

Enterprise Web Application Usability Testing with Following Implementation of Findings

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<p>Today the competitive online market requires a web application to be user-friendly and intuitive. Following usability principles during the application development process is a key for application to succeed. That's why usability principles should be learnt and followed by the whole development team.</p> <p>The goal of the thesis is to conduct the usability testing and improve an enterprise web application for Good Sign Oy in order to increase the quality of the product and enhance customer satisfaction with the product. The project includes full usability testing lifecycle and the process of findings implementation.</p> <p>The usability testing process is described in depth. All supplied documents are presented in the appendices. The chosen methodologies for testing implementation are explained and refer to the theoretical part of the thesis. The implementation of the testing results is made by the author and the choice is explained.</p> <p>The thesis could be useful for IT students who are familiar with usability principles and want to learn about the practical application of usability theory for enterprise web applications.</p> <p>The output of the project consists of a usability testing report and the improved business web application. The effectiveness of the changes made for the application was tested during the final usability testing. It showed that user satisfaction was increased from 68% to 84%.</p> <p>The thesis was written in fall semester 2014 in Sierre, Switzerland.</p>	
Keywords enterprise, usability, usability testing, software development, web	

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1 Introduction

1.1 Company overview

Good Sign Oy is a small telecommunication company located in Helsinki, Finland. The company consists of 17 employees and two partners. The company offers software as a service solutions for maintenance of billing, mediating, provisioning, internal accounting and reporting solutions for telecom and virtual operators, power and ICT companies. The company offers consulting services as well.

The history of Good Sign starts in 2007 when five people from Fujitsu IT department decided to start their own business. Eventually, Fujitsu has become the key customer of the new company in the areas of billing, reporting and provisioning. Within a couple of months they got a contract with Fujitsu having the freedom of being an independent organization. Nowadays the size of the company tripled and became international with customers in different European countries.

1.2 Products overview

The main product developed by the company is Good Sign Virtual Operator Management Platform (VOMP). It is a complete solution for various kinds of telecommunications operators and service providers. VOMP is a single integrated platform to integrate the administration of several independent services and control service activation, customer information, rating and billing. This platform can be shared between multiple brands and vendors. This provides maximum cost efficiency and minimum start up time.

good sign

Good Sign Work queue

26.12.2014

Search

My own requests

Enable refresh

Work queue

User	Service	Subscription/MAC	Created	Delivery	Scheduled	Completed	Status	Author
Antti Anttonen	Additional Capacity Order		01.09.2014 14:29				Queued	Antti Anttonen
Tuomas Tuomas	Additional Capacity Order		28.07.2014 02:25				Queued	Antti Anttonen
Kalle Kalle	AD Services		27.07.2014 23:01				Queued	Antti Anttonen
Matti Matti	Email		12.05.2014 11:53				Queued	Antti Anttonen
Matti Matti	Password change		12.05.2014 11:52				Queued	Antti Anttonen
Matti Matti	Password change		12.05.2014 11:50				Waiting params	Antti Anttonen
Matti Matti	Email		12.05.2014 11:36				Waiting params	Antti Anttonen
Matti Matti	Email		12.05.2014 11:28				Queued	Antti Anttonen
Tuomas Tuomas	AD User Account		08.04.2014 11:09				Queued	Antti Anttonen
Kalle Kalle	Device order		19.12.2013 11:26				Queued	Antti Anttonen
Kalle Kalle	Server order		19.12.2013 11:24				Queued	Antti Anttonen
IT - osasto	Device order	SERVER3	19.12.2013 00:23				Queued	Antti Anttonen
IT - osasto	Server order	SERVER3	19.12.2013 00:22				Queued	Antti Anttonen
IT - osasto	Messaging Services		19.12.2013 00:15				Queued	Antti Anttonen
Kalle Kalle	Problem notification		18.12.2013 21:34				Waiting params	Antti Anttonen

User Service Subscription Tekniikka Status Author Tasks In progress

Back

www.goodsign.fi

Picture 1 Good Sign VOPM typical page

The product in scope of this thesis is Good Sign Customer Portal. Unlike VOMP, customer portal is aimed not only at enterprise customers but also for private users. Customer Portal includes most of functionality from VOMP as well as new features to meet current needs of customers. The product has a brand new design which aims to simplify the working process of its users as much as possible. The final version of the product is planned to be published by the end of 2015.

good sign

Devices Billing Reporting Organizations

ABOUT

Find

Search

Organizations

Company name	User Name	ICCID	DeviceId	Sim ty.	Status	Sim Name
Good Sign Oy	Henrietta Henry	89100001100000000000	null		reserved	89100001100000000000
Good Sign Oy	Henrietta Henry	89100001100000000000	null		reserved	89100001100000000000
Good Sign Oy	Kuopio Kalle	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Anttonen Antti	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Henrietta Henry	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Henrietta Henry	89100001100000000000	200000000000		reserved	89100001100000000000
Good Sign Oy	Kuopio Kalle	89100001100000000000	200000000000		frozen	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		reserved	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		reserved	89100001100000000000
Good Sign Oy	Anttonen Antti	89100001100000000000	200000000000		activated	89100001100000000000
Good Sign Oy	Kuopio Kalle	89100001100000000000	200000000000		activated	89100001100000000000
Good Sign Oy	Henrietta Henry	89100001100000000000	200000000000		activated	89100001100000000000
Good Sign Oy	Flak Matti	89100001100000000000	200000000000		frozen	89100001100000000000

1 - 20 of 298 items

Picture 2 Good Sign Customer Portal typical page

1.3 Objectives

The aim of this project was to improve the usability of enterprise web application which has to increase the quality of Good Sign Customer Portal, enhance its customers' satisfaction and overall productivity of end users. The project consists of several parts: arranging usability testing, improving the application according to the usability testing report recommendations and arranging of final usability testing session to evaluate the final results. All of these steps are equally important for reaching the final goal of this project.

This thesis consists of theoretical part about usability and usability testing, the description of performed project activities and the actual usability testing outcomes. The usability testing plan includes a list of questions which will help to evaluate the project in the final usability testing stage.

The accompanying goal is to apply knowledge obtained in HAAGA-HELIA UAS and HES-SO UAS on Business Information Technology programmes, to rate own ability of applying theory in practice and getting real case experience.

This report must answer the following questions to rate how successful the project is:

- Is the product ready for release or is it required more work?
- Is the current version of the product usable?
- How easily do users understand toolbar buttons?
- How easily do users understand the icons and symbols?
- How helpful is feedback given by the product?
- How easily users perform the common tasks?
- How understandable the professional vocabulary used in the product?
- Is it easy to recognize clickable elements?

2 Usability

2.1 Usability and usability testing overview

Usability is the simplicity of use of a human-made object. Usability in terms of enterprise web applications implies limiting the scope of the concept to intuitiveness of use and easiness to learn.

The term usability testing is often misused when described as any of the approaches to evaluate a product. To get a clearer picture of the term the following definition will be used in this thesis: Usability testing is a process of hiring in-and-out employees as testing assistants who introduce either sample of a product target group or random users and their goal is to rate the level to which a product meets concrete usability criteria. (Rubin & Chisnell & Spool 2008, 21.)

Today usability testing is often a part of development life cycle. To achieve better results and reduce the costs usability testing session starts at the early mock-up stage. Early applied usability testing can help to avoid expensive user interface design reconstruction in future and will enhance a chance of a project success. (Krug 2005, 144.)

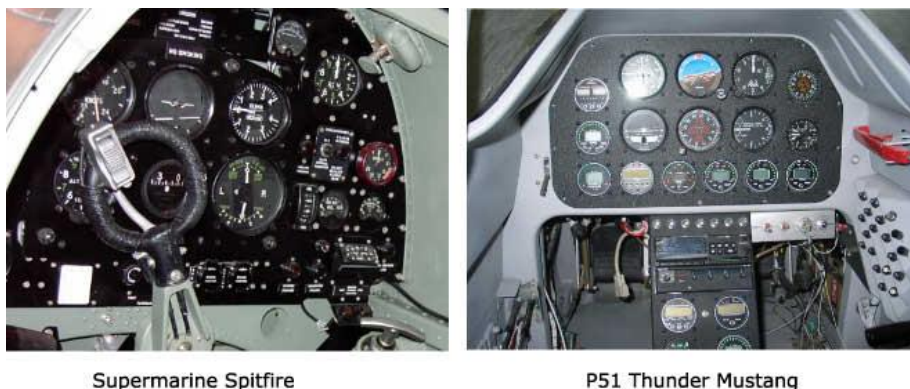
At the same time, usability testing can be applied also to existing products. Even though many usability books and articles state that fixing usability issues in web applications will increase profit, in reality the situation might be different. The point is that for a product to be successful it is also necessary to keep in mind quality, correctly identified target users group, understanding of business needs and processes, marketing and many other aspects. All in all, applied usability principles could only make a good product better. (Bridgewater 2013.)

2.2 The history of usability and usability testing

Usability in its modern interpretation appeared in 1911 when the monograph “The Principles of Scientific Management” was published by an American mechanical engineer Frederick Taylor. The monograph describes the methodology of productivity enhancement by

applying the time-motion study. The research was abided by Frank and Lillian Gilbeth who digged deeper into the topic and split the work motion into fewer stages which made work process faster and easier in 1916. (Usability Testing Central 2007.)

The next considerable step in the field of usability was made during the Second World War when people began to control electronics and electrical systems via user interface. The industrial psychologist John Flanagan discovered that the aircraft operator's productivity could be significantly increased by diminishing the amount of buttons, knobs, switches and control panels in a fighter aircraft. Using critical incident technique, Flanagan designed the board panel for P51 Thunder Mustang which was one of the most successful aircrafts for that time. Military oriented specialists made a considerable number of discoveries in usability sphere during the war time. (Flanagan 1954.)



Picture 3 Supermarine Spitfire and P-51 Thunder Mustang (designed by John Flanagan using Critical Incident Technique, an early usability testing) fighter cockpits. (Usability Testing Central 2007.)

The postwar period was followed by a micro-electronics boom and an increase of usability research in computer interface field. For example, in 1956 George Miller, American psychologist conducted an experiment in which he wanted to find out the average number of controls which a human can hold in his/her working memory simultaneously. Result of the experiment stated that on average a normal person can handle in memory about 7 things at the same. Since then this finding is sometimes referred as “the magic number seven plus or minus two” which adds to the original idea a kind of error. This observation has become one of the basic principles of user interface development. (Schweickert & Boruff

1986, 419.) At the same time IBM also started its researches on usability which helped the company become one of the major software and hardware companies in the world.

The first mentioning of the term usability in a scientific article was made in John Bennett's "The commercial Impact of Usability in Interactive Systems". The article illustrated the first usability testing session arranged by IBM in 1979. IBM owns the regular laboratories for usability testing since 1979.

The "think loud" method was invented by Ericsson and Simon in their work named "Verbal Reports as Data". This method is one of the most popular and effective usability testing techniques today. The book describes usability testing and the common usability principles. Meantime, Xerox research and development department suggested WIMP (Windows, Icons, Menus, Pulldowns) which eventually has become the basis of the modern user interface development. (Sauro 2013.)



Picture 4 WIMP (designed by XEROX) fighter cockpits

(URL: <http://www.theverge.com/2013/3/21/4127110/40-years-of-icons-the-evolution-of-the-modern-computer-interface>. Accessed: 11 November 2014)

One of the most significant milestones in the history of usability happened in 1984 when Apple released its Macintosh, the first computer which used a new user friendly interface with WIMP. The gist of the Apple advertisement company at that time was a tight connec-

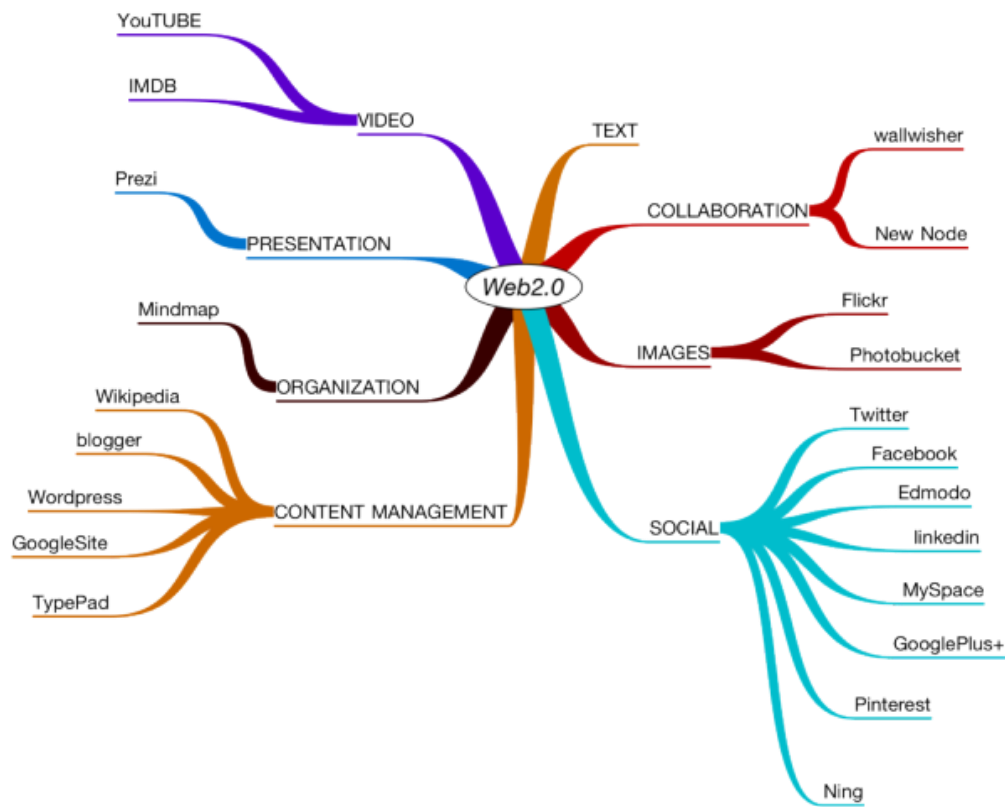
tion with a user. Microsoft has later developed Apple's success with its Windows operating system bringing usability to the next level. Microsoft and Apple produced a huge boost in usability researches with a vast number of achievements in user interface design during 1980s and 1990s. (Usability Testing Central 2007.)

