden katseluun	Kalenterina
		1	1	1	1			1
		1	1					1
	1	1	1		1	1		
		1	1					
		1	1		1	1	1	1
		1	1		1	1		1
	1	1	1			1		1
	1	1	1	1	1			
		1	1		1			1

Sähköpostien lukemiseen ja lähettämiseen	www-selailuun	Muuhun:	Olen maksanut puhelimellani HKL:n kertalipun	Juoma- tai välipala-automaatin ostoksen	Pysäköinnin
	1				
1	1				
				1	
				1	
	1			1	
1	1	IRC, SSH	1	1	
				1	
			1		

Jotain muuta	Olen valmis osallistumaan 1-2h kestoiseen jatkohaastatteluun myöhemmin keväällä (touko-kesäkuu). Haastatteluihin osallistumisesta saa palkkioksi finnkinon elokuvalipun.
	Ei
	Kyllä
	Kyllä
	Ei
	Ei
	Kyllä
	Ei
	Kyllä
	Ei

Tutkinto-ohjelma:	Tämän hetkinen opin-topisteiden määrä	Suku-puoli	Ikä	Käytätkö verkkopankkia	Omistatko luottokortin	Oletko ostanut jotain tuotteita tai palveluita verkkopalveluiden kautta (esim. Amazon.com, eBay, netanttila, verkkokauppa.com, huuto.net jne.)?
TLT	180-220	mies	26-30	Kyllä	Kyllä	Kyllä
TiK	140-179	mies	20-25	Kyllä	Kyllä	Kyllä
TIK	yli 220	nainen	20-25	Kyllä	Kyllä	Kyllä
TLT	140-179	mies	20-25	Kyllä	Kyllä	Kyllä
INF	100-139	mies	20-25	Kyllä	Ei	Kyllä
Informaa-tioverkostot	100-139	mies	20-25	Kyllä	Ei	Kyllä
TIK	60-99	nainen	alle 20	Kyllä	Ei	Kyllä
Informaa-tioverkostot	60-99	nainen	20-25	Kyllä	Ei	Kyllä
Informaa-tioverkostot	60-99	nainen	20-25	Kyllä	Ei	Kyllä
TLT	100-139	nainen	20-25	Kyllä	Ei	Kyllä

Oletko maksanut verkko-ostoksesi? Luottokortilla	Pankkitunnuksilla tilausta teh-dessä	Laskulla ennen tuotteiden saamista	Laskulla tuotteiden saamisen jälkeen	Muuten, miten?
1	1			
1	1			
1	1		1	
1	1		1	Postiennakolla
	1		1	Visa Electronilla
	1		1	
	1			
1	1		1	
	1		1	
	1			

