Antti Paananen

In-House Software Development Process:
A User-Centered Approach

Master's Thesis

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Abbreviations

CI	Contextual Inquiry
CW	Cognitive Walkthrough
ERP	Enterprise Resource Planning
HCI	Human-computer interaction
ISI	Interaction Sequence Illustration
IT	Information technology
SUS	System Usability Scale
UI	User interface
UX	User experience

Contents

Chapter 1

Introduction

This chapter describes the background and reasoning for the thesis as well as the focus and the limitations of the study. This section also presents the research problems and the overall structure of this thesis.

1.1   Motivation and aim of the thesis

In the 1980s, when the usage of personal computers (PCs) became more common, software design practices were still falsely assuming that the users were knowledgeable and competent in computer science. As an outcome, a significant part of the users were practically incapable of using operating systems and applications. During these times, the concepts of Human Computer Interaction (HCI) and usability became important. Since then, the design process of interactive software for common people has emphasized usability. This process is called human-centered design. [7]

The term Enterprise Resource Planning (ERP) was invented in the early 1990s.[11] The purpose of the ERP software is to offer techniques and concepts for integrated and thorough management of business, as well as making it more efficient. The usage of ERP software has increased globally and nowadays even service organizations have invested a lot of resources in ERP implementation.[12, 5]

Despite the importance of the efficiency aspect, the usability of ERP systems is not a widely researched subject area. However, weaknesses in usability may lead into low productivity and make it harder for users to achieve their goals.[17]

The aim of this thesis is to examine how the usability of a service-oriented ERP system can be enhanced by integrating usability inquiries, inspections and measures into the software development process.

This study examines a customer service related business process employed in the subscriber company, (described in more detail in section 1.2) and evaluates the state of its usability by using a variety of applicable methods:

- Contextual Inquiry to define the business process.

- Cognitive Walkthrough for usability inspection.

- Interaction Sequence Illustration (ISI) to measure the amount of interaction steps and to understand them.

- System Usability Scale (SUS) to give a global view of subjective assessments of usability.

- Remote usability evaluation (by using log data) to evaluate usability in distributed locations.

The measurements are focused on time, error rate and user satisfaction.

According to the ISO standard of human-centered design for interactive systems [8], many benefits can be gained by using human-centered methods as a part of software development process. The productivity of an individual user can be increased together with the operational efficiency of an organization. Usable and useful systems also reduce training and help-desk costs, as well as stress and discomfort because they are easily understood by users. In other words, human-centered design improves the UX (User experience).

The benefit of human-centered design (for software development process) is the increased total life cycle of a product and the likelihood of the project succeeding on time and within the budget. The human-centered approach also decreases the risk of software being rejected by the users, or failing to meet the requirements. [8]

1.2 Background and research questions

The subscriber of this thesis is a middle-sized company which is offering information services globally and practicing in-house software development. Because of the fast pace of growth, the company is willing to reform their current ERP system as well as the whole software development process. This thesis aims to join usability perspective into this process and give answers to the following research questions.

- ***How usability methods can help to identify critical disparities in the usage of a system?***

  Understanding the differences in the system usage between individuals can help to understand and deploy best practices throughout the organization and therefore improve efficiency.

- ***How is the use efficiency affected by the usability measurements?***

  It is important to find the most effective and usable user interface solutions and thus decrease the average time spent on tasks. Local differences can be tracked with remote usability measurements.

- ***What usability methods can be practically joined with the software development process of an ERP system?***

  Finding practical and efficient usability methods to be joined with the software development process can improve the quality of the end product.

1.3 Scope and structure of the thesis

This thesis covers a research study about the usability of a process, executed in the ERP system, and employed by the customer service department of the subscriber company. This process is related to a process of creating a new customer to the system, and specifically filling in the contact information. In general, the research study aims to join usability to in-house software development process. This thesis doesn't cover any other approaches to the development process. The literature research consists of a few usability methods and though the target of the research is ERP software, literature about them are not covered in the thesis. The results of the research may not be suitable for every organization.

