An approach for using personas and scenarios to procure user-requirements within a procuring organization

by

Andreas Anderljung
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By

Andreas Anderljung
At IKEA Components
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Supervisor: Jonas Nilsson, IKEA Components
Stefan Holmlid, IDA

Examiner: Stefan Holmlid, IDA

Resistents: Johan Jakobsson, Kristofer Gustafsson

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Abstract

The aim of this master thesis is to investigate how a procuring organization can use personas and scenarios to gather user-requirements in the procurement of software. To reach this understanding a case study is carried out to answer the questions of research; which is a definition that suits IKEA Components, which tools and how to use them; and what are the obstacles and enablers for working with personas and scenarios in procurement of software. The thesis consists of a theoretical study in the usability area followed by an empirical investigation with semi-structured interviews and observations. The study resulted in 4 personas and 8 connected scenarios that are based on user requirements. The first finding due to the question of research includes a usability definition applied to a real context. The second reveals examples of how personas and scenarios can make the development team understand the user requirements and thus contribute to procurement. The last finding is that the main obstacles and enablers for IKEA Components is the complexity of the main system, lack of resources and the management support.
I’m sitting in the kitchen in my childhood home and the winter has finally arrived. This fall passed by faster than I could realize and I remember the sunny day when I first arrived in Älmhult, to meet with my supervisor. It was by then not known how this study was going to be performed but after some meetings and discussions the outline for this study was created and the work was up and running. Älmhult has definitely made an impression that will remain in my heart and mind.

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Järna Saturday, December 27, 2008

Andreas Anderljung

“The shortest distance between two people is a smile”
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1. Introduction
The introduction of the study will consist of background information of the company, an explanation of the underlying reason for this study, the aim and question of research and finally the scope of this thesis.

1.1 About IKEA Components
IKEA Components (further referred as ICOMP), established in 1986, belongs to the IKEA group of companies. The business focus is on developing and trading raw materials, components and fittings for the IKEA range. (IKEA Components homepage 2008)

The task within the IKEA group is to pursue the development of future unique and customer friendly solutions within fittings and components to the IKEA range. The aim is to create substantial cost-and quality benefits for IKEA in the company’s development and trade of raw materials, components and fittings. The business is global and there are 750 employees based in Sweden, Slovakia and China. Through co-operation with IKEA Trading Offices, the company is in addition represented at several other sites around the world. (IKEA Components homepage 2008)

1.2 The Underlying reason for this study
Within IKEA there is annually a co-worker survey carried out to investigate factors regarding general comfort, experienced stress and to measure the common work and cooperation within the company. The result from the last conducted survey was introduced, and then every department was able to create an action plan to improve the business. The findings from the survey at ICOMP revealed that the employees felt that the IT-system were a constraint in the every-day work. The issue with the systems were seen as critical and placed in top of the obstacles the employees experienced in the survey. This issue is of course, seen as a problem, especially when the IT-systems intent is to support the employee’s activities and work.

The management has put this issue high on their agenda, and as a first step, the knowledge about this issue has to be strengthened among the people dedicated to the work with developing and purchase of software. A demand for an understanding of the users needs in the use of the system was expressed. The organization has no previous experience of working with usability related tools, methods or concepts. The management of the organization has made a strategic decision for ICOMP, to develop and purchase more usable systems in the future. Therefore, the IT manager at ICOMP started to form a pre-study that was formed as a master thesis conducted by me, Andreas Anderljung. The thesis is carried out, under the assignment of ICOMP as well as under Linköpings Tekniska Högskola, as master thesis in information technology.

1.3 The aim of this thesis
The aim of this master thesis is to investigate how a procuring organization can use personas and scenarios to procure user-requirements in the procurement of software. The thesis strives to reach this goal by answering the questions of research.

1.4 Questions of research
The aim of the questions of research is to give the thesis a goal to strive for during its life time. The questions will drive the thesis forward during the period the thesis is carried out.
After a pre-study before the start of this thesis and meetings with the IT-manager at ICOMP, it came clear that there was a need to answer three main questions from ICOMP.