Mikä tavoista on mielestäsi helpoin ja miksi?	Mikä tavoista on mielestäsi turvallisin ja miksi?	Mikä tavoista on mielestäsi paras ja miksi?l
Luottokortti on helpoin, koska sillä maksaminen hoituu nopeiten.	Pankkitunnukset. Silloin voi olla varma paljonko rahaa menee ja se menee oikealle saajalle.	Luottokortti sen helppokäyttöisyyden vuoksi. Ei tarvitse pitää kuin korttia mukana.
Luottokortti koska rahojen palauttaminen onnistuu yleensä helpoiten sitä kautta jos tulee ajankohtaiseksi	Laskula maksaminen tuotteiden saamisen jälkeen on turvallisinta koska silloin tuote on tullut jo perille eikä maksun yhteydessä välitetä luottotietoja	Luottokortti koska se on helpoin
Pankkitunnuksilla maksaminen on selkeintä ehkä siksi, että verkkopankin käyttö on valmiiksi melko tuttua eikä ole mahdollista unohtaa maksua kun sen tekee heti (unohtaminen on mahdollista jos tulee lasku). Luottokortin käyttäminen on vielä aika vierasta, eikä mielestäni missään ikinä ohjeisteta kunnolla, että mikä kortissa olevista numerosarjoista on missäkin kohtaa kysytty. Jos nämä olisi selkeästi ilmaistu aina maksun yhteydessä, luottokorttimaksu olisi varmaan helpoin.	Lasku on varmaan turvallisin, silloin ei joudu antamaan mitään tunnuslukuja. Sen jälkeen pankkitunnukset. Perustunee lähinnä tuntumalle siitä, että 'täytyyhän pankin olla turvallinen'. Luottokorttien numeroiden varastamisesta kuulee niin paljon tietoturvakursseilla, että luottokortin käyttö tuntuu aina pieneltä riskiltä.	Tykkään eniten pankkitunnuksilla maksamisesta, koska se tuntuu turvalliselta, se on jotain minkä valmiiksi osaan ja tulee tehtyä heti, niin ettei ole mahdollista hukata ja unohtaa laskuja.
luottokortti/pankkikortti. Ei vaadi erityisiä lisätoimenpiteitä, kuten esimerkiksi verkkopankkiin kirjautuminen tai laskun maksaminen erikseen	Verkkopankkiin kirjautuminen. Tunnukset säilytän piilossa ja luotan verkkopankkiini.	Pidän kortilla maksamisesta, sillä silloin saan hoidettua myös maksun saman tien alta pois. Asioin vain mielestäni luotettavilla verkkokaupoilla, joten en ole pelännyt toimitusten epäonnistumista.
Visa Electron tai jälkeen maksettava lasku. Verkkopankin käyttämät one time pad -tunnukset eivät kulje aina mukana.	Tuotteiden saamisen jälkeen maksettava lasku. Tällä tavoin voi varmistaa tuotteiden oikeellisuuden ja eheyden ennen maksamista.	Verkkopankki, Visa Electron ja jälkikäteen maksettava lasku ovat kaikki hyviä vaihtoehtoja. Koska teen vähän ostoksia, jälkikäteen maksettava lasku on ehkä paras vaihtoehto. Enemmän ostaessa tai vaihtoehtojen puutteessa suosisin varmaankin verkkopankkia.
Mielestäni on helpointa maksaa ostokseni pankkitunnuksilla, koska silloin lasku on hoidettu heti ostotapahtumahetkellä, eikä se jää vaivaamaan mieltä.	Mielestäni kaikki yllä olevat tavat ovat turvallisia. Luottokortilla voi ehkä helpoiten huijata, mutta siitäkin jää jälkeenpäin kiinni. Pankkitunnus on turvallinen tapa ja lasku on ehkä perinteinen tapa.	Mielestäni pankkitunnuksien käyttäminen on paras tapa, koska se on turvallinen, helppo ja maksu tulee hoidettua heti oston yhteydessä.

Millaisen kännykän omistat?	Millä perusteella olet valinnut nykyisen puhelimesi?	Mikä on nykyisen puhelimesi merkki ja malli ? (esim. Nokia N96, Sony Ericsson XPERIA. Jos käytät useampaa, voit listata ne kaikki. Laita ensimmäiseksi se, jota käytät eniten.)	Kuka maksaa puhelinlaskusi? Minä itse
Puhelin, jolla voin lukea sähköpostini ja selata wap-sivuja	Hyvän näköinen, merkki ja erittäin ohut rakenne.	Nokia 5310	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	työpuhelin, ei valinnanvaraa	E60	
Peruspuhelin ilman lisäominaisuuksia kuten kamera, sähköposti ja Internet-yhteys	Pieni, edullinen, helppo. Tarkoituksella peruspuhelin, jolla voi soittaa ja viestittää ja jossa on herätyskello, en kaipaa puhelimaan valtavaa määrää härpättimiä vaan tykkään peruspuhelimesta.	Nokia 6100	1
Älypuhelin (mahdollisuus asentaa itse lisää ohjelmia)	Valmistajan kanssa yhteinen kotimaa (suosi suomalaista). Hyvät ominaisuudet, miellyttävä ulkonäkö, sopiva tarjous sopivaan aikaan.	Nokia N81 8GB	1
Multimediapuhelin	Sain käytettynä ilmaiseksi.	Nokia 6300i	
Puhelin, jolla voin lukea sähköpostini ja selata wap-sivuja	Halpa hinta ja yksinkertaisuus. Itse en koe tarvitsevani 500 e maksavaa puhelinta, vaikka sillä pääsisi selaamaan reittiopasta tai päivittämään facebook statusta missä vain. Haluan puhelimen, jolla voi soittaa, lähettää tekstiviestejä, on luotettava ja halpa. Myös ympäristönäkökulma on minulle tärkeä ja ostankin puhelimen joko käytettynä tai yritän selvittää mistä puhelimen metallit on kaivettu tai miten valmistaja huolehtii vanhojen kännyköiden kierrätyksestä.	En muista suoraan, eikä kännykässä itsessään sitä lue. Googlaamalla löytyy tietoa, eli puhelin on Nokia 7070 Prism	1