The first actual chapter of the thesis is about the usability methods. Every usability method used in the research is discussed carefully. The second chapter introduces the process experiment. It covers the experiment steps and the implementation details. The third chapter analyzes the data acquired from the process and the implementation as such. The Last chapter summarizes and concludes the research study.

Chapter 2

Applied methods and measurements

In order to be able to discover reliable research data, the research methods must be understood thoroughly. This research study gathers data with a few types of usability methods and they are selected according to their practicality and utility in the research study context. Inquiries are used to study the business process and the process itself is measured from many different aspects and also remote evaluation is utilized to gather data easily from distributed locations.

Methods are used in different stages of the research to follow the structure of human-centered design principles. The following chapter describes these methods in more detail.

TÄHÄN VÄHÄN LAAJEMMIN

2.1 Remote usability evaluation

TÄHÄN VOISI ETSIÄ LISÄMATERIAALIA

There are many ways to implement remote usability evaluation.The data logging approach is being discussed in this paper. In the context of usability, logging means practices for mechanically recording the usage of a system.

Usage data of an application can offer valuable information about users' actions and can therefore be utilized in the process of improving software's usability. Even if logging can not replace the traditional usability methods, it provides many advantages over them. Logging is automatic, objective and it doesn't require direct observation. The data is gathered from the actual running application. [3]

2.1.1 Evaluation process

According to Bateman et al. [3] log-based usability evaluation process consist typically of three stages (see Figure 2.1). The first is called *application instrumentation* and in that stage logging capability is added to the application. In other words, instrumentation is a process which determines what data will be logged from the usage of an application. In order to gain useful data, successful decisions in instrumentation stage are crucial. Bateman et al. also assert that if wrong decisions are made and therefore large amount of low-level data has been collected, it might be challenging to interpret and it might not reveal any value. On the other hand, they remark that if only high-level events is logged, internal structures may remain undiscovered. Consequently both, low-level and high-level usage data need to be tracked and logged. Sometimes, when log data doesn't supply enough information for interpretation, contextual information is needed. Generally, it requires a significant amount of effort and vigilance to be able to gather all the essential data to be analyzed. [3]
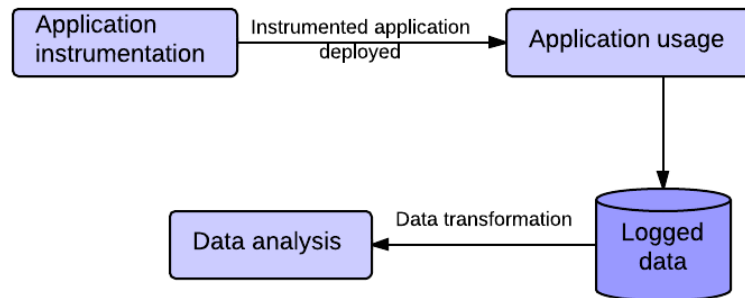
Figure 2.1: Process for log-based usability evaluation. [3]

The second stage of log-based usability evaluation process is *application usage*. It is a stage where the instrumented application is used in authentic or simulated situation. The log data is collected unobtrusively while the user is performing his tasks with the application. [3]

The final stage of the process is *data analysis*, in which a few different approaches can be used [3, 10]:

- Synchronize and searching

- Transforming event streams

- Performing counts and summary statistics

- Detecting, comparing and characterizing sequences

- Visualizing

This part of the process will be described in more detail in the following subsection Log data analysis.

2.1.2 Log data analysis

In order to gain beneficial usability information from user interface events, the log data has to be analyzed thoroughly. According to Hilbert and Redmiles [10], there are several approaches to sort out important usability information out of log data and to make it more understandable for humans. The first one of them is called ***synchronization and searching***.