Another milestone of usability history began with Web 1.0 in 1998. Web 1.0 era was a time when online stores came into the Internet. A huge amount of e-shops appeared but not many of them managed to survive. It was the exact time when such market giants as ebay.com, amazon.com were founded and survived while hundreds of others were unable to withstand competition. The reason of this e-shops boost on the Internet was HTML. For that time, it was a new mark-up language which made it possible for anyone to create a website. The language was and is easy and fast to learn and use. Its easiness gave a birth to a vast number of poorly designed websites which were hard or even impossible to use. The websites competition was very tough, and such criteria as usage intuitiveness and user-friendliness turned into a competitive advantage. For example in case of Amazon.com, the possibility of leaving a review and rate a product were important features which helped the e-shop to succeed but the proper and intuitive website design were the key to its success. (Usability Testing Central 2007.)

Such writers as Krug, Rubin and Nielsen popularized usability in wider software development circles and attracted public attention. The usability criteria were admitted as strategic in web site development. Usability testing for web moved from a laboratory into an office room, from few video cameras and the one-way mirror to web camera and screen recorder programs which made it times cheaper and more affordable for small companies. Internet has become more popular and the need to test websites in-lab was gone. In addition websites and applications got specific standards of using controls and elements which were familiar to a user. On the other hand, the emergence of mobile phones still required usability testing conduction in laboratories. (Sauro 2013.)

As a result of moving to Web 2.0 in 2004, the internet obtained a new meaning with such new evolving features as communities, wiki, blogs, social networking and other communication channels. Web 2.0 introduced a new design with rounded and convex controls which led to a huge number of websites and applications applying the style. Web 2.0 not

only brought new design practices, but also a significant number of usability design problems such as unclear icons instead of labels, hierarchical problems, overmuch scrollable page and flash based websites. (Kimak 2007.)



Picture 5 Web 2.0scheme (Hazem Torab 2014)

Since the times of Web 2.0 usability testing has become a frequent and recognized stage of web application development process. Despite of this fact, the profession of a usability engineer is still rare in medium and small size companies. As a rule, still only big companies which constantly have many software development projects can and want to afford usability professionals. (Franklin, Campbell & DeRosa & Hatter 2014.)

2.3 Importance of usability

To understand the importance of usability for enterprise web applications it is needed to compare the value of usability between enterprise applications and consumer applications.

As an illustration of a creating successful online shop, one of the most significant criteria is how simple and fast it is to list and buy a product. If user can't understand how to do a purchase they will go to a competitor website with more user-friendly design. The research made by Experian shows that retailers lose about £ 2.3 billion if a user has to spend more than 5 minutes for authorization and security procedures. As reported, only 17% of such users come back to website again. (Experian 2013.)

As for enterprise applications, they are first of all aimed to handle business needs. Following strict business process scenarios, such usability criteria as speed or the rule of magical number 7 lose their value. However, the basic usability principles are highly important for enterprises as well. There are several reasons to conduct usability testing for business web applications:

- a chance of increasing profitability of the product
- the minimization of UI elements which make user frustrate
- the diminishing of design flaws
- it minimizes the risk of redesigning need

(Franklin → & al. 2014.)

2.4 Usability testing techniques

There are 5 recognized methodologies which could be applied to usability testing.

Hallway testing

Testers are random people and the test is usually arranged in an office room. The hallway methodology is the best to apply in the early stages (when only mockups or prototype exist) of the development process. The biggest advantage of using this method is low cost and fast participants' selection time. (OpenHallway Blog 2009.)

In-lab testing

The in-lab testing is conducted in a special laboratory equipped with needed devices such as PC, tablets, mobile phones or any other devices. The laboratory is divided into two rooms through a one way mirror which allows observers to monitor the test without seen by a tester. The advantage of in-lab methodology is a possibility to monitor and record all user's interactions and reactions with an application. The cost of using this technique is usually very high. (Kaushik 2006.)

Remote usability testing

The remote usability testing methodology is used when test participants and organizers are located in different cities, countries or time zones. The possible edge of this technique is arranging several testing sessions at the same time. This testing could be applied when conduction of the remote testing significantly cheaper than arranging the testing in the country/town destination. (Rosenfeld 2010, 16.)

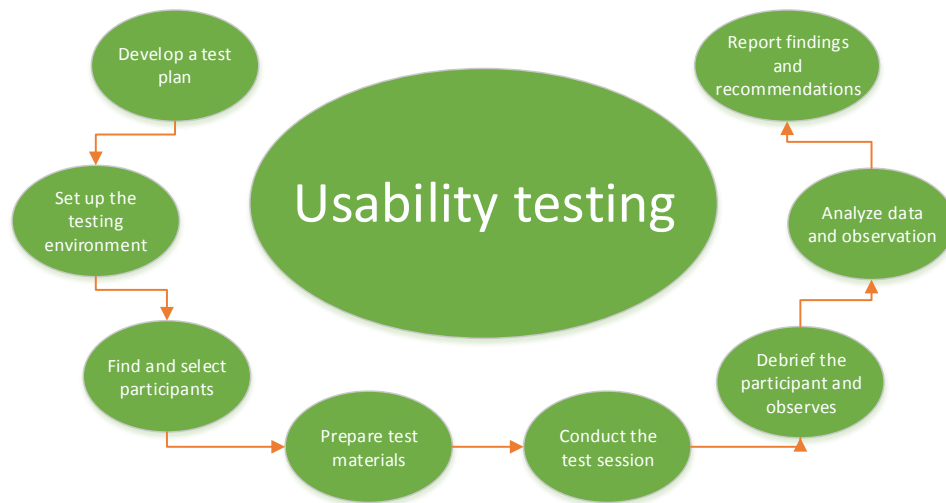
Expert review

The expert review is a method when the product is evaluated by the usability professional by usability heuristics. The output of this testing is a report of potential usability issues and recommendations for improving. The advantages of this methodology are that expert usually provides quick and quite inexpensive feedback about the application. However, the reliability is questionable and depends on the expert's background and experience. (Digital Communications Division 2014)

A/B testing

The A/B testing is a technique when two versions of one product are tested. These versions have only 1-3 different elements. The testing results then later are compared and the best result is used. This testing methodology is best to apply for existing product when A version is an actual product and B version is a product with proposed changes. (Nielsen 2012.)

2.5 Stages of usability testing



Picture 7 Eight stages of usability testing (Rubin 2008)

Excluding expert review method usability testing usually consists of eight different stages.

Develop a test plan.

The test plan is the base of the whole testing. The test plan identifies the targets and objectives of usability testing and research questions. It defines the test participants, the choice of methodology, creates a task list for the future testing, lists the needed equipment, identifies possible report output, assigns roles and appoints the deadline (Rubin, J. & Chisnell, D. & Spool, J. 2008). The content of the development plan often depends on the project type. Agile development methodology, which is getting more and more popular, requires handling chunks of development which makes it hard or sometimes impossible to predict the plan beforehand. However, Sonia Kaukonen, a usability engineer, believes that there should be at least a rough version of a test plan.

It depends on the project type: in current agile mode cooperation and handling small chunks of development can make it impossible to plan everything beforehand, there should be a rough vision though. It is helpful to base testing on known use cases, but these will usually evolve during the project, so high level planning is most helpful. (Sonia Kaukonen 11 November 2014.)

Setting up the test environment

The second step is setting up the test environment. When the test plan is finished and the methodology of the test defined it is needed to prepare a place for a test. The test environment depends on a chosen usability testing technique. For example, for Hallway testing the minimum equipment would consist of a computer, headphones and a screen recorder. However, when testing an enterprise web application with a mobile phone an in-lab testing might be preferable if application has not typical for mobile phones controls. In-lab environment equipped with multiple cameras, microphones, one-way mirror and PC or any needed devices. Usually the room for observers has a monitor which duplicates the tester screen. A/B testing could use either hallway or in-lab testing environments. Remote testing depends on a product development stage. On the late product development stages when an application is used with a production database security plays a significant role. Product owners have a choice either to use a test dummy database or set up the necessary security tools. Otherwise, equipment is basic – a screen recorder and microphone would make a start. (Sonia Kaukonen 11 November 2014.)

Find and select participants

As reported by Amber DeRosa, a senior usability engineer, the selection of participants is the most significant stage for usability testing cycle. She states that all testers should represent a target group of an application. She considers that if the chosen testers are not appropriate there will be no relevant results of usability testing. She also claims that even if a tester seems to be perfect it could appear that the tester does not represent the target group. DeRosa also reports that sometimes people give untruthful information about their abilities and experience which may also be a reason for failing a test attempt. (Franklin → & al. 2014.)

According to Nelson, the standard sample size for usability testing is 5 users. However, the other point of view was presented in a scientific experiment hold in 2003. The research was held with 60 users which were divided into 12 groups. The result of the experiment showed that the group out of 5 could identify from 55% to 99% of usability issues. (Faulkner 2003.)

Preparing test materials.

The fourth stage is preparing test materials. The test materials include such documents as a test scenario, background, after- and pre- test questionnaires, contract between a company and a tester and other needed documentation as well as data collection instruments. While a test scenario developing it is necessary to identify the certain web application business processes. There is no goal to test the whole enterprise application as it does not fit the testing time scope and will be insufficient. To identify the most valuable parts for testing it is needed to understand running business processes and predict the most popular features of an application. The common usability issues with navigation, search, clickable elements and other should also be taken into consideration while developing a test scenario. (Rubin → & al. 2008, 153.)

The pre-test questionnaire is usually developed to identify which social group user belongs to as well as their background with computers and applications. The after-test questionnaire is used to evaluate the testing process. The Likert scale could be taken as a good example of the after-test questionnaire. Using the Likert scale a user gets statements where they mark their feelings measuring from strongly disagree to strongly agree on the scale from 1 to 10 (or any other digit). (Burns & Burns 2008, 245.) “The feedback given by the website was easy to understand and helpful” is a typical question for the Likert scale and convenient way for developers to understand the user’s problems.

It was easy to edit the needed product

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

Picture 8 The Likert scale question example

Usability testing session

This is the stage when the actual testing sessions are arranged. The testing session arrangement characteristics highly depend on the development methodology chosen. Applied to the agile methodology the testing session can become interactive, for example improving application after each testing session to determine the best possible solution for the time.

Agenda of the testing is quite standardized and starts with introduction where user learns the rules of usability testing and gets a brief overview of the product. The pre-test ques-

tionnaire could be offered straight after the product overview or during the introduction. Having task list and needed supplies a user acts to reach the test goals while a test organizer makes notes and if needed gives the user a hint. After a user is done with the task list they fill the after-test questionnaire and discusses the testing process with the test organizer.

Debrief the participant and observes

The next stage is debrief the participant and observes. An organizer and a test participant discuss the process of test and the user feelings. The after-test questionnaire is usually filled in during this stage.

The main aim of discussion between user and the test organizer is to clarify problems the user faced during the test session. The after-test questionnaire is not always enough. It often happens that even despite of notice that the questionnaire is used to evaluate the product and not the user's skills, user still fills in the form with values which are debatable comparing to their interactions with a web application. The discussion could help the user to understand that the problems they faced were not their fault but the fault of developers or designers and fill the after-test questionnaire properly. (Rubin → & al. 2008, 229.)

Data analysis and observation

Analysis of the usability testing session data can be handled differently. If the time frame of a usability testing session is quite tough, the data analysis straight after the test would be the best solution. A data analyst should have a list of questions and points which were developed during the usability testing plan stage. They analyze the data after the testing session by watching video from the session and reading the notes made during the testing. The organizer should write down most crucial usability problems to transfer them to designers, so they could start thinking how to improve usability of the issue. So, no need to wait until the final report is ready – the most noticeable usability problems could be fixed as fast as possible. It could have a report, email or verbal form. (Krug 2005, 156.) This kind of "fast" report may also contain recommendations. If a test organizer is not sure about how the problem should be solved it should be marked as preliminary. Preliminary solution should not be considered as a final recommendation and can become of low priority for designers. However, these problems will be still written down in the final report.