- What is a definition of usability that suits IKEA Components?
  - The aim is here to give a common definition, so that stakeholders at IKEA Components can agree and unite among the “phenomena” of usability. This is seen as a base to be able to reach a consensus and reach future goals concerning usability.

However, the first question does not have the dignity of academic contribution to qualify as a question of research, and is therefore not seen as part of the main question of research. But ICOMP has a need to know the answer of the question and because of this, it will be seen in this paper, as a part of the result from the study, which will be delivered to ICOMP. The two later questions, which are presented below are the questions this thesis will challenge to answer and they will therefore be the thesis questions of research. These questions will be given their answers in the conclusions section in this thesis.

- Which tools and how should IKEA Components use these tools to consider usability aspects in procurement system?
  - Here the question manage, which tools to consider and use for IKEA Components, to handle user-requirements and thus develop or purchase future systems in a user-centered manner.

- What obstacles and enablers are there at IKEA Components for introducing and working with personas and scenarios in procurement of systems in a user-centered manner?
  - Here the aim is to clarify which obstacles and enablers there are for IKEA Components as a procuring organization for working with personas and scenarios.

1.5 Scope

The scope of the thesis will mainly be limited by which system that lie as the ground for the study. The scope is to assure that enough deep is covered, by this 20-week thesis and that the data collected will be possible to manage and analyze in the period of the study. Therefore, a limitation in the system will be necessary.

The system in use at ICOMP to be studied is from the ERP-vendor Lawson and named M3 Enterprise Management System. Within the system two processes have been chosen for further research; Strategic purchase and Customer order handling process. These where chosen because the IT-manager and other stakeholders felt that the existing problem with user dissatisfaction was strong in strategic purchase and lower in order handling but also because of that the main work are performed there. The users of the M3 application are placed within the ICOMP organization in Sweden, Slovakia and China. Because of the fact that the study will cover users in both Sweden, Slovakia and China in the use of the M3 system a field study in both Sweden and Slovakia will be conducted, and the users in China will be interviewed in conference call. To show a transparency in the methods and use of the models, another system that is separated from the mainly used M3 application was chosen. The second system is a tailored made system, and manages the customer service with the task of order components. The user group is placed in another department within the IKEA group, the IKEA Kund
Service Center, IKSC. This system is a smaller after-sale system and is not to be considered as large as the two processes of M3. The use of two different types of systems in the study will prove that the models for usability focus applied on them will be transparent and generalized by using them on several systems.
2. Method of research

The method of choice, which work as a foundation for this thesis is a case study. I will not only study a context in its real-life but I will also apply existing models onto the context, and therefore a literature study is conducted. This is to inquire into the subject of usability and investigate which tools and how they could be applied in the existing context. Assessing a method by its description is of rather limited interest compared to how the method in fact is used in a real-life development process (Näslund & Löwgren 1998, p. 1). A case study is defined (Yin 2003, p. 13) as

“A case study investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”

A case study is a method useful when the context of a phenomenon is interesting to study in itself, in contrast to an experiment where the phenomenon and the context should be separated when studied. (Yin 2003)

A case study on usability is particularly useful for capturing complex relations between entities and their context (Markensten 2005, p. 4), by other words relations between people, their acts, behaviors and existence within their context. This is the way the case study is used in this study, to investigate into the phenomena of usability and tries to transmit existing models into this specific context. This main strength of the approach is also its main weakness because of the fact that the context that is observed is in motion and constantly changes and it’s much up to the observer, and researcher, to interpret and describe it to the reader. Despite this weakness, the method is chosen because of the opportunity the approach gives to the research and there is more of how the work with the reliability and the validity was carried out in the section 2.2 Reliability and validity.

Usability is according to me, in it’s being, to some extent seen as an abstract and tacit knowledge shared between humans and computers in interaction, and thus a case study could be able to capture this knowledge and bring it into light for the other stakeholders. This method including a literature study and a case study will help me answer the questions of research. By applying existing tools from the literature research in the real context of the case study and evaluate the use of the tools I can hopefully answer the first question of research namely “Which tools and how should IKEA Components use these tools to consider usability aspects in procurement system?” and I expect that the second question “What obstacles and enablers are there at IKEA Components for introducing and working with personas and scenarios in procurement of systems in a user-centered manner?” can be answered by the chosen method as well, within the frame of a field study of the context.