It is often challenging to interpret user interface events alone and thereby discover valuable higher level events without any contextual information. The purpose of the synchronization and searching is to combine user interface event data with other informative data, such as observations or video recordings, in order to increase the understanding about the context of use. These two forms of data are complementary and can together provide wider understanding about the usability of a system. Observations or video recordings may supply additional information about the user interface event appeared in the log, or vice versa. However, there are few disadvantages with synchronization and searching techniques. For example video recording and observation typically require the presence of the observer. Furthermore, using video recording as a part of evaluation, produces a lot of data and can be inefficient to analyze. It might also have an disturbing affect on user's behavior. [10]

The second approach is ***transformation***. Transformations combine selection, abstraction and recording to transform events into more beneficial form of information. This information can then be utilized for instance in detecting, comparing or characterizing human behavior patterns. Selection is basically segregating useful information out of mass of user interface related events by filtering out irrelevant data or by selecting the relevant data. Example of selection could be a situation where the user has been writing a lot of text, generating a lot of data in the log, and trying to find save button from different menus. From the usability point of view, text inputs as log events are probably not that relevant, but time consuming browsing between different menus can be a sign from usability issues. [10]

Abstraction can be used to combine different events into a more understandable event sequences or patterns. For example user typing into different

text fields and then clicking a button in a web page could be interpreted as a login activity. However, in this kind of situation user interface event logs, must be supplemented with contextual data to be assured that the event sequence is really what it appears to be. Recording means generating new sets of events based on selection and abstraction. Less effort is required to analyze new sets of raw data because earlier analyzing techniques can be exploited. [10]

The third way of generating tangible usability information out of user interface log data is to use ***counts and summary statistics***. Counts and summary statistics are calculations based on usability-related metrics gathered from the log data. For instance, calculating the time spent on a specific task (performance time), can be critical information in usability evaluation. [3, 10]

Detecting, comparing and characterizing sequences are approaches which utilize sequence information of events. Sequence detection refers to an action in which ready-defined sequences are tried to be identified from the mass of source sequences. Sequence comparison is executed by usability analyst and it is made between two sequences. These two sequences can be generated for example by subjects or subject groups. In any case, the purpose of sequence comparison is to compare actual usage against some defined ideal usage. Sequence characterization uses the source sequences to create a model to summarize all features of interest in those source sequences. [3, 10]

The last approach for log-based data analysis is called ***visualization***. In visualization, transformed and analyzed data is presented in a graphical form. General way to visualize data is to use charts, but it is possible to use other visualization techniques such as heat maps based on clicks or mouse traveling. [3, 10]

2.2 Contextual Inquiry

TÄHÄN VIELÄ p1-raven pdfstä juttua. Contextual Inquiry is an unstructured interview method, but it has some qualities which differs it from traditional unstructured interviews.[15] It was originally developed to meet three requirements. Firstly it was supposed to identify a design process for systems that will be used similarly in different business contexts and in different cultures. It was also supposed to identify a convenient process for gathering user information in limited time and finally to identify a way to acquire information about users' work in eligible format. In addition to those requirements, the technique was noticed to be capable of much more. CI cherish participatory design and, because of that quality, users are able to involve in the

design. Users' contributes to the design by providing a deep understanding about the nature of the work. This is done through inquiry and it's a basis for fundamental work concepts. [16]

2.2.1 Fundamentals of Contextual Inquiry

Contextual Inquiry can be said to be an apprenticeship compressed in time. The basis of the method is premised on the idea of user being the expert instead of the interviewer, but unlike an apprentice, the interviewer neither learns the work by doing it, nor has the same amount of time available for learning. [4] CI differs from the traditional master-apprenticeship model in other ways also. A few fundamental principles of Contextual Inquiry are said to be essential in order to meet the specific needs of design problems [4, 1]. These principles are understanding the context of the work, creating a partnership, interpreting the work and steering the focus during the interview. [4]

Understanding the **context** of the work is the baseline of Contextual Inquiry. To gain the understanding about the work structure, the interviewer must pursue understanding about the details of users' work and these details can be found by following the users' actions at work. In general, it is important that interviewer avoids gathering abstract or summarized information about the context.[4]

It is essential to create collaborative environment and a **partnership** between the user and the interviewer while the real life work structure and activities are tried to be understood thoroughly. Partnership is an equal relationship between the interviewer and the user. In comparison to traditional interview or master-apprentice approaches, partnership doesn't give any power advantage to either parties. Instead, it fosters the interviewer's expertise to see the work structure and the user's expertise to do the work. There are many advantages in partnership approach. For example by paying attention to details and structure of work, interviewer can also teach the user to attend to them. In the best case scenario the interviewer and the user watch the work structure and think about design possibilities together. In this kind of scenario it is common that the work is suspended, while the parties discuss about the work structure, and then return again. For interviewer asking feedback for design ideas is also encouraged.[4]