The other way to analyze the data is to collect it after the test session but analyze it when all test sessions are done. This method shows the most repeated usability problems and draws a clear picture what was developed successfully and what is lacking in explicitness.

The third possible way to analyze the data can be used when iterative type of usability testing is conducted. Clear usability problems are getting fixed straight after the usability testing session, so, the next tester uses the newest version. This kind of test requires more work for everyone. Changes should be discussed in a development team and issues fixed. The test plan and session scenario might be updated.

Despite of several data analyzing methods there is a common order to complete study process. Firstly, gathering all the data together is done. The notes made during session, recorded video or/and audio, test questionnaires and other supporting information are put together in order to be processed. Secondly, highlighting the most critical problems which appear frequently is performed. Some of the usability problems could be clearly noticed during the testing process or discussion with a tester.

Report findings and recommendations

The most common way to present findings and recommendations after usability testing is report. A report usually consists of several parts: the background overview, methodology and findings and recommendations. The background part describes the application, the place and time when the test was held. Methodology chapter portrays the test session, pre- and after-test questionnaires results and statistics as well as other testing information to make it possible to recreate the test. Finding and recommendation part shows the weak and strong points of a web application. It is very important to point on well-working features both from development (for reusing in future) and team motivation (the critics only is disheartening) views.

The findings and recommendation part is normally formatted as a table with following headings "Problem", "Severity", "Recommendations". Severity assignment to the problems should be done based on application type. As it was noticed above, there are applications where loading speed is critical and the other where it does not affect anything. Severity is

important for further improvements and should always be a part of the report. Recommendation column is not mandatory by itself and can be filled in differently. If usability testing is done within a company, the recommendation table could be filled in after discussing problems with designers or/and development team. However, in case of expert review recommendation column is expected to be. The best way to make a report descriptive is to add visualization – for problems column the actual screenshots from the application and improved version for recommendation.

3 Work methods

Before starting this project the author got the necessary knowledge about usability and usability testing. The writer later made a try to apply her knowledge arranging a set of usability testing sessions for the company she works for. To practice her theoretical base she wrote several reports about usability testing which became a foundation for this thesis.

The company author works for uses agile methodology to develop the project. The usability testing and later implementing of findings were integrated into the development process. The improvement of the application was done with technologies the author developed during her studies and working life: ASP.NET MVC 4, JQuery, Microsoft SQL Server and Kendo UI.

The usability testing plan was developed by the author of this thesis, changed and approved by the development team. During the discussion the team decided if offered for testing functionality is critical to test or not and they were able to suggest application parts for testing.

For delivering results of usability testing to Good Sign presentation method was used. The presentation covered different levels of usability issues as well as highlighted well implemented application functions. The usability testing report was delivered to the company during the presentation.

4 Usability testing case

4.1 Detailed product overview

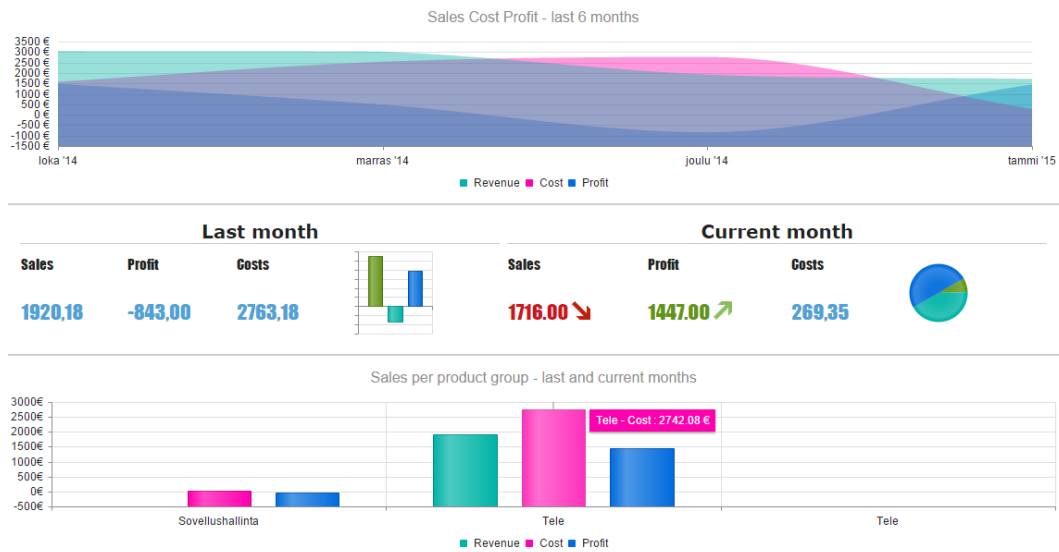
Good Sign Customer Portal is a single integrated platform which helps to integrate the administration of several independent services and control service activation, customer information, rating and billing. Customer Portal is distributed to customers as software as a service. It means that customer has an access to the software through the internet connection without a need to install it neither on their servers nor on their desktops. The advantages of SaaS are that user doesn't have to spend time and money on installing, maintenance and updating the purchased software. Usage of Customer Portal requires a VPN connection. Each company has their own database which is located in Fujitsu cloud system as well as the application itself. Customer portal is built with ASP.NET MVC 4 and Microsoft SQL Server. Front-end is handled with JQuery (AJAX and JSON) and Telerik's Kendo UI.

The application is customizable:

- it has different sets of modules for different customers and it is possible to choose concrete modules, take the whole set as well as order a new module
- it is possible to choose application layout or order a specific one

The core application modules are Devices, Billing, Reporting and Administration.

Devices part consists of Device list and Services dashboards. With Device list user can manage (edit information, update services and so on) existing SIM cards on organization/user level, register and/or activate new SIM cards; Services dashboard manages customers' subscriptions for the cloud or physical services.



Picture 10 Good Sign Customer Portal Statistics dashboard

Administration page includes around 35 different customer-specific dashboards for tuning the system and system's settings.

4.2 Testing scope

Having duration of usability testing strictly defined there is a need to choose functionality for testing the whole application is not able to fully meet the time frame. By the time of the testing session Customer Portal already had a lot of pages with functionality implemented, although it was not complete. Only the core and most frequently used pages and functions were chosen such as:

- add/edit/find/delete organization
- add/edit/find invoice
- add/edit/delete product from invoice
- manage with invoice statistics
- register and activate a new SIM card and multiple new SIM cards
- activate registered SIM cards

5 The usability testing process

5.1 Usability testing background

The first usability testing for Customer Portal was arranged by the author of this paper in the end of summer, 2013. It was the time when the first version of Customer Portal was ready to be published for customers. The application was improved based on the found test results. However, the author offered a new approach to migrate from JQuery UI to Kendo UI. The motivation for this switch came from a requirement to make the application look more attractive for business customers. Kendo UI brought significant changes into the application layout. At the same time new functions and features were added to basic CRUD (create/read/update/delete) pages. That's why the need in another usability testing has appeared. Having a small development team there was no resources to have usability testing applied often enough. However, it is always better to have at least one or two usability tests during development process of a project than having none at all.

5.2 Usability testing preparations

Every usability test starts with a plan. The testing plan describes required testing environment, test questions, participants and time frames. Objectives for this testing were the following: identify if the application is user-friendly, intuitive and meets the customers' needs. Questions for the research were formulated based on the first testing session. The aim was to get understanding on what was changed for good and what didn't bring the needed intuitiveness. Like many enterprise applications Customer Portal requires time for learning.

The testing plan had identified the probable tasks for user which later became the testing scenario. The most frequently used processes were picked for the task list. As task list covered multiple pages there was a possibility to check basic usability principles at the same time. The objective of usability testing was to answer the following questions:

- Is the product ready for release or is it required more work?
- Is the current version of the product usable?
- How easily do users understand toolbar buttons?
- How easily do users understand the icons and symbols?

- How helpful is feedback given by the product?
- How easily users perform the common tasks?
- How understandable the professional vocabulary used in the product?
- Is it easy to recognize clickable elements?

5.3 Set up the environment

Based on the research about usability testing methodologies the author chose to use the hallway testing technique for setting up the environment. The decision was made because of the ease to set environment up as well as the low cost of the method. As another advantage the company office where usability test was held is located nearby the testers and they are familiar with the place.

The company office had several rooms available for usability testing. The aim was to choose the one where the minimum additional installation was needed. The chosen room was “Monaco”. It is quite a small room for 4-5 people with a big 27’ screen, web camera, keyboard, microphone and speakers.

To make a tester feel as confident and relaxed as possible, the tester could choose between all common browsers, usage of a big screen or laptop screen, separate or laptop’s keyboard. To record the user’s interactions with the application a screen-recorder programme “Screencast-O-Matic” was used. The organizer was supposed to make notes during the process.

5.4 Find and select participants

The next step was to find and select participants. The experience of Amber DeRosa, a senior usability engineer at Vanguard, shows that the enterprise applications should be tested only by the target group of the application. However, the author felt the need to combine the usability testing practices with hallway testing method to get the maximum value out of usability testing. So, half of the users were represented the target group and the others were random users with different experience, age, gender and education.

To find the test participants from the target group the author decided to ask customers to provide the future users of the application who had no experience with the application before.

There were three participants who agreed to participate in the testing sessions. The test participants from the customer company were the perfect choice as they were the exact people who will work with the application. The other two random users were found through the network. The advantage to have random users for this testing was to identify the possible problems with overabundance of telecommunication specific terms used for application as well as basic usability issues. The description of the users could be found in Appendix 5.

5.5 Prepare test materials

The usability testing plan was discussed, modified and approved by the development team. The challenging part was that the application was aimed for 3 different customers by the usability testing time period. The biggest challenge was that all of them were focused on different modules of application. However, all three of them had some modules in common. All in all, the decision what to test was made after a prioritizing the customers and their core processes.

The author created a testing scenario based on final version of the usability testing plan. The goal of the test scenario was to make user learn how the application works and be able to repeat the same actions later. So, user was supposed to start with organization management then work with Invoice dashboard, manage SIM cards and return to the organization management. As an example, working with Invoice dashboard user had a possibility to learn how to work with sub-grids and use the knowledge later in the test.

After finalizing the test scenario it was possible to start preparing for user evaluation of the application. The Likert scale was used as after-test questionnaire. The user was asked about the certain processes they did as well as about the general feeling about the application. The Likert scale perfectly fits evaluation of user feelings about the process. There is a scale from 1 to 10 points varying from strongly disagree to strongly agree. The pre-

test questionnaire was short and anonymous. It included questions about the computer usage and some general personal information.

5.6 Conduct the test session

According to the usability testing plan the time scope for arranging actual usability testing session was between 23rd of June and 2nd of August. However due to the amount of high priority tasks for the author of thesis it was on hold. Finally, with a two weeks delay the testing session were arranged during 3 weeks instead of planned 5 weeks.

All testing sessions were conducted with following the same scenario:

- organizer briefly explains the testing rules
- tester fills in the pre-test questionnaire
- tester receives a task list and needed materials to accomplish the test
- audio and screen recording starts and organizer is ready to make notes
- user tries to perform tasks one by one
- when user finishes the testing session is discussed between user and organizer
- user fills in the after-test questionnaire

Some of the testers were already familiar with usability testing in theory but no one of them has ever participated. The hardest problem during the test was to make users “think loud”. It was necessary to remind at least several times per session. All of the users completed the task list with close to expected results. Some suspected problems were found and proved while some user’s misunderstanding was a surprise for the writer. As an example the combobox can be used. Some users did not have a clue how to use it at all while others were perfectly fine when interacting with it. The ability to use it did not depend on age of the tester but on experience they got working with enterprise systems. The users from random group couldn’t use it without a hint. However, it couldn’t be named as usability issue but the problem of different usage experience as the combobox is a part of standard controls today.

The application had some issues known by the author. The usability test helped to identify and prove that using sub-grids is not applicable in many cases. To edit a product inside an invoice the user had to expand three grids and choose the product from the fourth one of them. Each user failed the task to edit it without a hint. However, all participants complet-

ed deleting the product. To summarize, users would need training to be able to use sub-grids.

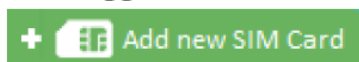
Picture 11 Edit a product inside invoice

Another issue was toolbar buttons. There was an attempt to improve them according to the first usability testing results but they were still hardly understandable for the user. The usability testing made for this report proved it again. One more problem was that there were 2 sets of almost the same buttons such as add, edit and delete with the difference in icon. Four out of five users misused them while doing tasks.