To answer the question “what is a definition of usability that suits IKEA Components?” it is probably a suitable way to investigate into the existing definitions in a literature study and then try to adjust them to a definition that suits the organization.

2.1 Case study for creating personas and scenarios

The question of research asks which tools and how to use them for consider usability aspects. I’m using the case study at IKEA Components to investigate if personas and scenarios could be used as a tool, and only by using them in a case study; in a real-life context, I can assess how the tools should be used. The aim of the study is to investigate how a procuring
organization can use personas and scenarios to procure user-requirements in the procurement of software. Why personas and scenarios? As a procuring organization with limited knowledge in the usability field I wanted to give them tools that are simple in concept which they could apply and use in the future procurement. Personas and scenarios is profoundly simple to understand but most be created with some sophistication according to Alan Cooper (2004). I first considered Usability inspection by experts in the system but it was eliminated because of the lack of knowledge at the procuring organization and because of the focus that was shifting to more simple and powerful methods. Heuristic evaluation was also considered in the beginning but eliminated because of the focus on user interface design.

Within this case study, semi-structured interviews will be conducted as a tool to collect primary data. The interviews are important to gather qualitative data and to later on create realistic and effective personas. Qualitative data is perhaps the most useful type of information for creating personas that seems like real people (Pruitt & Adlin 2006, p.130). The personas are applied as a usability tool in its real context to investigate if it could be used as a tool for developing more user-centered systems.

Qualitative data usually comes from smaller numbers of users and is collected via a method that promotes deep understanding thus answering the why question (Pruitt & Adlin 2006, p.121). This is why semi-structured interviews are chosen as the main method. The interviewees will be different stakeholders that surround the system. It is important that the population of interviewees consists of end-users, management and other key users involved around the system. Observations in observational site visits have been conducted to try to capture the actual work-practice and the use of the system, not necessary seen as a complement to the interviews but an important tool in the interpretation of the use of system in context. This helped, in the creation of scenarios and new design suggestion. The observation role made it possible to create sequence models, which was useful in the creation of scenarios and visioning of the user’s activities.

When handling a business like ICOMP, to work with existing field data is the best way to understand and improve the business processes. Gathering data from end-users is therefore an essential part and the best way to create buy-in and user adoption among the users. The importance of end-user data cannot be over emphasized. (Holtzblatt, Wendell & Wood 2005)

2.2 Reliability and validity

When conducting a qualitative study there is always a need to question the objectivity of the data collected and the analysis of the data, especially when a case study is carried out, where there is much up to the researcher, to interpret the data collected in interviews and observations. Because of the lack of review of all the amount of data collected throughout interviews and observation. One appropriate and useful device to work with the objectivity in a study is to partition the measurement of objectivity in to components, the reliability and the validity. The reliability means the extent to which a measurement procedure yields the same answer however and whenever it is carried out and the validity is the extent to which it gives the correct answer. (Kirk & Miller 1986, p. 19)

I have worked to strengthen the validity what concerns the collected data and the analysis of the data in the study. Because a qualitative method is used in my research it could question the reliability and validity of the study. This is because in both the interviews and the observations there will be the interpreter which analyze the primary data gathered in sessions
and therefore the readers lack the possibility to give criticism to the primary data. I have worked with the problem of this lack of criticism to the study by letting my supervisor and the end-users review the result for confirmation, which might strengthen the validity.

For strengthen the validity of the study I have worked with different methods, both interviews and observation which results correlated and thus strengthen the answer to be more complete. By using different methods which is called triangulation the research is strengthen by giving a more correct and enriched answer (Patel & Davidson 2003, p. 104-105). triangulation means to use different methods or sources when studying a social context (Bryman 2002, p. 260), and Flick (2006, p. 24) claims that the study becomes more fruitful if different theoretical approaches are combined or taken into account in combining methods. And that it can strengthen the validity of the findings, if the results from the different methods coincide (Patel & Davidson 2003, p. 104). The fact that I have used different methods will according to the literature strengthen the validity of the study.