Even if a partnership should be created between the parties, the interviewer should still be able to steer the interview and keep the **focus** of the conversation on work-related topics relevant to the design [4]. The focus point should be decided before the research takes place, and data gathering should have a deliberated and precise goal. This goal or focus should be

dependent on the information needs of the design.[1]

The success of Contextual Inquiry and system design depends on the facts gathered, but the facts are not enough. They are a starting point. *"From the fact, the observable event, the designers makes a hypothesis, an initial interpretation about what the fact means or the intent behind the fact."*[4] In other words, **interpretations** are needed and they are critical for success. In the final version of the system, interpretations have to be correct or the system fails. This is why it is important to share and validate the interpretations with the customer early enough. [4]

As soon as thorough understanding about the work is available, design for a system model can be created.[16]

2.2.2 Contextual Inquiry interviews

Practical preparations of CI includes careful planning. The first phase of planning is to set the focus for the research. Focus can be for example a definition of a problem which need to be solved. It creates ground rules for the interview and it is therefore easier for the interviewer to steer the conversation. After the focus has been set, the inquiry itself need to be designed. The challenge in inquiry design is to find a way to determine underlying issues which cause problems in the work. The approach for the design should be slightly different if the aim of the Contextual Inquiry is to support upgrading the system, creating a totally new system or redesigning the process. If CI is used to help the design process of a new system, a challenge is to get the designers and the users to work together in order to define new ways of working, and to develop a system design to support them. [4]

The structure of the interview is considerably straightforward. First task of the interviewer is to introduce the CI process and ask permission to record the conversation and the work. The interviewer has to also make it clear that understanding the work of the user is the primary target of the research, and that all the misunderstandings should be corrected. This is called the conventional interview phase. The next step of the interview is to clarify the rules. In traditional Contextual Inquiry process it is desirable for the interviewer to interrupt and ask questions and correspondingly for the user to indicate if the time is inconvenient for interruption. This phase is called a transition. The third part of the CI is the actual interview (the contextual interview proper phase), which consist of observation, asking direct questions, suggesting interpretations, writing notes and recording the whole chain of events. Finally the interviewer should wrap up (the wrap-up phase) the interview, ensure that everything is understood correctly and summarize the

process. This is the last chance for the user to revise misunderstandings. [4]

Contextual Inquiry is usually conducted by one person and the intervie-wee. If two people are used, the roles of note-taker and interviewer must be separated. This means that interviewer is leading the discussion and the note-taker does not involve in it. The approximate length of the interview should be two hours. It is also important to get an overview of user's back-ground and demographic information in order to be able to focus on relevant things. It is also important *not to use predefined set of questions*, but to familiarize oneself with the ares of concern in the process. Artifacts offering relevant information about the work, such as cheat sheets or notes, should be also collected, photographed or copied. [19] Reviewing the notes is usually required after the interview in order to ensure their comprehensiveness. It is probable that some ideas or impressions might have forgotten during the interview. [14]

2.2.3 Analysing the data

The data gathered from Contextual Inquiry consist of notes, recordings and possibly artifacts. In order to be able to analyze the data, it has to be in identical format. This is why it might be beneficial to create a summation of the data. It can be done for example by transcribing important notes from the recordings and by describing the artifacts and their use. Once the data is coherent, the analysis can begin.