Työnantajani	Joku muu	Käytän kännykkää viikoittain Puhumiseen	Tekstiviesteihin	Multimediaviesteihin	Valokuvien ottamiseen	Musiikin kuunteluun	Videoiden katseluun	Kalenterina
		1	1	1				
1		1	1					
		1	1					
		1	1		1			1
	1	1	1					1
		1	1					1
		1	1		1			
		1	1		1			
		1	1					1
		1	1		1	1		1

Sähköpostien lukemiseen ja lähettämiseen	www-selailuun	Muuhun:	Olen maksanut puhelimellani HKL:n kertalipun	Juoma- tai välipala-automaatin ostoksen	Pysäköinnin
			1	1	
	1			1	
		herätyskellona		1	
1	1			1	
				1	
			1	1	
			1		
		herätyskellona			
1	1	Herätyskello	1	1	

Jotain muuta	Olen valmis osallistumaan 1-2h kestoiseen jatkohaastatteluun myöhemmin keväällä (touko-kesäkuu). Haastatteluihin osallistumisesta saa palkkioksi finnkinon elokuvalipun.
pesutuvan pesukoneen maksu	Ei
	Ei
	Kyllä
	Kyllä
	Ei
	Kyllä
	Kyllä
pesutuvan pyykinpesukoneen käyttömaksun	Kyllä
	Kyllä
	Kyllä

8. Appendix D: Interview answers

Miten rekisteröitymisprosessi erosi aikaisemmin käyttämistäsi palveluista?	Mikä teki rekisteröitymisprosessista turvallisen tai turvattoman tuntuisen?	Tuntuiko salasanan valinta turvalliselta?
muuten sama, mutta kuukausiraja oli uusi	luottokorttitunnukset puuttuivat sivustolta	
	tuntemattomaan palveluun ei haluta antaa tietoja	
kuukausiraja oli uusi juttu	luottokortin numeron antaminen häiritsi	
	ei mitään erityistä turvallisuutta herättää ollutta	
ei ole kännykälllä rekisteröitynyt, samanlainen kuin tietokoneella tehtävät	salasanan näkyminen haittasi muuten ok	salasana näkyy, ei tunnu hyvältä
	palvelu ei antanut kunnolla palautetta, laittaisi harkitsemaan käyttämistä	ei antanut palautetta salasanan vahvuudesta
aikaisemmin on kysytty tarkempia tietoja	outoa, että salasanassa näkyy yksittäinen kirjain, oikea nimi epäilyttää, mutta maksupalveluissa pitää olla, ei tiedä pitääkö luottokortin numeroon laittaa välit	outoa, että salasanassa näkyy yksittäinen kirjain
lasku tuli kotiin	ihmetteli mitä tapahtui kun palvelu ei toiminnut odotetusti (ilm. jokin virhe toiminnassa)	
palvelu ei ollut hankala	ei erityisen turvallisen tuntuinen	
ei suuria eroja, kysyttiin vähän vähemmän asioita		
ei, päätiedot löytyi, osoite puuttui, mutta sitä ei varmaan tarvita	ärsytti että osa tiedoista oli piilossa,	