Originally



Was suggested



After first usability testing



Picture 12 Toolbar buttons during the first usability testing

The problems with usability mostly appear when the client claims for a needed functionality. In following issue the customer required that when user adds a product they should

first choose the category it belongs to. Actually there are 3 nested categories. To get the product the user wants to add they have to know by heart to which sub categories it belongs. Even though the author explained to the customer that it must be hardly usable the clients did not change their view. During the usability testing the users from target group were specially tested with one extra task: they were given only the product description. Despite of the fact that they did this action with the old system and knew all the categories there they couldn't perform the task and add the needed product.

2 Add products

Offering

Service

Module

Product description

Picture 13 Add product requires user to know 3 sub-categories by heart

There was a task to find basic information about the SIM card. It was a surprise that all the users completed the task fast with 1 or 2 clicks. The task was expected to be failed when user had to click on ICCID of the SIM to open the dialog with information.

	Company name	User Name	ICCID
<input type="checkbox"/>	Good Sign Oy	Aaltonen Henri	F12050429000001
<input type="checkbox"/>	Good Sign Oy	Pirkko Mikko	F12050429000002
<input type="checkbox"/>	Good Sign Oy	Oja-Moula Pasi	801980007100000000
<input type="checkbox"/>	Good Sign Oy	Korhonen Jukka	801980000000000000
<input type="checkbox"/>	Good Sign Oy	Lomasaari	GoodSign_Oy_VIRKUS...
<input type="checkbox"/>	Good Sign Oy	CHARGES PAID	Self-Registration 00000000...

SIM card

ICCID 89358020712030015996

IMSI xxxxxxxxxxxxxx

PIN1 xxxxxxxxxxxxxx

PIN2 xxxxxxxxxxxxxx

PUK1 xxxxxxxxxxxxxx

PUK2 xxxxxxxxxxxxxx

Status reserved

Time Stamp 23.11.2013 9:15:59

Picture 14 Click on ICCID to get information about a SIM card

All other usability issues are described in Appendix 5, usability testing report.

5.7 Debriefing the participant and observers

To get more feedback on the usage of the system the organizer discussed the testing session progress with the participants. The overall experience was positive however most of them were able to suggest ways to improve the accessibility of the application.

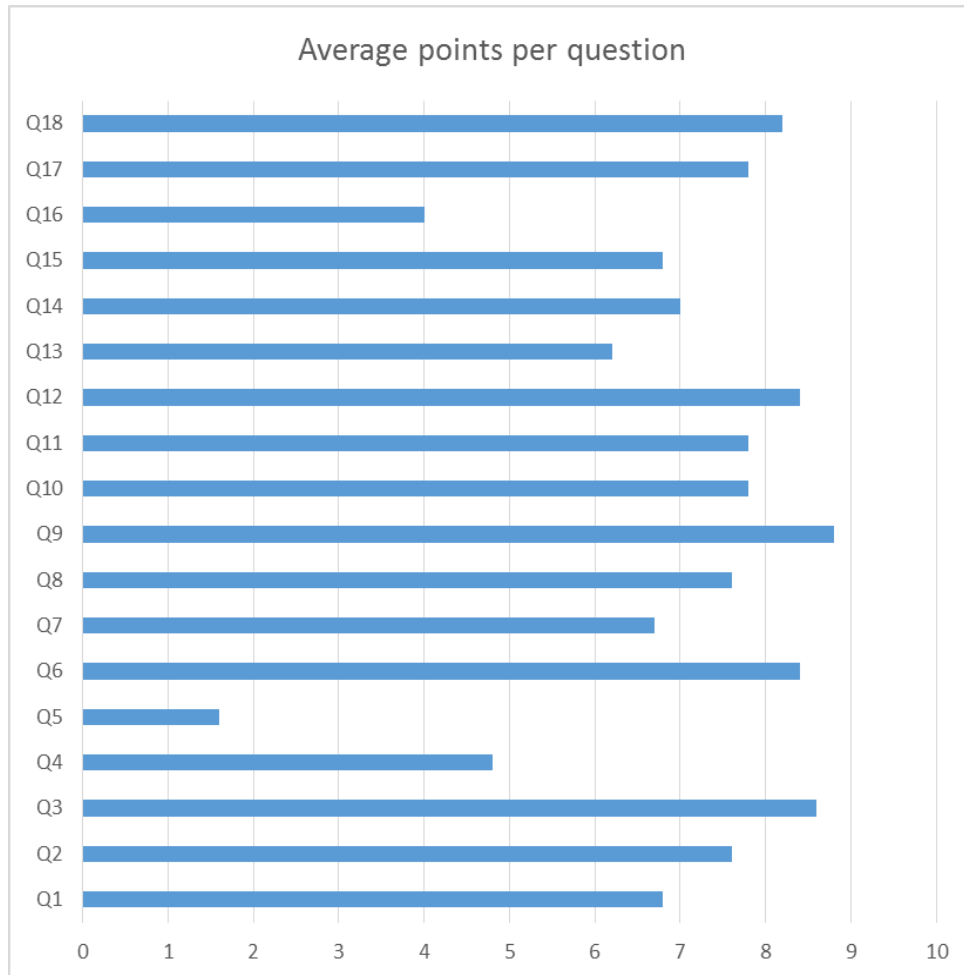
As a rule, discussion of testing session between organizer and tester is useful for several reasons. The main reason for that is that it helps to remind of the issues the user faced during the test which often leads to more accurate evaluation with the Likert scale. Another problem with evaluation is one cultural peculiarity of the participants. In most cases Finnish people give higher rates when they are asked to evaluate something. It's usually a good characteristic in social life but not for product usability evaluation. For instance, one person who participated in the first usability test had severe trouble to complete the tasks but his evaluation showed that the system was one of the user-friendliest of all time.

5.8 Analysing data and observation

To analyse the data collected during the usability test the author created a table with a column per each user and the task they did. By watching the recorded videos and taken notes the writer filled in the table with problems users faced and time they needed to accomplish the task. Having all information for each user the author tried to compare the results in order to get the whole picture of the application and how well its functions could be used.

As was said above the Likert scale was used for user evaluation of the application. The average result per all questions was 6.8. It is quite a high result which could be interpreted in a way that all in all the tested application functions are generally fine. However, the reader may remember that Finnish people usually give higher scores than the evaluated

item deserves. On the picture below the reader could see the average points per question. The list with questions can be found in Appendix 2, Likert scale.








Picture 15 The Likert scale results. Average points per question.

5.9 Report findings and recommendations

To report findings and recommendations the author created a usability testing report which could be found in the Appendix 5. The report contains 4 columns:

- Problem
- Problem description
- Severity
- Recommendations

The problem column describes the area of usability issues or a concrete task where usability problems appear. The problem description explains why this is a problem and how users reacted when facing it. The severity shows how serious problem is. There are several severity levels used in the report:

Icon	Description
	Good practice. The idea of implementation works fine should be reused in similar cases.
	Info. Might be re-thought and fixed if there is time available.
	Warning. The problem is not critical but is highly recommended to fix it before the release.
	Major problem. The problem is important to be fixed. High priority.
	Critical problem. The highest priority should be fixed before the release.

The severity level will help the development team to quickly create a plan of improving the application and fix the most critical problems first instead of wasting time on less important issues.

The recommendation presented in the usability testing report is a combination of the author's and the company designer's ideas for application improving. While writing the recommendation the author took the basic usability rules as a fundament for creating new elegant solutions for problematic areas.

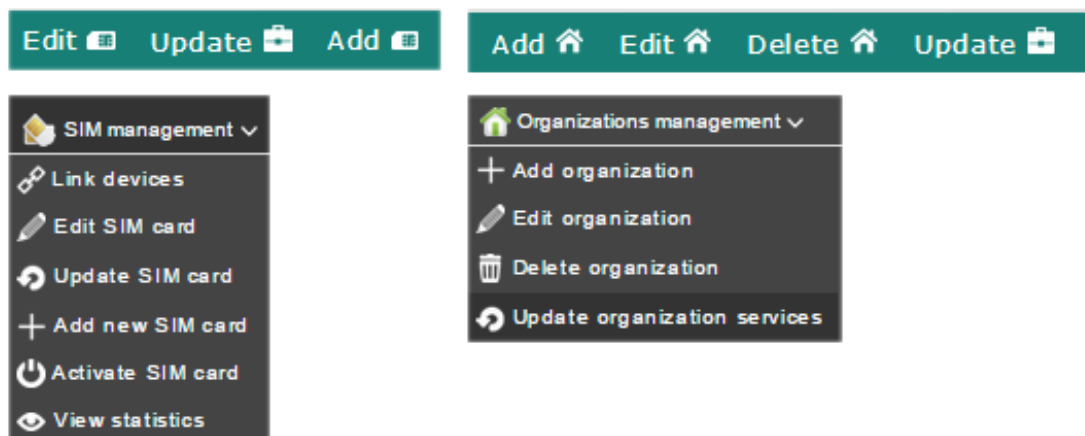
6 Implementation of findings

In this part the author will describe the changes performed or explain why it is not currently possible to make them now.

Several navigation issues of different severity levels were identified during the testing. The most critical problem was that toolbar has several buttons with the same short text (a verb) on it and the difference between them was not self-explanatory icons. To solve this problem the buttons were combined by category under drop down menu and given obvious names which clearly show what buttons do. Basically, making drop down menus with long descriptive names is able to solve all toolbar-navigation issues. It was achieved by using Kendo UI menu. The advantage of using Kendo UI Menu is that it is integrated as C# code and it is possible to add a user right checking into the menu control.

```
@(Html.Kendo().Menu()
    .Name("invoiceToolbar")
    .SecurityTrimming(securityTrimming => securityTrimming.HideParent(true))
    .Items(items =>
    {
        items.Add().Text(@Html.Resource("Common.Header", "ReportManagement").ToString())
            .ImageUrl("~/Content/Custom/Fujitsu/Images/Report/reports25x28.png")
            .Items(innerChildren =>
            {
                if (Roles.IsUserInRole(AuthRightId.ButtonReportRerun.ToString()))
                {
                    innerChildren.Add().Text(@Html.Resource("Common", "ReRunReport").ToString())
                        .LinkHtmlAttributes(new { @id = "RerunReport" });
                }
            })
    })
    .Render()
```

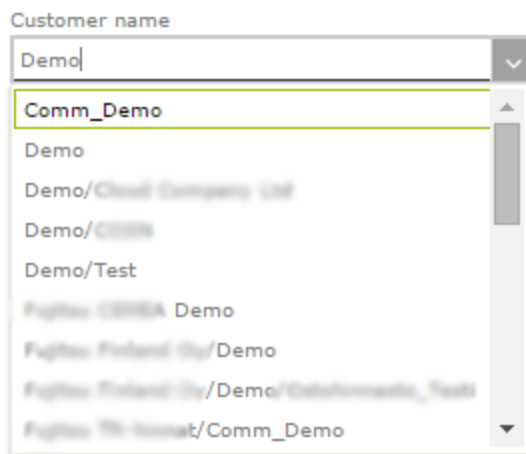
Picture 16 Kendo UI creating menu is integrated to ASP.MVC



Picture 17 SIM page toolbar menu before (top) and after (bottom) changes applying

The other problem of the portal was loading time. It took around 20 seconds to load data in grid view. There were several options to increase loading speed. The row limit became up to 5,000 (200,000 previously), the procedure was speeded up by the database administrator and for some pages grid does not show anything until the user chooses needed organization or user. Finally, it takes 4-8 seconds to load 5,000 rows. Even though 4-8 seconds would be a poor result for a usual website on the Internet, it is ok loading time for enterprise web application. In case of end-user usage when the row number is quite low it takes less than a second to load the grid data.

Good Sign Customer Portal is used by Fujitsu which provides services for around 25.000 corporate and private clients in Finland. The problem arising while using combobox is that there are a lot of sub-organizations and the system shows them in the following format: "Fujitsu/CompanyX/ComanyY". The solution could be to show only the actual organization name which does not work. The reason is that some companies have the same name. Usability test identified that to find CompanyY user has to type all its parent organizations. To solve this problem the author changed the procedure to search by "contains" method.



Picture 18 "Contains" type of search

The next critical usability problem was on invoice edit screen. There were several problems on one screen: the buttons which effect only 4th sub-grid was on the top of the window, it was hardly understandable that user has to expand the grid four times to get to the product level. The idea of this screen came from the customer and they didn't want to change anything, however they agreed on the minor changes. The edit and delete product buttons were moved into product level. Now each product row has two buttons and it is clear what is changeable and what is not. To solve the extending problem the author decided to make each 1st row of the grid and sub-grids already expanded. Finally, when user comes to the page they see expanded rows and buttons where they belong. The author believes that it is possible to find a better way to present the invoice information however, it is unlikely possible without the changing of the whole idea.