By letting end-users review the result, the respondent validity of the research is strengthened. This is a popular method in qualitative research because it could help assure that the result is in alignment with the opinion of the interviewees, and thereby strengthen the validity. (Bryman 2002)

### 2.3 The conduct of the study

Because of the fact that gathering qualitative data leaves much trust to the interpreter, in her work of filtering the information flow and her ability to give an objective view of the data material; this chapter will describe how I conducted the study in both the interviews, observation and interpretation.

#### 2.3.1 The core team

Within the study a core team was created to manage the project. The creation and buildup of the core team are made with guidelines according to Pruitt and Adlin (2006). It was an advantage if the core team involved in the realization of the interviews and later personas are created as a cross-functional team. This will hopefully ensure that people with different perspectives will pay attention and focus on different aspects on the data and later the design (Holtzblatt & Wendell & Wood 2005). Literature point out that the people in the core team doesn't necessarily have to understand the creating of the personas to be helpful (Pruitt & Adlin 2006, p. 71), and claims that the user is the expert, not the interviewer (Holtzblatt & Wendell & Wood 2005) An important attitude is said to be that the people involved in the core team is sensitive to the need for user focus in the company and that they will be excellent as team members. The members in the group also functions as a critical perspective on the work and can ensure that the decisions taken do not arrive from myself. This reduces the risk of isolation, which may lead to that the work is affected of own assumptions and bias. The selection of core member is also a question of political and organizational strategy for later acceptance and buy-in on the project (Pruitt & Adlin 2006, p. 71).

The core team in this project will be my self as a usability representative, my supervisor who is a business intelligence analyst and with assistants from the IT-manager at the ICOMP. My supervisor as a business intelligence analyst, which have taken a fundamental course within the usability area and the IT-manager with his IT expertise and IT work-practice will provide the project with a cross-functional quality and knowledge about the context at ICOMP. The hope is that a business intelligence analyst can add the understanding of the workflow and
context in which the systems will be used, and be able to look at the greater picture of a user-experience. The IT-manager can provide the team with knowledge and a key perspective of what development teams need from the personas and a deep understanding in the interest and resistances for the new method. The IT-manager can also provide knowledge on how systems are procured and purchased at ICOMP.

2.3.2 The interviews leading to personas
In the study, interviews were interpreted and finally analyzed to personas. Personas are found to be a very good way to communicate user data to the people who did not participate in the collecting of data, who are the developers. (Holtzblatt & Wendell & Wood 2005) The personas give the development team a way to get to know their users and their story, without the need of constantly meeting the users in real life. The most powerful tools are always simple in concept, but they often must be applied with some sophistication. Our most effective tool is profoundly simple: Develop a precise description of our user and what he/she wishes to accomplish (Cooper 2004).

The intent was to create one primary persona for four user groups in the user population. The user population is further described on sections 2.3.3 Convenience selection for interviewees and in 5. Analysis to personas.

2.3.3 Convenience selection for interviewees
When to consider who to interview it’s important to involve interested parties and stakeholders. This is to not create a system based on just one sort of stakeholders, by involving more different types, the acceptance for the project will hopefully grow and buy-in will be easier when all holders have participated and seen it’s potential. No one person can embody all the users of a real enterprise system, many roles must be considered and gathering stakeholders goals, worries and ideas is a key to set the focus on the project and the coming interviews. In addition; when to decide upon which users to interview, start out by determining which work or life activity to be supported. (Holtzblatt, Wendell & Wood 2005)

The thesis manages this through a research at the ICOMP organization for users and different job roles. The questions to help in that step are according to Holtzblatt, Wendell and Wood (2005):

- What is the work or activity you expect to support, what are the key tasks?
- What are their attitudes and feelings towards activities?
- How does this work fit into the users whole work life? To which processes is it attached?
- Who else is involved in making this happen? With whom do they work and collaborate? Who advise them in their work?
- Who provides with information and who is using the result and output from the users work?