Oliko rekisteröitymisprosessissa jotain, mikä estäisi palvelun käytön?	Käyttäisitkö palvelua, jos rekisteröityminen olisi tällainen (eli syöttäisitkö oman luottokorttisi tiedot)?	Kuinka paljon informaatiota olet valmis antamaan mobiiliaitteen kautta? Entä tietokoneen kautta?
		ei eroa
	kyllä	puhelin turvattomattomampi, koska laitetta ei tunnteta kunnolla
		kännykän käyttö netissä yhtä turvallista kuin tietokoneenkin
		matkapuhelin sama asia, mutta tietokoneella helpompi tehdä
ei		kännykän kautta luottokorttitietojen antaminen epäilyttää, tietää enemmän tietokoneista eikä tunne matkapuhelimia kauhean hyvin
	vajavaisesti toimiva palvelu ei estäsi, mutta häiritsisi	ei osaa vastata onko turvallisuudessa eroja, ei usko että eroja, voisi antaa tietoja kännykän kauttakin
ei paitsi ettei ole käyttänyt ja luottokorttintietojen antaminen epäilyttää		kännykkä ei tunnut yhtä turvalliselta kuin tietokone, kännykästä ei näe kaikkea kerralla, kotona turvallista tehdä ja kännykällä tuntuu huolettomammalta
		ei eroa, internet sama, ei osaa sanoa menisikö kännykällä verkkopankkiin
		turvallisuus sama, vaivalloisempaa vain
		verkkopankin käyttäminen maksamiseen tekee turvallisen tunteen

miten tarkistat www-sivun turvallisuuden?	Tuntuisiko rekisteröityminen turvallisemmalta, jos se tehtäisiin tietokoneella? Vaikuttiko matkapuhelin rekisteröitymisen tekemiseen?	Valitsisitko mieluummin jonkin toisen maksutavan? Miksi?
		ei, kortti on aina mukana
SSL-salauksen tarkistaminen, kotimaisuus	olisi helpompaa tietokoneella	ei, ehkä verkkopankki. luottokortista saa rahat takaisin!
		verkkopankkitunnukset
https ja sertifikaatti, jos syöttää luottokortin numeron	matkapuhelin ei tuttu, ei osaa tehdä samoja asioita	ei, joskus lasku tuotteen mukana, luottkortti on helppo
sertifikaatti ja https		pankkitunnuksia käyttää yleensä, hotelli varauksia on vahvistanut luottokortilla
		verkkopankkitunnukset, kirjautuminen verkkopankkiin luo turvallisuuden tunnetta
		ei omaa luottokorttia, mutta ei siinä ole mitään vikaa
	rekisteröityminen tuntuisi turvallisemalta tietokoneella	riippuu tilanteesta, isompiin ostoksiin luottokortti pienempiin operaattorin laskulle
	olisi tuntunut turvallisemmalta tietokoneella, koska kännykällä nettiselailu on uutta eikä ole varma onko turvallista	verkkopankki todennäköisesti, ei omista luottokorttia, riippuu tuotteen koosta käyttäisikö postiennakkoa tai laskua

Zero-click	Yläraja zeroclickille?
jos tietää käyttävänsä uudestaan, helppous tärkeää	kyllä viikko tai kk-raja
OK, kunhan varmistetaan halukkuus ostoon	Ei halua
kätevää, mutta epäilisi turvallisuutta	kyllä, se tekisi siitä vähemmän vaarallisen. jos rahaa voisi mennä rajattomasti, niin raja pitäisi olla
ei tiedä, puhelimen voi varastaa helpotsti	musakaupassa hyvä olla
todnäk joo, ainoa henkilö joka käyttää omaa kännykkää	kyllä kuukausi tai kertaraja, rajojen muuttaminen vain pin-koodin avulla
miksi ei	ei jos käytettäisiin väärin niin käyttäjät jäisivät kiinni
voisi olla kiva, voi tulla himoshoppailtua	yläraja olisi hyvä rajoittaisi himoshoppailua, lisäisi myös turvallisuuden tunnetta
ei, jos kännykkä pöllitään tai joku muu käyttää niin huono juttu	ei vaikuta, pitää saada itse hyväksyä
vaikea sanoa, pitäisi tietää miten toimii, vahinkoja voisi sattua	voisi auttaa
varmaan käyttäisi	yläraja kuulostaa hyvältä, on itse tilanteen hallinnassa