Edit invoice

Previous Invoice

Next Invoice

Roll back invoice

Re-run invoice

Add Product

Credit Invoice

Send Invoice

Invoice information

Description	Price	Cost	Profit	Work Object	Note
Tele	169,41	131,91	37,50		

Description	Price	Cost	Profit	Work Object	Note
Yhdistetty viestintä	169,41	131,91	37,50		

Description	Price	Cost	Profit	Work Object	Note
Taskuposti	169,41	131,91	37,50	FM62	

Product group	Product	Charge type	Amount	Sale price total	Cost price total	Profit	Note		
Päätelaitteet	Mobile Phone Nokia Lumia 625	kk-maksu	1	9,70	5,29	4,41		<div>Edit</div>	<div>Delete</div>
Viestintäpalvelut	MOLCMS Elinkaari palvelu silypuhelimet	kk-maksu	5	86,90	28,80	58,10		<div>Edit</div>	<div>Delete</div>
Päätelaitteet	Mobile Phone Nokia Lumia 925	kk-maksu	1	19,85	9,77	10,08		<div>Edit</div>	<div>Delete</div>
Viestintäpalvelut	MOTRAVELER Lotus Notes Traveler taskupostipalvelu Avausmaksu	käynnistysmaksu	1	0,00	1,98	-1,98	<div></div>	<div>Edit</div>	<div>Delete</div>
Päätelaitteet	Mobile Phone Nokia Lumia 830	kk-maksu	3	43,20	35,91	7,29		<div>Edit</div>	<div>Delete</div>
Viestintäpalvelut	Managed Mobile CORE per Device	käynnistysmaksu	15	0,00	23,10	-23,10	<div></div>	<div>Edit</div>	<div>Delete</div>
Viestintäpalvelut	MOTRAVELER Lotus Notes Traveler taskupostipalvelu	kk-maksu	4	9,76	3,96	5,80		<div>Edit</div>	<div>Delete</div>
Viestintäpalvelut	Managed Mobile CORE per Device	kk-maksu	15	0,00	23,10	-23,10		<div>Edit</div>	<div>Delete</div>

Picture 19 Improved “Edit invoice” dialog

Adding product to invoice is related to previous paragraph and was marked as a critical problem as well. When the user wants to add a product they have to fill all levels the product belongs to. The problem is that the user has to know each level by heart because with the customer logic, user fills the levels one after another and there is no possibility to start from any other level than first. To solve this problem the author used JQuery and its method “.change()”. When any of the levels or product field gets the value, the previous levels automatically fill into.

2 Add products

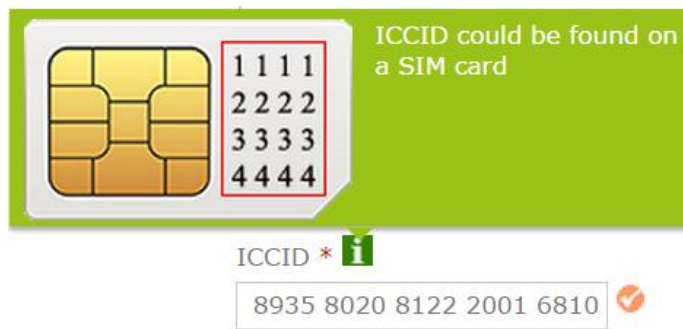
The screenshot shows a form titled '2 Add products'. It contains four rows of input fields. The first row, labeled 'Offering', has two adjacent text input boxes followed by a small downward-pointing arrow. The second row, labeled 'Service', has a single wide text input box followed by a downward arrow. The third row, labeled 'Module', also has a single wide text input box followed by a downward arrow. The fourth row, labeled 'Product description', has a single wide text input box followed by a downward arrow. All input boxes are currently empty.

Picture 20 User had to know each level by heart

Unsafe actions were the next major problem. The user could have eventually rollback or rerun the invoice without a possibility to restore the invoice or made changes. The author added a confirmation message to prevent user from eventual clicking.

Even though no one of the testers completed the task of finding invoice statistics the author was not allowed to place it under Report and Statistics module. The invoice statistics link is now under invoice management drop down menu.

One of the point to have random users were to understand if the terms used in the application are clear for people having no background in telecommunications. Based on the result some of the names were changed and for others the info tooltip was added. To create tooltips the author used Kendo UI. However, there could be a large number of tooltips even on one page and the author created several functions which create a needed toolbar. The first function creates toolbar with a picture from the left and text on the right side. Another is the text only. The JQuery function accepts the picture path, width, height, id of the element and the tooltip text. Finally, to call the function the user just needs to write one line and give parameters. To type 16-20 digits number easily the mask was applied for all ICCID textboxes.



Picture 21 Tooltips for business area specific words and mask for a long number

Another navigation problem happened with the Device page. Users needed to register a SIM card and had troubles finding the Device pages. After a discussion the decision to rename this page into SIM cards was made except for the one client who preferred to keep the old name. The icons for the pages are different as well: the device page has relative icons in page name and on the drop down menu.

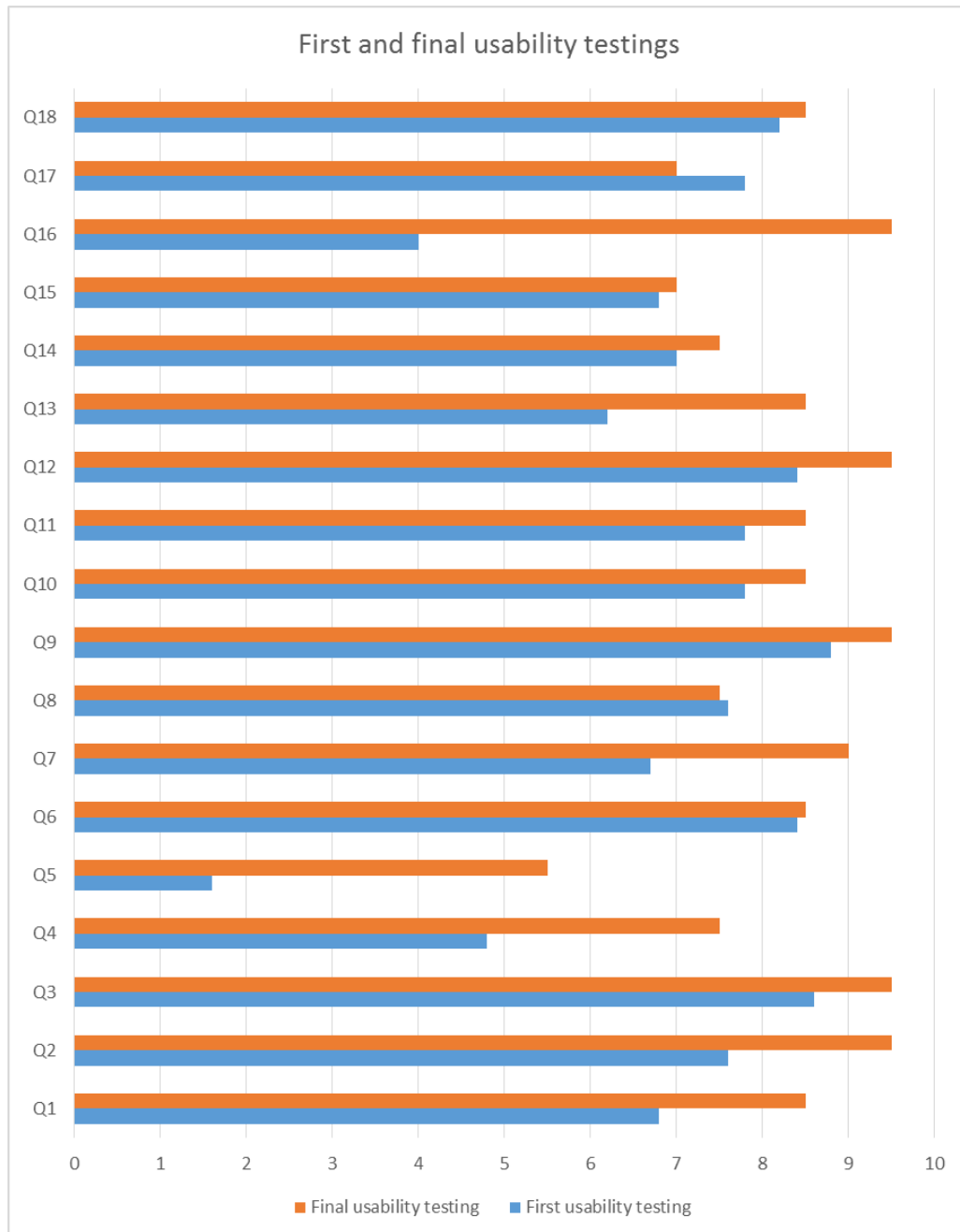
The problem of buttons on scrollable dialogs was fixed by another developer. He created footer for each dialog where the needed buttons are always visible.

The clickable elements with a cursor problem were fixed with a CSS class which assigns a property cursor: pointer. The author is not able to say if all of those cases were handled but it will be once any of the developers see it.

The data validation was not applied for all the fields. The critical validation was missing for date periods. The author used regular expressions to handle this problem. ICCID validation is done by clicking on an icon which sends the request to the database if user is able to use the typed ICCID.

7 Results and conclusion

To analyse the completed work the final usability testing was arranged. The purpose of the final testing is to clarify if the author was able to answer the research questions.



Picture 22 The Likert Scale result before and after changes applied

To evaluate the project the author will try to answer the usability testing research questions.

Is the product ready for release or is more work required?

The author thinks that the application is ready for the first release. The most critical usability issues were fixed or improved. The rest of them prevent the application to be released.

Is the current version of the product usable?

Even though some of the usability issues are not fixed it is ok to use application as it is. Users evaluated the application with total 84% of satisfaction. The lowest average point after changes were applied was 5.5 out of 10. Before the test the minimum was 1.6. Author believes that it is a satisfactory result to claim that the product is usable.

How easily do users understand toolbar buttons?

The toolbar buttons were replaced with drop down menu where user sees brief description of an action they can do. The users did not have any problems while using them and did not misuse any of them as it was before changes applied.

How easily do users understand the icons and symbols?

When toolbar buttons were replaced with drop down menu and the brief action description was written the icons became only a decorative part. The icons used in grids are recognizable to user and the user intuitively understands that they may click on them to get additional information or to download a report.

How helpful is feedback given by the system?

The user satisfaction of the feedback increased even though they noticed that the feedback format could be better in several places. All in all users are satisfied with the current version.

How easily users perform the common tasks?

After applying changes to the application the overall time on completing of the usability testing scenario decreased by 20 minutes on average. The critical usability issues which were improved but not fixed still take some time but twice or threefold less. The good point

is that all of the tasks were completed while before changes were applied several tasks were failed.

How understandable is the professional vocabulary used in the product?

Some of the telecommunication terminology cannot be changed to more understandable and the author decided to use tooltips with descriptions of the terms. Moreover, the web application uses string resources for localization. It is also possible to create the company's own language and create suitable for themselves names. This solution solves the problem of the modules and actions naming as well.

Is it easy to recognize clickable elements?

The usability testing showed that clickable elements are recognizable for user. The users did not have any problems with grid links and completed the related tasks successfully. The author applied style changes to show pointer on clickable elements.

User's satisfaction was increased from 68% to 84%. It can be noticed that the users rated the application as it is better than average even before application improvements. Even though the change by 16% can be seen as not significant, this increase does bring a value. The weakest elements were improved and during the final testing time for accomplishment of the hardest tasks was reduced by more than a half. Some of the found usability issues were re-thought completely and the expectations were met during the final usability test.

However, some of the improved functions still need work. It became easier to manage invoice's products but still users find this task not easy enough. The migration from toolbar buttons to drop down menus received positive feedback from the users. The main application menu modules are still changing and don't have a final structure. However, the next improvements session is out of the scope of this thesis.

In conclusion, the author evaluates her work as very well done. The author considers that she successfully achieved this thesis' objectives: usability of the application was improved which increased the customers' loyalty; the author got deeper knowledge about usability, usability testing and software development; the author applied theory learnt during her

studies in HAAGA-HELIA UAS and HES-SO UAS and got a real practical experience of the usability testing life cycle process. After getting this project done author feels the confidence in her ability to proceed during the whole process by herself. The project did not only helped her to learn new things but make networks with her company customers as well as to get experience in business communications.

References

- Boruff, B. & Schweickert, R. 1986. Short-term memory capacity: Magic number or magic spell? *Journal of Experimental Psychology*, 12, 3, pp. 419-425.
- Burns, A. & Burns R. (2008). *Basic Marketing Research*. 2nd ed. Pearson Education. New Jersey.
- Experian. 2013. New research: Half of consumers abandon online purchases during validation stage. URL:
<http://www.KeepItUsable.com/blog/?p=1234>. Accessed: 18 Sep 2014
- Flanagan, J. 1954. *Psychological Bulletin*. URL:
<http://www.apa.org/pubs/databases/psycinfo/cit-article.pdf>. Accessed: 16 October 2014.
- Franklin, C. & Campbell, R. "Usability Testing with Amber DeRosa and Alicia Hatter". The Internet Audio Talk Show for .NET Developers, 2014. URL:
<http://www.dotnetrocks.com/default.aspx?showNum=959>. Accessed: 18 September 2014.
- Gonzalez, S. 2014. The JQuery Foundation. URL: <http://jqueryui.com/>. Accessed: 21 October 2014.
- Hazem, K. 2007. Top 100 Web 2.0 Sites. URL:
<http://web2magazine.blogspot.fi/2007/01/thanks-for-web-2.html>. Accessed: 24 September 2014.
- Hwang, L. 2013. Usability cant save the world. URL:
<http://usability.com/2013/10/usability-cant-save-the-world/> Accessed: 24 Oct 2014
- Digital Communications Division 2014. Heuristic Evaluations and Expert Reviews. URL:
<http://www.usability.gov/how-to-and-tools/methods/heuristic-evaluation.html>. Accessed: 12 November 2014.
- Kaushik, A. 2006. Lab Usability Testing: What, Why, How Much. URL:
<http://www.kaushik.net/avinash/lab-usability-testing-what-why-how-much/>. Accessed: 4 October 2014.