The analysis of CI consist of three steps. The first step is to set focus for the analysis. It is often the same than for the inquiry itself, but occasionally insights from the inquiry makes the original focus outdated. In this case, the new focus for the analysis need to be identified. The next phase in CI analysis is to choose the data display. There are various of methods available for that, such as affinity and workflow diagrams. After the data display has been chosen the final step is to organize the data in the data display. [14]

The affinity diagram organizes single notes in to higher categories or hierarchies. In affinity diagram there are no predefined categories for the individual notes. Instead, a single note is being used to define a category and then the corresponding notes are being attached to the same category. In other words, the notes creates categories and categories then raises common structures and themes. After the categories or groups are formed, and there is no floating notes left, the groups have to be descriptively named. Then groups of groups are being collected, and thereby hierarchies created. The named groups and hierarchies, and the headings of them, then represents new information in an affinity. [4, 14]

The workflow diagram can be used if the work process need to be tracked

and understood thoroughly. At first, the notes from each interview need to be reviewed, after which the flow charts can be conducted. The flow charts should reflect the work process of each individual in every interview. After that all the flowcharts need to be displayed and compared. Finally, a composite work flow diagram (containing the stages perceived in most of the inquiries) can be created. [14]

2.3   Cognitive Walkthrough

Cognitive Walkthrough (CW) was developed in the early nineties and it was originally intended to help reviewing 'walk-up-and-use' interfaces, such as Automatic Teller Machine (ATM). CW is a formal usability inspection method for professionals involved in the development process. The key concept behind CW is to use theory as a guide for design review. It is easy to understand and apply and therefore feasible to use in a regular development process. [9, 13] The method consist of two phases: preparatory and analysis phases. In the preparatory phase, the tasks, sequences for tasks, users and their backgrounds and the interface to be analyzed will be agreed upon. The actual analysis will be accomplished in the analysis phase, where every action of every task will be executed and analyzed. In general the Cognitive Walkthrough method can benefit all phases of the design and development process.[20]

2.3.1   Preparations

Cognitive Walkthrough can be accomplished by using detailed design specification of the user interface which has been received after requirement analysis and functionality definition processes. The walkthrough can be also performed on a paper simulation, minimal prototype or fully functional prototype of the UI. Formally Cognitive Walkthrough evaluates design's ease of learning by exploring it. [20]

The analysis can be done individually or in a group. In a group the process starts with designers presenting the design to a group of peers and it's usually done after a certain milestone in interface design. The designers can then benefit from the feedback and improve the implementation for the next revision. Participants may represent different organizational units and in the evaluation team they have to adopt different roles, such as recorder, facilitator and various kinds of expert roles. [20]

The first step in walkthrough preparations is to describe the users of the system and choose the tasks for analysis. If the background and technical

experience of the users are described in the beginning, more details can be possibly revealed in the walkthrough itself. The selection of tasks (for analysis) is critical and should be based on facts, such as requirement analysis, needs analysis or concept testing. The amount of tasks should be moderate and it is important that the set of chosen tasks include some core functionality and some combinations between those core functionalities. Furthermore, to make tasks as concrete as possible, context descriptions must be included. [20]

After the tasks have been chosen, the action sequences for the tasks need to be described. Basically it means that the sequence of actions, which are required to accomplish the task with the UI, are being described. These actions can be as simple as "press the start button" or "write your name in the text field". However, depending on the level of user expertise and user descriptions, actions might also consist of several simple actions which can then be executed as one block. These kind of actions could be for example filling in the register form or going to a specific website. The interface definition should include the prompts preceding all the actions in the task and the interface's reactions to those actions. If the development is already finished, all the information from the interface is available, but if the development process is only in the beginning, paper descriptions are needed. The level of detail in paper descriptions depend once again on the expertise of the users. [20]

2.3.2   Analysis

The Contextual Inquiry analysis phase examines the actions of the tasks and generates a plausible story or a review about the reasons why the users (which have been defined earlier) would have chosen those actions. These stories are based on presumptions about user's expertise and objectives. Sometimes users trust on their problem-solving skills, which is why it is important to understand the problem-solving process in the analysis phase. In order to mimic this process in the analysis phase, four steps should be taken. First, a rough description of the task to be accomplished should be considered. Then the user interface should be explored and actions should be taken according to assumptions users might have. The third step is to observe if the user interface is returning the expected results for each action. The last part of problem-solving process is to assume and define users' next action.[20]
TÄHÄN VIELÄ LISÄÄ ARTIKKELISTA + ETSI MUUTA AINEISTOA

2.4 Interaction Sequence Illustration

Considering the practical impacts of the thesis, it is important to use methods and measures which can shore up the software development process in a real-use context. This is why the process and it's interactions are reviewed using ISI method, which utilizes authentic use context and real users. [18] ISI was originally developed for evaluating the usability of IT tasks carried out in healthcare industry, but there are no defined reasons why it could not be utilized in different environments.