Tunnistautumispalvelun käyttäminen rekisteröitymiseen?	Mitä olet ostanut verkkokaupasta?
kyllä, jos vaiva vähenee. facebook aika luotettava, shibolleth luotettava. ei mitään kerran käytettyä palvelua. haluaa nähdä mitkä tiedot menee.	musiikkia, urheiluvälineitä
ei	
kyllä, ei väliä kuka tarjoaa pankki luotettavin	cd, dvd, huuto.netistä
mahdollisesti, luottamus googleen ja facebookiin ei paras mahdollinen	leffoja ja musiikkia, vaatteita,vakutuksen
kännykällä kirjoittaminen hitaampaa, kännykällä voisi käyttää koska helpottaisi tietokoneessa vähemmän hyötyä	
joo, kätevä homma kunhan on turvallinen, ei suurempaa väliä kuka tarjoaa, koska on itse antanut tiedot välityspalvelulle	
kiva ajatus että tiedot menisi helposti, kenen palvelu olisi turvallinen? eniten luottaa pankkitunnuksiin	
miksi ei, ei tiedä luotettavuudesta, facebook ei tunnu luotettavalta	
kuulostaa hyvältä, raha-asiat pankin kanssa, muuhun käyttöön facebook tai google voisi kelvata, ei antaisi googlelle luottokorttinumeroa, muut tiedot kyllä	
mielellään tekee uudet tunnukset, koska pelkää että facebookin tiedoilla pääsisi sisään musiikkikauppaan	

Mitä et ostaisi verkkokaupasta?	Mitä voisi ostaa
kalliita ostoksia, etukäteen testattavat,	mitä vaan kunhan ei suuria summia, lääkkeitä luotettavasta lähteestä ja ruokaakin
ei lääkkeitä paitsi luotetuista lähteistä	
	vakuutus joo, lääkkeet joo luotetusta lähteestä
	ruokaa, lääkkeitä (ehkä suomesta apteekilta)
mitä vaan jos kauppa tuntuu luotettavalta, hinta lisää pohdintaa, jotkut tuotteet haluaa nähdä etukäteen	

Miten rekisteröitymisprosessi erosi aikaisemmin käyttämistäsi palveluista?	Mikä teki rekisteröitymisprosessista turvallisen tai turvattoman tuntuisen?	Tuntuiko salasanan valinta turvalliselta?
eka kerta puhelimella,	luottokorttitietojen luovuttaminen epäilyttää, mailissa tuli luottokortin tiedot takaisin,	
	ei tuntenut palvelua	
ei ole rekisteröitynyt	korttitietojen paljastuminen voisi antaa toiselle mahdollisuuden rekisteröityä, ei tuntunut täysin turvalliselta, ei vahvistuksia vaan meni suoraan loppuun asti	
ei olennaista eroa, verkkokauppa.com kysyy enemmän tietoja useammassa vaiheessa	enemmän ohjeita kentistä olisi voinut olla	jokainen kirjain näkyi kun se syötettiin, joku olisi voinut seurata
ei eroa		ei mitään erikoista
normaalilta vaikutti	luottokortin numero jäi muistiin lomakkeelle,vaikka salasana meni väärin ja hävisi	kyllä
	ei tuntunut epäturvalliselta	
ei ole ennen käyttänyt luottokorttia rekisteröityessään	ei mitään ihmeellistä, ei käytä tuntemattomia kauppoja internetissä	
ei kauheasti, puhelimessa pienempi ruutu, ei selitystekstejä, tietoja kysyttiin hieman vähemmän	ei ajatellut turvallisuutta ollenkaan, ei mitään ihmeellistä, jälki käteen ajateltuna luottokorttitietojen lähettäminen epäilyttää	
ei koskaan ennen puhelimella, nyt riitti yksi ohjelma homman hoitamiseen		salasana näkyy ja joku voi nähdä sen, samaa ongelmaa ei tietokoneella
ei juurikaan, eka kerta kännykällä		