To determine which interviewees to involve in the study a convenience selection was done of the population of users. The reason for using a convenience selection was made because the need to generalize over the findings is not that important in a qualitative as in a quantitative study, which is the main reason for using a probability selection (Bryman 2002, p. 117). And because of the scope of the study, to focus on only three systems, (mentioned in section 1.5 Scope) the selection was carried out over the co-workers performing their work in these systems. To increase the spread of the selection, and capture different views on the use of the
system, the interviewees where chosen from mainly 8 different job roles which were using the system. The job roles were Business Support, Supplier Service, Customer Service, Customer Relations, ISTRAS (strategic purchase), Supply Planner, System Owners and Call-Operators. The job roles are described in the section 4.1 The context and business of ICOMP for further reading.

The co-workers were collected through snowball selection. The snowball selection is a selection method upon a stated criteria which is described by Bryman (2002 p. 117) as an effective method when the population is not well know and/or when a study would not benefit from random selection. The snowball selection starts out with interviews with interviewees who might have first hand information on who to interview upon the selected criteria’s, in this case; that the users should work in the chosen systems and the selected job-roles stated above. The first interview was held with system owners in the selected parts of the system and also with my supervisor and the interviews gave nominees as interviewees. To gather and collect the users, I collected the users in an Excel spread-sheet to get an overview of the population of interviewees, including the job-roles that the study needs to cover, to ensure that the users were working in the selected part of the system.

2.3.4 The conduct of the interviews

Totally 20 interviews was carried out and four interviews were made in call conference which could affect the interpretation and the results. To avoid misunderstandings the interviewees were able to demonstrate their work in the system through a virtual meeting interface, where I as interviewer could see the work in the system performed by the interviewee. The length of the interviews were set to two hours because one hour was considered to be to short and more then two hours was only to appear when the situation in the interview were leading to interesting findings. The structure of the interview is in a semi-structured way, meaning that I used a script, Appendix A, throughout the interview. This is to ensure that I will cover all of the critical questions I had identified. The information generated through semi-structured interviews is generally rich, in-depth material that gives the researcher a fuller understanding of the informant’s perspective on the topic (Becker & Bryman 2004, p.268). The use of the semi-structured interviews increases my chances to create rich personas and scenarios from the collected data.

The script will function as a guide to get back on track from the perhaps side track that can easily occur during the life of an interview. The interview script was created with support from the guide in Pruitt & Adler (2006, p.134) on how to cover all of the critical questions identified. I also conducted a pilot interview with one co-worker within the user population and after the interview the script was reviewed after input from the interviewee, and justification within the questions was made. Some questions which not was characterized as main topic was moved from the section and placed in the introduction section, but that was all of the justifications made to the script.

The interviews was scheduled over a longer time period because of the fact that I wanted to get a better of understanding the existing work-practice and interpretation of users on the way. Therefore, there is a possibility that the later scheduled interviews will be of higher quality then the former. This can have affected the validity of the study, in the first interviews.

During the interviews I acted according to the observer participator (Bryman 2002, p. 287), where I participated in the interviews as an observer counterpart with the interviewee and there will be no clear participation role. But there were situations where participation was
unavoidable, e.g. when the interview was getting in a dead end or if the interviewee needed help to express themselves.

2.3.5 The conduct of the interpretation

The interpretation of the interviews was carried out with help of notes from the interview and is also recorded with audio recorder, in case something was unclear. The record was especially helpful in the beginning of the interviews when my knowledge of domain and work-practice was low. For the interviews to be fruitful, I conducted interpretation in most cases within 24 hours. This increased the possibility to have more quality interpretations and thus a better ground for creating precise personas. During the interpretation of the interviews, I had help from my supervisor. He helped me review some of the interpretation of data and correct it when something was obviously wrong, e.g., facts about how the business areas are working and how specific job roles are performing their work and the relation to other stakeholders.

2.3.6 The conduct of the observation

The length of the observation was set to two hours like the interviews. During the observation I analyzed how the system support the actual work-practice and the things I paid attention to, was how the system supports the intents of the users, not only the primary but the all their intents. By analyzing all of the steps that are taken during the completion of a task, I realized the work-practice and work-flow by the users and by analyzing how the system supports these steps, the system was evaluated. Hesitations and errors is something to look into for further research as well as triggers which start a sequence of work in the system. My role was to act as the observer participator according to Bryman (2002). When studying the system I looked on how the system supports the ongoing task of the user, and this was done through both the observation role and the semi-structured interviews.