Kimak, B. 2007. Top 10 web 2.0 usability design mistakes. URL: <http://www.umaitech.com/cms/?p=23>. Accessed: 14 November 2014.

Krug, S. 2005. Don't make me think: A Common Sense Approach to Web Usability. 2nd ed. New Riders.

Nielsen, J. 2012. A/B testing, usability engineering, radical innovation: why pays beset? URL: <http://www.nngroup.com/articles/ab-testing-usability-engineering/>. Accessed: 7 October 2014.

OpenHallway Blog 2009. URL: <http://blog.openhallway.com/?p=146>. Accessed: 9 October 2014.

Rosenfeld, N. B. 2010. Remote Research: Real Users, Real Time, Real Research. 1st ed. Media.

Rubin, J. & Chisnell, D. & Spool, J. 2008. Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. 2nd ed. Wiley Publishing, Inc.

Sauro, J. 2013. A history of Usability. URL: <http://uxmas.com/2013/history-of-usability>. Accessed: 17 September 2014.

Schade, A. 2013. Remote usability testing: moderated and unmoderated. URL: <http://www.nngroup.com/articles/remote-usability-tests/>. Accessed: 2 October 2014.

Spillers, F. 2007. Usability from WWII to the present- the historical origins of usability testing. URL: http://www.usabilitytestingcentral.com/2007/02/the_history_of_.html. Accessed: 14 November 2014.

Tingting Zhao 2013. Usability testing: how do we design effective tasks. URL: <http://design.canonical.com/2013/08/usability-testing-how-do-we-design-effective-tasks/>. Accessed: 19 December 2014.

Appendices

Appendix 1. Interview with usability engineer Sonia Kaukonen

1) Is the developing a test plan is just a bureaucracy which could be done at the end or it may really help to understand why and what will be done?

It depends on the project type: in current agile mode cooperation and handling small chunks of development can make it impossible to plan everything beforehand, there should be a rough vision though. It is helpful to base testing on known use cases, but these will usually evolve during the project, so high level planning is most helpful.

2) What is the best place to conduct the usability testing?

Natural settings are usually best. A lab environment remains a lab environment and may create a sterile “exam” atmosphere, but is acceptable for desktop or web applications. Especially regarding the use of mobile devices with web applications (e.g. impact of light conditions, disruptions, holding/handling the device) is good to perform in natural settings.

3) What is needed minimum as equipment for conducting the usability testing?

A functioning hard- and software, usually with an internet or other necessary connection, ideally recording device (screen action, voice, possibly facial expressions via video), note-taking material (preferably held by another person rather than the moderator him/herself).

4) Does the test hold in laboratory gives better results than office-room or remote testing?

It depends on the nature of the solution to test. It will probably eliminate disruptions, but may create, as mentioned, an exam feeling, exclude many natural environmental influences, which may be crucial to take into account while planning the user interface. Remote testing is limited when it comes to personal contact or body language of the tester.

5) Who is the best person to conduct the test? Should he/she be professional in this sphere?

Rather a usability/user experience person than a developer, who has a stronger relationship to the product features and may not be able to behave neutrally. Also a marketing person could have a different interest in influencing the testing person, e.g. for brand crea-

tion. A knowledge of specific interviewing techniques, neutrality and attention to certain behaviour is required and usually given by a UX specialist.

6) What is the minimum of tester should we have for usability testing to get valuable results?

This needs to be differentiated. The profile of a tester depends on the discovery needs. Should the person be familiar with the product/industry/typical processes and to which extend? How high should be the ICT literacy (usually normal use of a PC is required), does the person fit a “persona” type, for example a certain age/profession/etc.? As for the amount of testers, Nielsen has proven that 5 is enough, scientific research claims that more is required, reality limits the amount of testers/tests.

7) Is there maximum?

Usually along testing, similar, most crucial findings are confirmed several times by different testers so then we are close to the maximum. Not to forget the budget, resource and time restrictions in this case. Also in current agile settings, the reaction time is much shorter which makes full-blown testing sessions impossible, but works better when eliminating flaws on the spot in smaller entities.

8) If we conduct testing several times can we invite the same people for the same improved application?

In iterative development, it can be valuable when the same testers review the progress in repeating tests. This should not be seen as separate tests, but as a sequence.

9) Talking in enterprise applications usability testing scopes, how valuable would be random testers?

If a specialist software is meant, a potential users of different level of knowledge would be more beneficial than someone who is not familiar with the topic at hand.

10) Will testing have any value if the target group wasn't chosen right?

I assume that e.g. users with lacking basic ICT literacy cannot test advanced specialist or enterprise software, because tasks and goals won't be identical (or they won't be able to even figure them out). It is probably laborious to get to the issue at hand then.

11) How much information user should receive before starting the test?

Clear guidance regarding the task and goal, practical information, way of speaking out loud, and briefing about next steps are useful for orientation.

12) In enterprise application scope should user have some pre-test instructions how application should be used?

This may be case specific and perhaps too complex to cover by a pre-test instruction. Rather different competence level users from beginner to advanced with suitable type of use cases to walk through by doing.

13) Should the test be conducted at the same scope of time (e.g. from 10 to 11)?

Regarding the duration of tests, it would be good to run an internal pilot with a co-worker, yet not necessary familiar with the feature to get some realistic estimate how much time to reserve for the test.

14) Should all the testers test the same version of the application or the changes applied after every testing are possible?

It would be good to differentiate, which level of implementation was the basis for the test, also in order to track the implemented changes and corrections and their success or failure. Iterativity should enable that testing is more or less continuous.

15) What is the best period of time when testing should be repeated?

Constantly, from early prototypes along the implementation and before the release, rather than to wait for next larger version, because adjustments will be more difficult to implement.

16) If tester doesn't think loud as he/she was asked, should it be remained to him/her?

Open ended questions about perceptions and way of working can be helpful. Certain tester type may have problems with stating loud what they do and how they feel during performing the task. If so, running a retrospective (watching a video record with the tester and inquiring afterwards) may be an alternative.

17) What shouldn't be said to tester and what could be?

Avoiding leading yes-no questions, avoiding comments proving that the tester is "wrong" (developers may feel like defending their work if present at tests), not giving hints (unless the situation is really stuck), not blaming the tester for doing poorly, not letting the user to think for a while when confronted with a tricky situation, but interrupting his/her thoughts may be contra-productive.

It is good to give affirmative feedback along the process, checking if things said were understood properly, other open questions, also with regard to feelings and perceptions can give good insight.

18) After the testing is done, should it be reviewed with tester or after-test questionnaire is enough?

If the tester was outspoken, a detailed walkthrough may not be necessary anymore, but a summary and wrap up inquiry is usually better than a form.

19) What is the best method to analyse the data if we have notes and video from the tests?

Transcript is often too time-consuming and often lacking added value, at least in industry settings. It is good to edit the highlights of a video and add notes/markings respectively, especially when discussing it with other stakeholders who won't have time and understanding to watch the whole video. For the UX team, a more extensive material can be kept.

20) Should it be done by one person or it can be done in a team?

In general, it is always best to discuss in team to get different background information or find new perspectives. Preparations can be made by a single specialist. For that however, a preliminary summary of the video material is needed (see above).

21) If the testing scope of time is quite short which stages of usability testing could be left?

In new agile approach, I would rather see short, ad-hoc tests than a large planning and testing phase which takes place when things usually cannot be corrected anymore (without substantial efforts/costs).

22) Does every usability test give results?

Usually, there is always some food for thought in the real use, in testing and also after launch, which can bring yet other unpredicted issues. The main problem is if usability test findings can be implemented.

***Good Sign for Virtual Operators
Usability Testing Questionnaires***

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Pre-test questionnaire

The age group

- a) under 18 b) 19-29 c) 30-45 d) 46 and above

Occupation

- a) student b) employee c) other _____

Computer used per day (weekdays)

- a) < 3 h b) 3 – 8 h c) 8 – 12 h d) > 12 h

Computer used per day (weekend)

- a) <3 h b) 3 – 8 h c) 8 – 12 h d) > 12 h

Likert scale

Likert scale

Before you start the questionnaire, please remember that it is about the product, not about your user skills. This questionnaire will help us to improve the product and not evaluate your skills.

Please, circle the number that represents how you feel:

Invoice page

1. It was easy to navigate to the invoice search window

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

2. It was easy to understand how to fill the invoice search form

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

3. It was easy to find out how to download the needed invoice

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

4. It was easy to add products to the needed invoice

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

5. It was easy to edit the needed product

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

6. It was easy to understand how to fill the add new invoice form

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

Organization management

7. It was easy to add an organization with given criteria

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

8. It was easy to find the created organization

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

9. It was easy to edit the organization

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

SIM card management

10. It was easy to understand where to search for the ICCID

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

11. It was easy to register a SIM card following the instruction

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

12. It was easy to activate a SIM card following the instruction

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

Basics

13. It was easy to navigate through the portal

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

14. The feedback given by the website was easy to understand and helpful

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

15. I can say that it was easy to me to act during the whole process

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

16. It was easy to understand which button I need to click to do what is needed

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

17. Colors of the portal are pleasant to my eyes

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

18. The font used on the website is easy to read

Strongly disagree 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 Strongly agree

***Good Sign for Virtual Operators
Usability Testing Plan***

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Usability testing plan

Objectives:

The aim of this usability testing is to rate the level to which Good Sign Customer Portal meets specific usability criteria in order to improve the product performance, productivity and end-user satisfaction.

Research questions:

- Is the product ready for release or is it required more work?
- Is the current version of the product usable?
- How easily do users understand toolbar buttons?
- How easily do users understand the icons and symbols?
- How helpful is feedback given by the product?
- How easily users perform the common tasks?
- How understandable the professional vocabulary used in the product?
- Is it easy to recognize clickable elements?

Time:

01.05.2014 – 31.07.2014

Assigned to:

Alena Gurshchenkova

Methodology:

Testers: 6 people with different education, gender, age and experience. 3 users represent a target group of the product.

Equipment: 1) computer 2) web-camera 3) screen recorder program 4) timer

Place: "Monaco" office room.

Tools: The user is able to choose a browser to work with: Opera, IE 10, Google Chrome and Firefox.

Participants:

The number of expected testers is six. Three testers will represent a target group and will be recruited from the company's customers. These participants have experience of using the system with an old interface as well as general experience of business application management. Other users will be random users. Random users are needed to identify if the application meets the basic usability criteria. Random testers may have limited experience in enterprise application usage as well as may be without any experience.

The testers will be offered to complete a set of task scenarios delivered to them and give feedback concerning the usability and acceptability of the product user interface.

Training:

The testers will receive the basic overview of a product, explanation about usability testing and the set of tasks.

Procedure:

The participants will be involved into the usability testing holding in Good Sign office at Munkkiniemen Puistotie 25, Helsinki. The usability testing will be held in the office room "Monaco" which has the described above equipment with Good Sign Customer Portal web application and supported software. The testing will be recorded by a web-camera focused on user face and a screen recorder program. The notes will be taken by the person in charge.

The person in charge will briefly describe the concept of usability testing and the tested product. The participant will sign the agreement with testing details. The participant will ask questions if needed. The testers will fill a pretest form with basic background and demographic questions.

While testers are taking the usability testing they use a “think loud” method. When starting a new task the participants should read the description aloud. The person in charge will note user behavior and reactions as well as the systems feedback.

Roles:

A person in charge

- Provides a product overview
- Describes the concept of usability testing
- Records testers interaction with the product and its feedback
- Conducts the usability testing session

Tester

- Takes part in the usability testing session
- Fill a pretest and after test questionnaires

Output:

- Findings and recommendations report
- User answers statistics

Tasks:

Find invoice/invoices by given criteria, download them

Add a product to an existing invoice

Edit/delete a product from an existing invoice

Add new invoice

Add/edit/delete organization

Register and activate a SIM card

Find information about a SIM card

***Good Sign for Virtual Operators
Usability Testing Scenario***

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Login information

User name: Test_user

Password: Pr1v3t1t1sm3!

Task list

#1: Add an organization with name Good Sign Test Oy. Parent Organization is Appetit; the address is Munkkiniemen puistotie 25, Helsinki, 03300, Finland.

#2: Edit Good Sign Test Oy, set:

Business id: 345612-2

ZIP code: 022000

#3: Find an invoice for Good Sign Oy made between 01.03.2014 and 31.03.2014. Download it.