Oliko rekisteröity-misprosessissa jo-tain, mikä estäisi palvelun käytön?	Käyttäisitkö palvelua, jos rekisteröityminen olisi tällainen (eli syöttäisitkö oman luottok-orttisi tiedot)?	Kuinka paljon informaatiota olet valmis antamaan mobiiliaitteen kautta? Entä tietokoneen kautta?
	epäilyttää, että tiedot tuli takaisin, mutta jos haluaa todella käyttää niin ei väliä	nettisurffaaminen tuntuu turvalliselta, puhelin tuntuu turvalliselta
	ei	ei tunnu yhtä turvalliselta, ei tunne puhelinta
		ei eroa
ei		ei käytä nettiä kauheasti puhelimella, helpompaa tietokoneella ja tietokone tuntuu turvallisemmalta
	kyllä, jos on päättänyt käyttää tätä kauppaa	yhtä turvallisen oloiset, tietokone nopeampi
ei osaa sanoa onko		ihan hyvin voi antaa tietoja itsestään jos on ennestään tunnetu palvelu, laite ei ole este
		oma kännykkä turvallisen tuntuinen, ei muuta kommenttia
		verkkopankin käyttäminen ei ongelma puhelimella
ei	jos luottaa palveluntarjoajaan	infon antamiseen tottunut tietokoneella, matkapuhelin melkein sama asia jo kuin tietokone
		sama oloisia laitteita tietoturvan kan-nalta
	ok	tietokone on tutumpi

miten tarkistat www-sivun turvallisuuden?	Tuntuisiko rekisteröityminen turvallisemmalta, jos se tehtäisiin tietokoneella? Vaikuttiko matkapuhelin rekisteröitymisen tekemiseen?	Valitsisitko mieluummin jonkin toisen maksutavan? Miksi?
	tietokoneen käli helpompi	tässä tapauksessa luottokortti, isompi kerta maksu hoidettaisiin "tiskillä"
		mieluiten laskulla, myös paypal hyvä
	näpyttely vaikeampaa kännykällä, pitää skrollata	lasku kotiin, tuntuu varmalta ja turvalliselta
	yhtä turvalliset	verkkopankki
		luottokortti on OK, suoraan kauppaan tai paypal-tyyppinen palvelu
		lasku tuotteen mukana mieluiten, musiikkikauppaan tili varmaankin hyvä
		luottokortti on hyvä, lasku olisi turvallisempi, mutta hidas
	puhelin tuntuu epämääräiseltä asialta	lasku kotiin, kun maksaa kerralla niin homma on hoidettu

Zero-click	Yläraja zeroclickille?
kirjautuessa kysytään salasana sen jälkeen ei tarvitse tunnistautua	-
ei	ei vaikuta
ei kuulosta hyvältä	ehkä, ei kommenttia vaikuttaisiko omaan käyttöön
kuulostaa hyvältä, tietoturva huolen aihe	yläraja tekisi turvallisemman tuntuisen, arvio 20€/kk
luultavasti joo	kuulostaa järkevältä, musiikille: 100€/päivä, muut tuotteet lisättynä: luottokortin rajat
harkitsisin, lisäisi kännykän turvatasoa esim. suojakoodin käyttö, raskaampi tunnistautuminen kk:den välein	kyllä
tuskin ottaisi käyttöön	turvallisempaa, mutta ei varmaan siltikään käyttäisi
riippuu tuotteen hintaluokasta	kyllä, enemmän kuin 10 euroa
ei varmaan, ei tee heräteostoksia	ei oikeastaan, harmittaa jos yksikin ostos tulee tehtyä turhaan
ei, monta ostosta voisi hyväksyä samalla salasanalla	ei
kuulostaa kätevältä, mutta ei halua, kun puhelin voi hävitä	ei väliä