2.4.1 Description of the Interaction Sequence Illustration

Interaction Sequence Illustration is a low level analysis method for human-computer interaction. It uses data acquired during the Contextual Inquiry process and doesn't gather any of its own. However, the inquiry data has to be complemented with documentation about interaction activities. There are three objectives for ISI method to handle. The first is to demonstrate how the user perceives the system. The second one is to identify and document activities, and to discover problems. The first two objectives creates the third one, which is to support the user-centered design and development. [18] The strength of ISI lies in the analysis of data and it can be used to compare the interaction sequences of two of or more UI implementations. On the other hand it can provide prominent information on only one UI's interaction sequence.

2.4.2 Utilization of the Interaction Sequence Illustration

The utilization of Interaction Sequence Illustration can be simplified in seven steps (see Figure 2.2). First the data need to be collect (notes and screenshots) alongside Contextual Inquiry interview. Then the screenshots need to be arranged in the right order and all the superfluous data need to be removed. The third phase is to count the interaction steps based on screenshots and activity analysis. After the analysis the screenshots needs to be modified and important details highlighted. Then the sequence numbers as well as a detailed description text should be added to give a profound understanding about the actions. The outcomes of the method are illustration, or illustrations depending on the number of research objectives, of the interaction stages. Every stage contains step-by-step illustration (or illustrations)
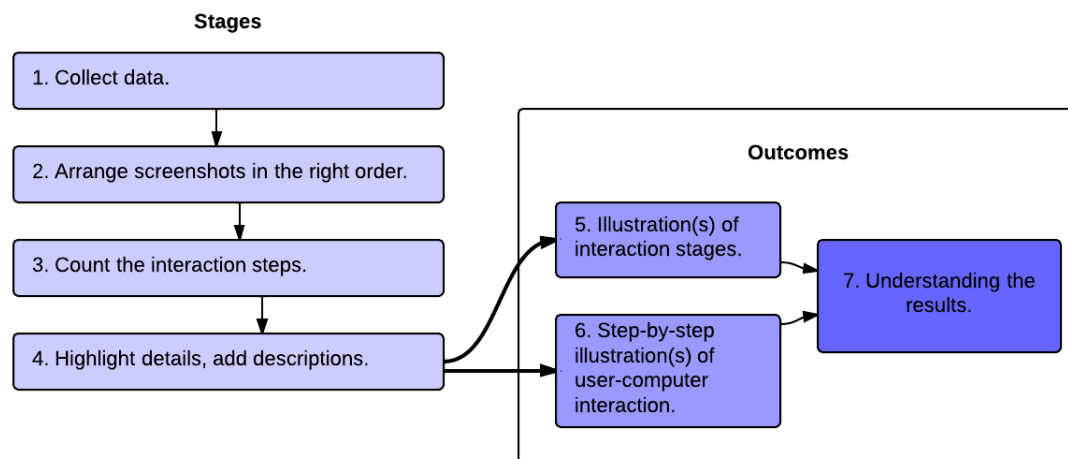
of user-computer interaction. [18]

Figure 2.2: Interaction Sequence Illustration steps and outcomes.

2.5 System Usability Scale

In his paper Brooke [6] argued that usability is not any real existing quality, but a good usability artifact is *appropriate to its purpose.* In other words "the usability of any tool or system has to be viewed in terms of the context in which it is used, and its appropriateness to that context"[6]. Still in many cases, context related usability evaluation is not desirable. The reason for this is that a large scale context analysis is usually neither cost-efficient nor practical.[6] SUS responds to these challenges by offering an easy and quick way to get subjective ratings about the usability of a system. It is not limited to any specific technology, which makes it universal tool for usability evaluation. [2]