2.4 Summary of the method

The study preformed is ethnographic, which often is the case when qualitative interviews are conducted (Bryman 2002, p. 287). The study has taken characteristics from the field of ethnography, which are summarized and the choice is discussed below.

The role in the interviews and observations as observer participator was taken because of the nature of the context. It was not possible for me to actively join in the observation, and it was not my intent. The aim of the role as observer participator was to study the context from an observation role but not as a complete participator, because I was not able to and for the risk of going native (Bryman 2002), to strongly identify with the context and become blind. And neither was the role as a complete observer taken because of the risk of not understanding the context and misinterpret. The risk with the observer participator is also misinterpretation of the context but it’s smaller and here were also the possibility to interact when needed, and therefore, this role was chosen.

The selection was chosen in a mix of convenience selection and snowball selection. Despite the lack of objectivity which might occur in a convenience selection and the risk of affecting the result by the selection, this selection is chosen. It is chosen because of the opportunity to collect data from the selected system of the study and to take advantage of knowledge of the stakeholders, in the use of the system. It would probably not been possible to collect data from 20 interviews in three countries within this thesis time frame, without the pre-knowledge of the stakeholders.
3. Theoretical frame of references

During this chapter, a presentation over the theories, which serves as the ground for the thesis is conducted and later used for analyzing the empirical findings.

3.1 Usability

It’s obvious that the most appropriate way to start a thesis in usability is to give a review and declaration on the subject usability. This is to clear-out the disparity that might exist, and unite about a common understanding of usability. Usability is what has become the general term when talking about usable systems in the means that it’s a property the system should possess. As the general term it has become, many people can relate to usability, but has very hard to specify what lies beyond the meaning by the word -usability. (Gulliksen & Göransson 2002, p. 55)

Gulliksen and Göransson (2002, p. 55) start out by asking the rhetorical question; “Isn’t all systems usable?” and “Doesn’t everybody involved in developing systems, have the objective to make usable systems?” Apparently, according to Gulliksen and Göransson (2002, p. 55), situations where the aim is to develop usable systems are rare. In the CHAOS report, which include an annual survey of 40,000 American system development project since 1994, there was about 50% of the total amount of projects that were suffering from increased costs and decreased functionality. And in a report from Lederer and Prasad (1992, p. 52) so many as 63% of all development projects become more expensive or time delaying. Some of the most common reasons which are mentioned are that users often demand changes or that there is a possible lack of communication between users and analyst (Markensten 2005, p. 28).

3.2 Historical walkthrough

Before the more general accepted term usability there was a scientific discipline HCI, Human-Computer-Interaction which contained all aspects of interaction between human and computer. It was developed through HMI in the mid 1980, which is concerned with the interaction between human and machine. With the new discipline of HCI the subject moved from just to deal with the user-interface to be about all aspects that could have importance for the interaction between human and computer. That the use of computers has grown rapidly can everyone witness and the subject of HCI has transformed and there is today no one clear-cut definition or understanding for the discipline. (Gulliksen & Göransson 2002) Maybe the most accepted definition is:

“Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.” (ACM Special Interest Group on Computer-Human Interaction Curriculum Development Group, 1992, section 2.1. see Gulliksen & Göransson 2002, p. 39)

The ACM group claims that HCI consists of four different main areas according to;
the use and context, human characteristics, computer characteristics and the development process. To develop an interactive system in a successful manner, the process of doing this must get to know the users of the system, their background, ability and constraints, but also the context in which the system is used. Further, we must get to know the technical aspects as possibilities and constraints that might exist in the development tools. On the user and technical aspects, we must develop a model that consists of processes to conduct these two together. This can easily be seen as an impossible task, and for sure, it is a great challenge. (Gulliksen & Göransson 2002, p. 41)

3.3 Definition of usability

Usability is in the center of the user-centered design of developing systems. It is therefore in the readers advantages, to clear out and get the understanding for the term, so the search for the Holy Grail in creating usable systems can continue.