#4: Add a new invoice for the company Good Sign Test Oy for period between 01.06.2014 and 15.06.2014. Add a product:

Offering: Tuotepalvelut

Service: B_0077

Module: C_0186

Product description: Vuokraohjelmisto Avausmaksu

Amount: 12

Price: 120.56

#4.1 Try to add a product with the name "Exchange 2010 Service - 4000, normal".
(Optional)

When added, close the dialog.

#5: Find the created invoice. Add a product to the invoice:

Offering: Patja+KHP

Service: Päätelaitteiden hallinta

Module: Päätelaitteen tietoturva

Product description: F-Secure Anti-Virus Client Security, 250-499 users Avausmaksu

Amount: 1

Price: 45.60

Check if the product was added.

#6: Edit the added product. Set the price 135 and amount 5. If everything fine, delete the product.

#7: Back to the invoice page. Reload it. Choose an invoice and change its status to "Approved".

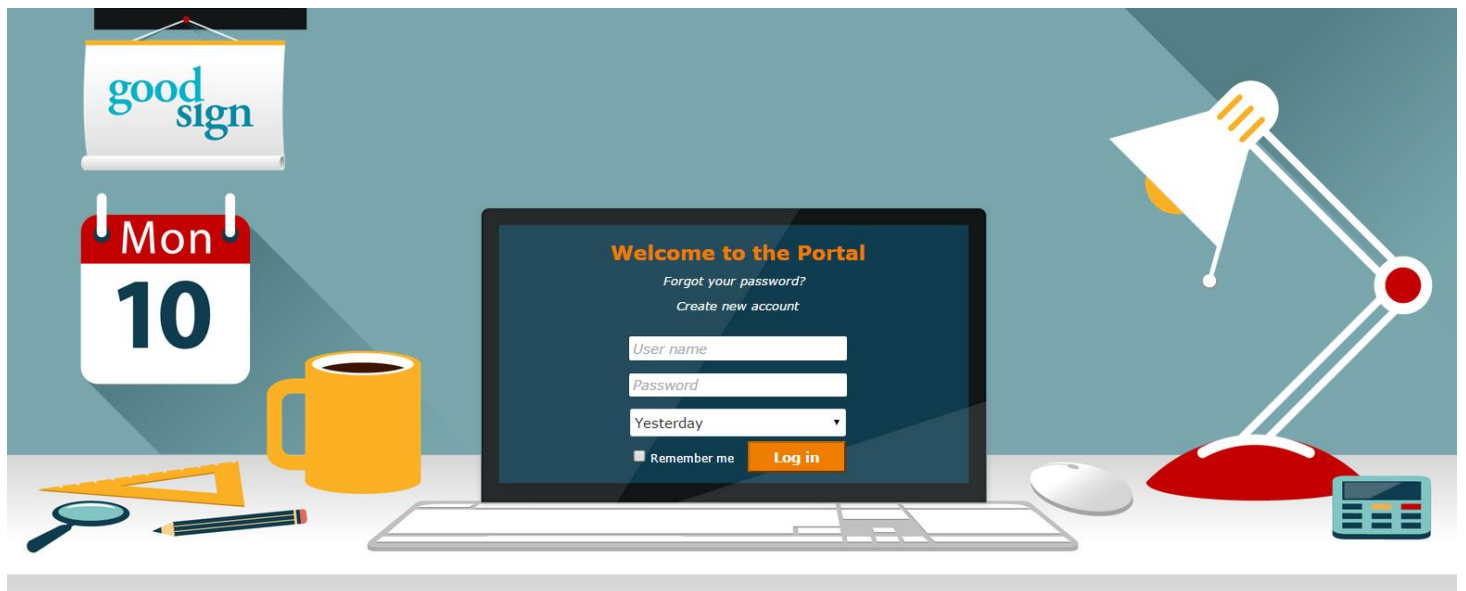
#8: Delete Good Sign Test Oy organization

#9: View invoice statistics for all organizations.

#10: Take one SIM card and register it for Fujitsu Finland Oy. Activate it.

#11: Take 3 other SIM cards and register them using multiple SIM registration

***Good Sign for Virtual Operators
Usability Testing Report***



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Summary

Aim:

The aim of this usability testing is to rate the level to which Good Sign Customer Portal meets specific usability criteria in order to improve the product performance, productivity and end-user satisfaction.

Number of participants:

Five testers. Three of them represent the target group and other are randomly chosen testers.

Testing sessions:

The duration of the session is 40 to 60 minutes. They were arranged between 7th of July and 2nd of August.

Method:






Testers: 6 people with different education, gender, age and experience. 3 users represent a target group of the product.

Equipment: 1) computer 2) web-camera 3) screen recorder program 4) timer

Place: "Monaco" office room.

Tools: The user is able to choose a browser to work with: Opera, IE 10, Google Chrome and Firefox.

Severity levels and results:

Icon	Description	Found
	Good practice. The idea of implementation works fine should be reused in similar cases.	2
	Info. Might be re-thought and fixed if there is time available.	5
	Warning. The problem is not critical but is recommended to fix.	9
	Major problem. The problem is important to be fixed. High priority.	7
	Critical problem. The highest priority should be fixed before the release.	3

Users' information and evaluation

User #1 – target group user

The age group: 30-45

Occupation: employee

Computer is used per day (weekdays): 3 – 8 h

Computer is used per day (weekend): <3 h

Test questions	user #1
It was easy to navigate to the invoice search window	9
It was easy to understand how to fill the invoice search form	8
It was easy to find out how to download the needed invoice	9
It was easy to add products to the needed invoice	4
It was easy to edit the needed product	1
It was easy to understand how to fill the add new invoice form	9
It was easy to add an organization with given criteria	9
It was easy to find the created organization	7
It was easy to edit the organization	9
It was easy to understand where to search for the ICCID	10
It was easy to register a SIM card following the instruction	8
It was easy to activate a SIM card following the instruction	8
It was easy to navigate through the portal	6
The feedback given by the website was easy to understand and helpful	7
I can say that it was easy to me to act during the whole process	7
It was easy to understand which button I need to click to do what is needed	3
Colors of the portal are pleasant to my eyes	7
The font used on the website is easy to read	7

User #2 – target group user

The age group: 30-45

Occupation: employee

Computer is used per day (weekdays): 8 – 12 h

Computer is used per day (weekend): 3 – 8 h

Test questions	user#2
It was easy to navigate to the invoice search window	7
It was easy to understand how to fill the invoice search form	8
It was easy to find out how to download the needed invoice	10
It was easy to add products to the needed invoice	5
It was easy to edit the needed product	1
It was easy to understand how to fill the add new invoice form	9
It was easy to add an organization with given criteria	6
It was easy to find the created organization	8
It was easy to edit the organization	9
It was easy to understand where to search for the ICCID	10
It was easy to register a SIM card following the instruction	8
It was easy to activate a SIM card following the instruction	8
It was easy to navigate through the portal	4
The feedback given by the website was easy to understand and helpful	7
I can say that it was easy to me to act during the whole process	6
It was easy to understand which button I need to click to do what is needed	4
Colors of the portal are pleasant to my eyes	8
The font used on the website is easy to read	8

User #3 – target group user

The age group: 30-45

Occupation: employee

Computer is used per day (weekdays): 3 – 8 h

Computer is used per day (weekend): 3 – 8 h

Test questions	user#3
It was easy to navigate to the invoice search window	7
It was easy to understand how to fill the invoice search form	7
It was easy to find out how to download the needed invoice	8
It was easy to add products to the needed invoice	4
It was easy to edit the needed product	2
It was easy to understand how to fill the add new invoice form	9
It was easy to add an organization with given criteria	7
It was easy to find the created organization	7
It was easy to edit the organization	9
It was easy to understand where to search for the ICCID	10
It was easy to register a SIM card following the instruction	7
It was easy to activate a SIM card following the instruction	8
It was easy to navigate through the portal	6
The feedback given by the website was easy to understand and helpful	6
I can say that it was easy to me to act during the whole process	8
It was easy to understand which button I need to click to do what is needed	4
Colors of the portal are pleasant to my eyes	7
The font used on the website is easy to read	9

User #4

The age group: 19-29

Occupation: student

Computer is used per day (weekdays): 8 – 12 h

Computer is used per day (weekend): 3 – 8 h

Test questions	user #4
It was easy to navigate to the invoice search window	5
It was easy to understand how to fill the invoice search form	8
It was easy to find out how to download the needed invoice	9
It was easy to add products to the needed invoice	6
It was easy to edit the needed product	1
It was easy to understand how to fill the add new invoice form	7
It was easy to add an organization with given criteria	5
It was easy to find the created organization	9
It was easy to edit the organization	8
It was easy to understand where to search for the ICCID	5
It was easy to register a SIM card following the instruction	9
It was easy to activate a SIM card following the instruction	9
It was easy to navigate through the portal	8
The feedback given by the website was easy to understand and helpful	7
I can say that it was easy to me to act during the whole process	7
It was easy to understand which button I need to click to do what is needed	5
Colors of the portal are pleasant to my eyes	8
The font used on the website is easy to read	9

User #5

The age group: 19-29

Occupation: student and employee





Computer is used per day (weekdays): 8 – 12 h

Computer is used per day (weekend): 8 – 12 h

Test questions	user#5
It was easy to navigate to the invoice search window	6
It was easy to understand how to fill the invoice search form	7
It was easy to find out how to download the needed invoice	7
It was easy to add products to the needed invoice	5
It was easy to edit the needed product	3
It was easy to understand how to fill the add new invoice form	8
It was easy to add an organization with given criteria	6
It was easy to find the created organization	7
It was easy to edit the organization	9
It was easy to understand where to search for the ICCID	4
It was easy to register a SIM card following the instruction	7
It was easy to activate a SIM card following the instruction	9
It was easy to navigate through the portal	7
The feedback given by the website was easy to understand and helpful	8
I can say that it was easy to me to act during the whole process	6
It was easy to understand which button I need to click to do what is needed	4
Colors of the portal are pleasant to my eyes	9
The font used on the website is easy to read	8

Findings and recommendations

Basic usability issues

Problem	Problem description	Severity	Recommendations
Navigation	SIM card management: all users tried other pages before going to the devices page.		Change the name of the page from Devices to SIM cards.
Buttons	Everyone had to read a title of a button before clicking it. The problem is critical when using application on a tablet.		Give a brief action descriptions for buttons. 
Loading time	It takes about 20 seconds to load a Device page. The reason is that it loads thousands of rows at once.		Row set should be minimized, procedure optimization might be applied if possible.

Invoice management

FUJITSU

Services

Invoices

Reports

Statistics

Devices

Log out

Add

Edit

Delete

Update

View

Find

Edit

Add

Status

Search

Organizations

Previ...

OrganizationDescrip...

Customer...

Status

Service manager

SAP order

Invoice d...

Period - s...

Period - e...

Invoice ...

Customer ref.

Header text

PDF

Ubi Est

Approved

2014-06-...

2014-06-...

234,45

PDF

Bonomet

201134

2014-06-...

2014-06-...

688,81

201134

Sopemus (2011-11-30)

PDF

Nebula Oy

201801

2014-06-...

2014-06-...

2.202,84

Ubi Stronging

PDF

NordCom Oy

201110

6324229

2014-07...

2014-06-...

2014-06-...

4.778,18

Sopemus (2011-11-30)

Sopemus (2011-11-30)

PDF

Stockmann-konserni

201109

Timo Kulkkanen

2014-04-...

2014-06-...

720,04

Sopemus (2011-11-30)

PDF

Global VoiceLink Oy

201109

6324218

2014-07...

2014-06-...

2014-06-...

5.673,91

Sopemus (2011-11-30)

PDF

Publi

201136

6324214

2014-06...

2014-05-...

2014-06-...

1.291,83

Leikki Milla

Publi, Milla, Kulkkanen te

PDF

Publi

201136

6324215

2014-06...

2014-05-...

2014-06-...

1.593,07

Leikki Milla

Publi, Milla, Kulkkanen te

PDF

OM - Kulkkanen

201136

6324216

2014-06...

2014-06-...

2014-06-...

110,38

PDF

Valtuutettu Kulkkanen

201136

6324217

2014-06...

2014-06-...

2014-06-...

2.266,44

PDF

OM - Kulkkanen

201136

6324218

2014-06...

2014-06-...

2014-06-...

82,26

PDF

UO, VU - Kulkkanen

201136

6324219

2014-06...

2014-06-...

2014-06-...

188,91

PDF

UO, VU - Kulkkanen

201136

6324220

2014-06...

2014-06-...

2014-06-...

39,67

7

8

9

10

...

>

>>

1 - 25 of 5000 items

Organizations

Previ...

OrganizationDescrip...

Customer...

Status

Service manager

SAP order

Invoice d...

Period - s...

Period - e...

Invoice ...

Customer ref.

Header text

PDF

Ubi Est

Approved

2014-06-...

2014-06-...

234,45

PDF

Bonomet

201134

2014-06-...

2014-06-...

688,81

201134

Sopemus (2011-11-30)

PDF

Nebula Oy

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2014-06-...