2.5.1 Description of the System Usability Scale

System Usability Scale (see SUS form) is a ten-item *Likert scale,* meaning that every item consist of the scale of five, ranging from "Strongly disagree" to "Strongly agree". The questionnaire is generally being filled right after the possibility to use the system to be evaluated. The focus should be on immediate responses and too much time shouldn't be given to the respondents. [6] `TÄHÄN LISÄÄ!!!  TEN YEARS OF SUS -ARTIKKELISTA`

2.5.2   System Usability Scale in practice

The outcome of SUS is a single value which express the overall usability of the system. The value consist of all the items and none of them are meaningful as such. System Usability Scale can be calculated by first summing the score contribution (range from 0 to 4) from each item. Before summing the scale positions of the items 1,3,5,7 and 9 need to be subtracted by one and the scale positions of the items 2,4,6,8 and 10 need to be subtracted from 5. The last step is to multiply the sum of the scores by 2.5 to get the overall SUS value, which will range from minimum of 0 to maximum of 100. [6] The resulting single score is an easy-to-understand measure, and can therefore be discussed with the wide range of stakeholders. [2]

2.6   Quantitative measurements in usability evaluation

The last process measurements used in the research are simply the time which was consumed while carrying out the task and the success rate of the task.

Chapter 3

Usability evaluation experiment

Human-centered design consist a few activities and iterative process (see Figure 3.1). [8] The empirical part of this thesis adapts human-centered design principles and the steps of the process experiment are highly linked to its activities. The reasoning for this approach in the pragmatical part of the research study can be found from the earlier research done about the topic. `miksi hyvä???` The steps are described in detail in section 3.1. This chapter will also describe the implementation phases of the experiment.

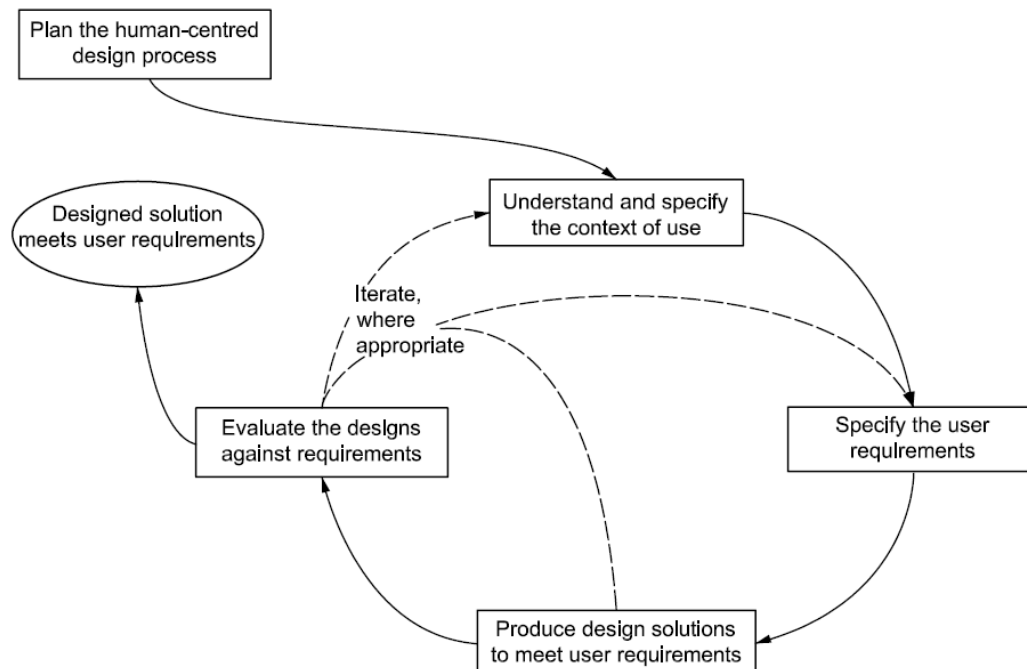`TÄHÄN JOTAIN CONTEXTUAL DESIGNISTÄ JA ITSE PROSESSISTA JOTA ARVIOIDAAN!!!!!`

Figure 3.1: Human-centered design activities.[8]

3.1 Applied human-centered design process

This part of the thesis forms the first step of the human-centered design process: *Planning the design process.* The section applies the framework of the human-centered design process and offers one possible approach to user-centered in-house software development.