3.3.1 ISO definition

To look into the definitions of usability and turn to the ISO definition can give insight to the reader. The ISO 9241-11 definition concerns usability and this might give an understanding of what the ISO standard puts in the word of usability:

“The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” - ISO 9241-11, 1998 (Gulliksen & Göransson 2002, p.55)

- Effectiveness is defined as the accuracy and completeness the users achieve there intended goals.
- Efficiency is defined as the ratio between the consumption of resources and by which accuracy and completeness the users achieve there intended goals.
• Satisfaction is defined as the amount of lack in discomfort and the positive feelings the users feel towards the product in use.
• The specified context of use is defined as the users, the task, the equipment and in what physical and social environment the product is in use.

The ISO definition is said to be concrete and possible to gather and discuss around to receive a consensus (Gulliksen & Göransson 2002, p. 64). The fact that it is an international standard improves the usage in organizations, which might have international affairs. It is also formed in such manner that it is possible to measure the usability in effectiveness, efficiency and satisfaction. The possibility to measure and quantify the usability, give the definition a broader usage and it is mainly the efficiency that can be measured in time or the effectiveness that can be measured by looking at how many completed task of total task that were completed. The satisfaction would be possibly to cover through surveys. (Gulliksen & Göransson 2002).

The fact that usability often has been considered as an non-functional requirement by developers (Gulliksen & Göransson 2002, p. 64), has lead to the consequence that usability are seen as an interface related issue (Nielsen 1993, p. 23). This definition consists of a wide range, from the user’s perspective of functionality to the experience of satisfaction in the use of the system, which moves away from the interface design focus.

3.3.2 Usability engineering
Jakob Nielsen is a practitioner and publisher of a book on a field in the usability discipline called Usability engineering. Central in Usability engineering is the focus on designing human-computer interfaces that are easy to use. Nielsen claims that usability is a narrow concern compared to a larger issue of system acceptability, which means if the system is good enough to satisfy the needs and requirements of all the users and the stakeholders, like the end-users and the management involved in develop and purchase of the system. The overall acceptability of a system is a combination of social acceptability, practical acceptability and usefulness. Within usefulness, Nielsen divides the sense of the word into utility and usability see figure 2. The term usability is familiar with the meaning of the ISO 9241-11 definition stated above. (Nielsen 1993)

![Diagram](image)

**Figure 2: Nielsen’s aspect of usability (Nielsen 1993, p. 25)**

From this overview picture, Nielsen created his definition of usability and has presented a way to concretize usability through putting value in the following attributes to the subject.
• Easy to learn; so the user quickly can start with the work.
• Efficient to use; when the user has learned the system, it must show to be efficient to work with.
• Easy to remember; It must be easy to return to the system and remember how it is working.
• Few errors; the user should not be able to do errors, and if so, be able to return to the before error, secure state.
• Attractive; the use of the system should be pleasant for the users; the users should like the system.

These attributes are seen as an inspiration when measuring the usability. Another central characteristic of usability engineering is the focus on evaluation of prototype models on the actual end-user, so called usability testing. Usability testing is a technique used to evaluate a product or design with the actual user. The technique is in contrast with usability inspection where experts use different methods to evaluate a product or design without involving the end-users. Because of this focus on evaluation, it has been important that the attributes are developed measurable, which they clearly are. But there exist a lack of attributes supporting the effectiveness. (Gulliksen & Göransson 2002)

3.4 The User-Centered Design

Recalling the picture of ACM, where they try to summarize the four areas in the process of creating interactive systems, it has become clear, this is not an easy task. Within the HCI, researchers and practitioners has devoted time to find out how to create interactive systems that consider both the users and the technical aspects of system development. The model that has become generally accepted in this development process is named user-centered design (UCD). As the name suggest the model sees the user in the center of the design process, but you can question, what actually lies in the meaning of user-centered design. There are no general accepted definitions of the UCD- process so a walkthrough of the existing definitions will follow. Even if there is no accepted definition, there is a common agreement on the subject and Preece gives the following definition for user-centered design (Preece et al. 1994, p.722):

"An approach which views knowledge about users and their involvement in the design process as a central concern"