Tunnistautumispalvelun käyttäminen rekisteröitymiseen?	Mitä olet ostanut verkkokaupasta?
ei, jaksaa syöttää tiedot	auton osia
verkkopankkitunnukset kävisi, mieluiten käsin	
ehkä, facebook ei turvallinen, pankki tai viranomainen, luotettavampi kuin facebook	tietokoneen, lentoliput
pankki kuulostaisi turvalliselta, gmail voisi olla ok	
ei välttämättä kaikkia tietoja olisi siis turha palvelu, ei osaa vastata	
periaatteessa kunhan toimii yksinkertaisesti	
riippuu minne tiedot menevät, verkkokauppaan mielellään syöttäisi itse	
kuulostaa kätevältä, luotettavuus kysymysmerkki, facebook tunnusten katoaminen todnäköisempää kuin pankkitunnusten, tietojen näkyminen rekisteröitymisen yhteydessä lisäisi luotettavuutta, mutta parempi tehdä itse	
pankkitunnuksia tottunut käyttämään, pankkitunnusten käyttäminen kännykällä tuntuisi oudolta, koska tunnukset ei mukana, kännykällä jokin muu palvelu olisi parempi	
kyllä voisi käyttää, varsinkin jos palveluntarjoaja on tunnettu	
ei tarvetta	

Mitä et ostaisi verkkokaupasta?	Mitä voisi ostaa
ruokaa - haluaa nähdä ruoan ensin, vakuutusta ei halua - kaipaa apua, ei lääkkeitä	
sovitettavat tuotteet	lääkkeitä luotettavasta lähteestä, vakuutuksen
tärkeitä asioita hankittaessa haluaa tavata asiakaspalve-lijan	periaatteessa mitä ta-hansa
ei kalliita tuotteita	
lääkkeitä	

Miten rekisteröitymisprosessi erosi aikaisemmin käyttämistäsi palveluista?	Mikä teki rekisteröitymisprosessista turvallisen tai turvattoman tuntuisen?	Tuntuiko salasanan valinta turvalliselta?
eka kerta puhelimella,	luottokorttitietojen syöttäminen on arvelluttavaa; kännykän käyttö on arvelluttavaa, koska kännyköiden tietoturvasta ei puhuta	
	tuntui turvalliselta, mutta oma eka kerta oli pelottava	salasana näkyi, mikä tuntui oudolta
pc:llä menee nopeammin, tämä oli selkeän näköinen	luottokortin tietojen antaminen ennen kuin on ostamassa epäilyttää	salasanan näkyminen häiritsi
	ei	salasana näkyi, mikä tuntui oudolta. yksin käyttäessä ei haittaisi
	sivusto ei ole salattu	ei
ei ole kännykällä käyttänyt verkkokauppaa		
nopeampi kuin rekisteröityminen yleensä		salasanan näkyminen ei haitannut
ei ole rekisteröitynyt puhelimella, vaikutti ihan normaalilta	salasana näkyi	salasana näkyi, ei hyvä
	ei mitään erikoista	salasana näkyi, mikä tuntui oudolta, oletti, että oli tehty testiä varten niin
ei eroa	salasana näkyi, luottokortin käyttäminen ei tunnu turvalliselta	salasana näkyi, ei hyvä

Oliko rekisteröitymisprosessissa jotain, mikä estäisi palvelun käytön?	Käyttäisitkö palvelua, jos rekisteröityminen olisi tällainen (eli syöttäisitkö oman luottokorttisi tiedot)?	Kuinka paljon informaatiota olet valmis antamaan mobiiliaitteen kautta? Entä tietokoneen kautta?
		kännykän käyttö on arvelluttavaa, koska kännyköiden tietoturvasta ei puhuta
jos olisi uusi palvelu niin miettisi kaksi kertaa rekisteröityykö		mieltuiten tietokoneella, mutta jos sovellus liittyy puhelimeen niin sitten samalla laitteella
		ei eroa
	joo, vähän luottokorttitietojen syöttäminen mietityttää	ei eroa
		tietokoneeseen on tottunut, kännykässä ehkä isompi kynnys, koska vähemmän harkintaa ja tilanne nopeampi
		ei tiedä turvallisuudesta, mutta aika kankeaa muuten
ei	parempiakin sovelluksia kuin luottokortti-reksiteröityminen	matkapuhelin turvattomampi, tottumuskysymys varmaankin eikä tiedä miten matkapuhelimet toimii
		langaton verkko tuntuu hieman epäturvalliselta, yleensä tykkää käyttää tietokonetta
		tietokoneella pystyy tekemään enemmän asioita samalla, kuten tarkistella sivun ulkonäköä