The process itself is executed by the personnel highly expertized in the area of customer service and the primary tool for the process is a tailored ERP system. Moreover, the distinctive nature of the business sets additional challenges for the usability evaluation. This is why it is presumable that the process can not be understood thoroughly without understanding the work in practice. Because of the reasons mentioned earlier, Contextual Inquiry is chosen as a method for *understanding and specifying the context of use.*

The researcher must have a profound understanding about the context of use in order to *specify the user requirements.* A qualified system can be implemented only if the user requirements are precisely defined. Many of the methods used in this experiment aims to assist in this crucial state of development. Technically the process of requirement specification can be initiated while running the Contextual Inquiry. Although, it is essential to remember that the focus in CI should be mostly on understanding the context of use. This thesis uses user evaluation, expert evaluation and measurement methods to identify all the user requirements affecting on the user experience and the functionality of the system.

While the user requirements have been specified, *design solution can be produced according to these requirements.*

- Creating the model for gathering data

- Modified contextual inquiry

- Process measurement methods

- Analysis 1.

- Prototype creation

- Remote evaluation - process measurement methods.

- Analysis 2.

3.2   Practical implementation

Kuinka monta osallistujaa, millainen ympäristö, missä maassa, minkä ikäisiä osal
kauanko tehneet työtä kuinka testaus sujui, menetelmäkohtaisesti,
mitä välineitä käytettiin miten toimi.

Chapter 4

Analysis

4.1 Results and comparisons

-Comparison between country offices -Comparison between individuals (esim. kuinka kauan kesti tietyn toiminnon tekeminen) / Overall comparison (esim. kaikkien koehenkilöiden yhteinen kehitys.) - Interaction sequence illustration (esim. kuinka monta steppiä ennen ja jälkeen)

4.2 Implementation analysis

-Should these methods be implemented as a part of the process or not.

Chapter 5

Summary and conclusions

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Appendix A

SUS form

System Usability Scale

	Strongly disagree				Strongly agree
1. I think that I would like to use this system frequently	1	2	3	4	5
2. I found the system unnecessarily complex	1	2	3	4	5
3. I thought the system was easy to use	1	2	3	4	5
4. I think that I would need the support of a technical person to be able to use this system	1	2	3	4	5
5. I found the various functions in this system were well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this system	1	2	3	4	5
7. I would imagine that most people would learn to use this system very quickly	1	2	3	4	5
8. I found the system very cumbersome to use	1	2	3	4	5
9. I felt very confident using the system	1	2	3	4	5
10. I needed to learn a lot of things before I could get going with this system	1	2	3	4	5

Appendix B

Contextual Inquiry: Research plan

Contextual Inquiry practicalities

Focus:
- A customer creation process in the current ERP system is not highly optimized and especially the contact information input actions could be improved significantly.
    1. How the customer creation process can be expedited?
    2. How the number of errors can be minimized?
    3. How editing the customer details can be made easier?

Inquiry Design:
- The subscriber company wants to create a new ERP system. The whole work process (from the need of creating a new customer or editing it emerges, until the Save button has been pressed) needs to be examined in order to enhance the customer creation and contact information input processes.
- The inquiry needs to aim into a more straightforward and partly automated process implementation.

Inquiry in practice:
1. Introducing
    - Ask background and demographic information
    - Make the focus clear for the user
    - Ask permission to record
    - Introduce the method and master-apprentice approach

    The conventional interview. Duration approximately 15 minutes.

2. Stating the rules
    - Set rules
        - User works
        - Interviewer interrupts

    The transition. Duration approximately 30 seconds.

3. Interviewing
    - Observe, interpret, ask questions, suggest interpretations, analyze artifacts and write notes
    - Recall principles of context, partnership, interpretations and focus as guidelines

    The contextual interview proper. Duration approximately 60 minutes.

4. Summarizing
    - Summarize interview and relevant occurrences
    - Ask for corrections
    - Ensure thorough understanding

    The wrap-up. Duration approximately 15 minutes.