2014-06-...

2.202,84

Ubi Stronging

PDF

NordCom Oy

201110

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2014-07...

2014-06-...

2014-06-...

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Sopemus (2011-11-30)

Sopemus (2011-11-30)

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Timo Kulkkanen

2014-04-...

2014-06-...

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Sopemus (2011-11-30)

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Global VoiceLink Oy

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2014-07...

2014-06-...

2014-06-...

5.673,91

Sopemus (2011-11-30)

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Publi

201136

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2014-06...

2014-05-...

2014-06-...

1.291,83

Leikki Milla

Publi, Milla, Kulkkanen te

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Publi

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2014-06...

2014-05-...

2014-06-...

1.593,07

Leikki Milla

Publi, Milla, Kulkkanen te

PDF

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2014-06...

2014-06-...

2014-06-...

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PDF

Valtuutettu Kulkkanen

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2014-06-...

2014-06-...

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PDF

OM - Kulkkanen

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6324218

2014-06...

2014-06-...

2014-06-...

82,26

PDF

UO, VU - Kulkkanen

201136

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2014-06...

2014-06-...

2014-06-...

188,91

PDF

UO, VU - Kulkkanen

201136

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39,67

7

8

9






10

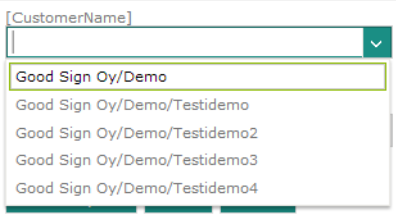
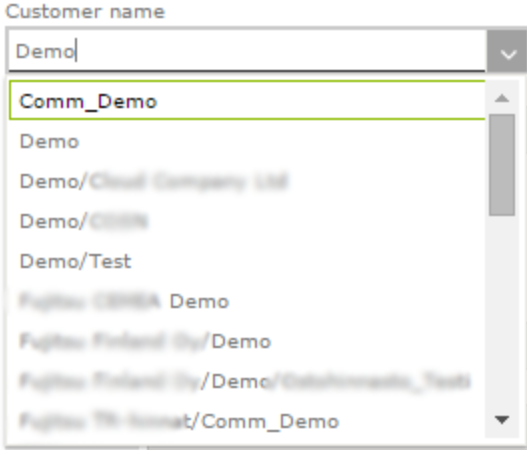



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1 - 25 of 5000 items

Problem	Problem description	Severity	Recommendation
Search for invoice	<p>The testers had three criteria to search for invoice.</p> <p>Despite of this fact, half of testers used a search box which allows to search by only one criteria.</p> <p>When rows were filtered (by organization) they started scrolling trying to find the needed one.</p> <p>After a hint to use another way of search they used a search window. Other testers used only invoice search window and didn't use search box or tried to use it for other purposes (tried to find organization with invoice search).</p>		
Datepicker	<p>There is no specified format for date and no date validation. One of users didn't know how to use datepicker and typed the date.</p> <p>Start date <input type="text" value=""/></p>		<p>Add validation messages. The desired date format could be specified if needed.</p> <p>Start date <input type="text" value="2014-04-30"/> </p> <p>End date <input type="text" value="fdf"/> </p> <p>The date format is invalid. Please use yyyy-mm-dd</p>
Combobox	While searching for organization the needed company was Good Sign Test Oy. It was needed to		Allow "contains" type of search.

	<p>type “Apetit/Good Sign Test Oy” as there was no results for Good Sign Test Oy. The problem is getting worse when the organization has more than one hierarchical parent</p> 		
Find created invoice	As users had experience with the search window all of them used it to search for invoice.		High learnability level.
Edit invoice window	While “add product to invoice” task all of users went to “Add invoice” window. Half of users closed the window, however others added new invoice and product right there.		
Edit the product	To edit the price and amount the user has to expand 3 grids in a row and choose the product on a 4 th row. As every row is editable, every time when		Could be added a button “Edit” on each row to escape misunderstanding.

user chose “edit” they got a form with different parameters, but not with needed ones.

Product selection form showing nested categories:

- Description
 - Viestintäpalvelut-Tele Services
 - Description
 - Yhdistetty viestintä
 - Description
 - Taskuposti
 - Product group | Product
 - Viestintäpalvelut | MOMDMZP Fujitsu Managed Mobil
 - Viestintäpalvelut | MOMDMZP Fujitsu Managed Mobil
 - Viestintäpalvelut | MOACTIVE ActiveSync taskuposti

Cost price total	Profit	Note	
3,93	-3,93		Edit
5,40	-5,40		Edit
2,61	-2,61		Edit




Delete the product

After user learnt how to edit the product, the deleting process is ok. However, the problem would be the same as with edit if the first task was “delete the product”.











The delete button could be added on each row, where deleting is possible.

Cost price total	Profit	Note	
3,93	-3,93		Delete
5,40	-5,40		Delete
2,61	-2,61		Delete

Add a product	<p>To add a product to the invoice it is needed to know all levels before the actual product. The task “add product” was failed by every tester.</p> <p>2 Add products</p> <p>Offering <input type="text"/> <input type="text"/> ▼</p> <p>Service <input type="text"/> <input type="text"/> ▼</p> <p>Module <input type="text"/> <input type="text"/> ▼</p> <p>Product description <input type="text"/> ▼</p>		<p>Should be possible to start with any level: the highest should be filled automatically.</p>
Rollback and re-run invoice	<p>When clicking re-run or rollback invoice the system doesn't ask for conformation. Rollback button will delete the invoice with made changes. During the test one of the user clicked “roolback” button when tried to edit the product.</p>		<p>Add confirmation with a short explanation what these buttons do. Renaming of the button “rollback” to “delete invoice” would be self-explanatory.</p>
Invoice statistics	<p>The task “find invoice statistics for all organizations” was failed by all users.</p>		<p>Move Invoice Statistics into Report Module.</p>


Organization management

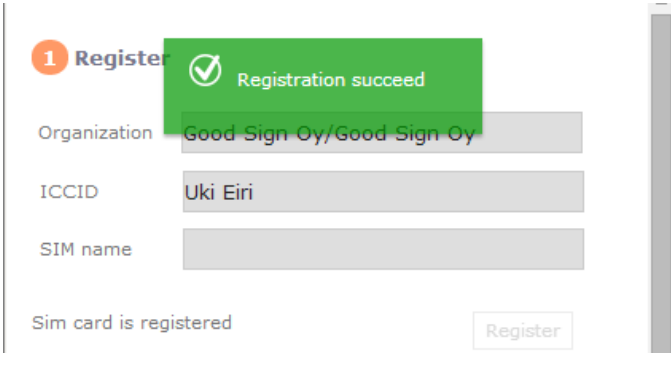




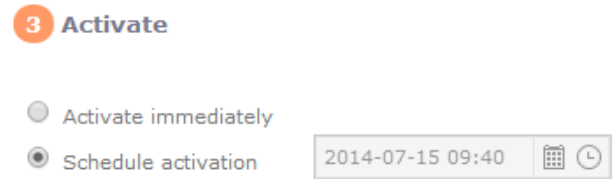

Problem	Problem description	Severity	Recommendation
Navigation	<p>The navigation process to add a new organization from the Invoices page was difficult in the half of cases. The possible reason is that the page has two “add” buttons with different icons. During 2 sessions users clicked “add invoice” and tried to fill it. One of the users navigated to “Services” page to complete the task while user can manage organization from any page.</p> 		<p>Toolbar should be obvious and have a word “organization” in it.</p> <p>The possible solution:</p>  <p>Or could be implemented as a drop down menu to save a place.</p>
Combobox	<p>The combobox “Parent organization” has a default value (the home organization of a user or chosen organization from organization</p>		

	tree). Testers who represented a target group did the task well meanwhile random users failed to use combobox without a hint.		
Observe the organization	Most of the users needed a hint about expanding the organization tree. Another half couldn't find it because the page reloading was needed.		Make first organization expanded by the default. The organization tree search would be a good additional option.
Edit organization	Half of users tried to edit organization choosing it from the grid and not from a tree.		
Delete organization	Half of users tried to delete organization from the edit window. However all of the users completed the task without problems.		
Scrolling	It takes some time to user to understand that to save organization it is needed to scroll the window.		Save and Close button should be always visible on the page button.

			<div><div>Add Organization</div><div><div>Basic information</div><div>Billing information</div><div>Login information</div></div><div><div>Select organizational type</div><div><div>Company Name *</div><div>Parent Organization</div><div>Business ID</div><div>Customer invoice reference</div><div>Street address</div><div>Post box</div><div></div></div></div><div><div>Save</div><div>Close</div></div></div>
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SIM management

Problem	Problem description	Severity	Recommendation
Navigation	<p>There are 3 buttons which have the same text on them:</p> <div><div>Add🏠Edit🏠Delete🏠Update📦</div><div>Edit📦Update📦Add📦</div></div>		<p>The buttons could be grouped by category:</p> <div>🏠 Organization: Add Edit Delete</div>
ICCID input	<p>It is hard to type the ICCID (16 digits) and check if there were mistakes.</p> <div>ICCID <input type="text"/></div>		<p>Devide input into several parts:</p> <div>ICCID <input type="text"/><input type="text"/><input type="text"/><input type="text"/></div>
ICCID finding	<p>If user doesn't know what is ICCID it is not easy to understand where to search it.</p>		<div><div><div>ICCID ⓘ</div><div><input type="text"/><input type="text"/><input type="text"/><input type="text"/></div></div><div></div><div>Add a tooltip</div></div>

ICCID validation	<p>No feedback for invalid ICCID.</p> 		<p>Give the right feedback.</p>
Clickable	<p>The cursor doesn't give an idea that this link is clickable.</p> 		
Schedule activation	<p>The schedule activation textbox is disabled even when radio button checked.</p> 		<p>The bug should be fixed. As an addition when user click on a datepicker the "schedule activation" radio button could be checked automatically.</p>
Open dialog by clicking on ICCID			<p>Good solution. All users completed the task for 1-2 clicks.</p>

on the grid

The screenshot shows a 'SIM card' dialog box with the following fields:

ICCID	89358020712030015996
IMSI	XXXXXXXXXXXX
PIN1	XXXXXXXXXXXX
PIN2	XXXXXXXXXXXX
PUK1	XXXXXXXXXXXX
PUK2	XXXXXXXXXXXX
Status	reserved
Time Stamp	23.11.2013 9:15:59

In the background, a table lists SIM cards with columns for ICCID, IMSI, PIN1, PIN2, PUK1, PUK2, Status, and Time Stamp. A mouse cursor is pointing at the '89358020712030015996' entry in the ICCID column.



Radio buttons de-
pendency

The screenshot shows a form with two radio buttons:

- ☒ Activate/update immediately
- ☐ Schedule activation/update

Below the radio buttons is a date and time picker showing '2014-08-05 08:30'. A calendar is open, showing the month of August 2014. The date '5' is highlighted, and a tooltip shows 'Wednesday, August 6, 2014'. The date '6' is also highlighted in the calendar grid.



Make "Schedule activation/update" chosen when user selected the date.

Appendix 6. Final usability testing: User information and evaluation

User #6 – target group user

The age group: 30-45

Occupation: employee

Computer is used per day (weekdays): 8 – 12 h

Computer is used per day (weekend): <3 h

Test questions	user #6
It was easy to navigate to the invoice search window	9
It was easy to understand how to fill the invoice search form	9
It was easy to find out how to download the needed invoice	10
It was easy to add products to the needed invoice	7
It was easy to edit the needed product	5
It was easy to understand how to fill the add new invoice form	8
It was easy to add an organization with given criteria	9
It was easy to find the created organization	8
It was easy to edit the organization	9
It was easy to understand where to search for the ICCID	9
It was easy to register a SIM card following the instruction	8
It was easy to activate a SIM card following the instruction	9
It was easy to navigate through the portal	8
The feedback given by the website was easy to understand and helpful	8
I can say that it was easy to me to act during the whole process	7
It was easy to understand which button I need to click to do what is needed	9
Colors of the portal are pleasant to my eyes	6
The font used on the website is easy to read	9

User #7

The age group: 19-29

Occupation: employee

Computer is used per day (weekdays): > 12 h

Computer is used per day (weekend): 8 – 12 h

Test questions	user #7
It was easy to navigate to the invoice search window	8
It was easy to understand how to fill the invoice search form	10
It was easy to find out how to download the needed invoice	9
It was easy to add products to the needed invoice	8
It was easy to edit the needed product	6
It was easy to understand how to fill the add new invoice form	9
It was easy to add an organization with given criteria	9
It was easy to find the created organization	7
It was easy to edit the organization	10
It was easy to understand where to search for the ICCID	8
It was easy to register a SIM card following the instruction	9
It was easy to activate a SIM card following the instruction	10
It was easy to navigate through the portal	9
The feedback given by the website was easy to understand and helpful	7
I can say that it was easy to me to act during the whole process	7
It was easy to understand which button I need to click to do what is needed	10
Colors of the portal are pleasant to my eyes	8
The font used on the website is easy to read	8