miten tarkistat www-sivun turvallisuuden?	Tuntuisiko rekisteröityminen turvallisemmalta, jos se tehtäisiin tietokoneella? Vaikuttiko matkapuhelin rekisteröitymisen tekemiseen?	Valitsisitko mieluummin jonkin toisen maksutavan? Miksi?
salatun yhteyden ikoni		
		mielummin verkkopankkitunnuksilla, koska jokainen tuote maksetaan itsenäisenä ostoksena
		verkkopankkitunnukset, tuntuu turvallisilta
normaalisti tarkistaa web-sivun turvallisuuden		
	tietokoneella näkee koko ajan millä sivulla on	verkkopankkitunnukset on tutut ja turvalliset
		mobiilisti reksiteröityminen operaattorin kautta, maksamisella ei niin väliä, verkkopankkitunnukset mieluiten muuten
		verkkopankkitunnuksilla yleensä, ulkomailta paypal tai luottokortti

Zero-click	Yläraja zeroclickille?
ehkä, voisi uskoa käyttävänsä	kyllä, ehdottomasti
kyllä, kätevä palvelu	voisi olla turvallisuussyistä, mutta pienillä summilla ei haittaa. raja: 100€ kertaostos
kyllä, kaipaisi taustatietoja	kuulostaa järkevältä, voisi käyttää ilman rajaa
en välttämättä, haluaa varmistaa ettei rahat lähde ilman lupaa	ei vaikuta
mahdollisesti	mielellään, mutta voisi käyttää ilmankin
ei	ei vaikuta koska haluaa pitää kontrollin itsellää
en todellakaan, ei luottaisi	pin-koodi hyvä olla joka tapauksessa
ei	ei vaikuta
haluaa pin-koodin	ei usko, pienille ostoksille voisi olla OK
periaatteessa joo, miellellään pin-koodi estämään väärin käytöksiä	voi olla

Tunnistautumispalvelun käyttäminen rekisteröitymiseen?	Mitä olet ostanut verkkokaupasta?
pankkitunnukset hyvät vahvaan tunnistamiseen ja kevyeen jos ei kertakäyttösalsanoja, facebook ja google myös hyviä kevyeen tunnistautumiseen	kaikenlaista: vakuutuksen,
pankkitunnuksia voisi käyttää, koska muut vaihtoehdot eivät yhtä turvallisia.	
kyllä, jos voisi tarkastaa tiedot. ei väliä kuka tarjoaa	tietokoneen, lentolippuja, konserttilipun
pankkitunnukset joo, mutta tunnusten luominen ei kynnyskysymys	
kyllä, jos voisi rajata mitä tietoja annetaan	
ei	varannut hotellin, täyttänyt tilauslomakkeen lehdelle ja maksanut verkkopankissa
en, haluaa tietää mitä tietoja antaa	tietokoneeen osia, musiikkia pelejä, soittoäänen puhelimella
ok	
	vakuutuksen, lääkkeitä
uudet tunnukset ok, jos ei kauheasti muistikuormaa. facebook ja gmailkin kelpaisi, mutta ei juurikaan lisäarvoa	

Mitä et ostaisi verkkokaupasta?	Mitä voisi ostaa
vaatteita, auton,	lääkkeitä luotettavasta lähteestä
	mitä vaan kunhan ei tarvitse etukäteen kokeilla/nähdä
vaatteet (ei voi kokeilla)	mitä vaan kunhan ei tarvitse etukäteen kokeilla/nähdä ja luotettu palvelun tarjoaja
	elektroniikkaa, fyysisiä tuotteita
vaatteet yms.. ei voi kokeilla	melkein mitä vain jos tuntee tahon
vaatteita (pitää kokeilla)	kännykällä immateriaal-ista
ruoka	lääkkeitä luotettavasta lähteestä
mitä vain jos tuntee lähteen luotettavaksi	
elintarvikkeet	
tuotteita, jotka vaatii sovittamista	