What is the meaning in the term of users, centered and design according to Gulliksen and Göransson? By users, as they claim, they mean the people that are going to interact and complete tasks in the system, the so called end-users. The end-users are often not the people who purchase or develop the system and there is no substitute for the real users. The mean of centered is that users are actively involved throughout the whole process and that every activity centers on the need of the users. The use of the word design is complicated because of the value that different stakeholders put in the term. The people in the system development process sees the whole system development as a matter of design and the people that are devoted to the design of the interface sees that process as a matter of design. The users that work in the system see the interaction on the screen as the design. The user-centered design should surround the whole development process to achieve the intent of developing usable systems according to ISO 9241-11. Design is a common used word in the discipline of
usability and should have the same meaning as system development to the reader. (Gulliksen & Göransson 2002)

3.4.1 The ISO standard

The international standard which had a definition of usability also has a definition of user-centered design. The ISO 13407; Human-centered design processes for interactive systems, define the model through the satisfaction of four activities that should occur in the system development process as:

- To understand and specify the context of use.
  - By looking at the user group that exists; identify the goal of the users and in which context of use the system will occur.
- To specify the requirements of the users and the organization.
  - By not only looking at the organization’s requirements, but also put effort into the user’s requirements, and see user requirements as both functional and non-functional. These requirements should also be measurable.
- To produce design solutions.
  - The design solutions should be concrete and possible to understand by the users, by creating mock-ups and simulations the design should be evaluated in as realistic environments as possible.
- To evaluate the design towards requirements.
  - That evaluating occurs in an iterative manner until the target of the requirements is achieved. And in every evaluation the design should be evaluated towards the user requirements in previous steps.

These steps have been illustrated in Figure 3 that describes the model

![Figure 3: ISO definition 13407 (Gulliksen & Göransson 2002, p. 105)](image_url)

The foundations which the ISO 13407 relies on are the iterative nature of the model and the importance of user requirements to be considered together with the organizational requirements. It is worth mentioning that the ISO 13407 is not a complete system development model that can stand on its own. It is more like a concept to be transformed into a process, and in turn to be integrated and used in existing system development models. (Gulliksen & Göransson 2002)
3.5 How to create personas from contextual data

When collected and consolidated the contextual data, the people that have worked during the interviews and the interpretation will have an understanding of the data that others might not have. This is because the data in the interviews has been experienced by the interviewer during the interpretations, this understanding is hard to attain when seeing the data from outside as another stakeholder. When they walk through the data they can see the issues and needs but they will probably not really know the users, their needs and problem. The personas can help the users come alive to the developers without the need of the developers to meet the users constantly. When the personas are built from rich data they can help the developers and management and contribute to the understanding of users needs and focus on their characteristics. (Beyer & Holtzblatt 1998)

3.5.1 Sequence model to scenarios

The sequence model is a model to evaluate how the system improves the actual work-practice. All actions people take in doing their work reveals their strategy, their intent and what matter to them. The actual work will become more efficient if the system contributes to the work-practice, otherwise it will be seen as a problem in the users work to achieve their intended goals. It is important that the system supports all the intents of the users, not only the primary, otherwise the system will never be accepted. This model describes the work done by a user as a sequence of steps or actions that occur to achieve its intent. The model gives low-level, step-by-step information, on how the work is actually done which contributes to the designer that develops the system. The model is similar to a flow diagram or task analysis but it is unique in the fact that it reveals the intent and the trigger that injects the sequence. There are several components in the creation of a sequence that will be described in brief. (Beyer & Holtzblatt 1998)

Step is the action that people take during the completion of a task, not necessary broken down into every movement. Filling an incoming order might look-like; Fill in the delivery information, checking the status of the ordered goods, run a customer credit checkup, make the order to the warehouse, send the order to the financial department for them to send an invoice to the customer. The aim for the steps is to see the overall structure of the work, and see how it will fit together, without giving a large amount of information unable to manage. (Beyer & Holtzblatt 1998, p.100)

Hesitations and errors are important to identify because it indicates places were the user’s work-practice might have poor support by the system. This might be something to look closer into in the system. If the task has high cognitive friction the hesitation might indicate that this is a crossroad for the user to choose alternative ways to complete the tasks. Here the interviewer should ask the interviewee to think-out loud to reveal more of the issues and try to get the user to explain the act of the decision making. (Beyer & Holtzblatt 1998)
Triggers are the event that starts the sequence and every sequence has one. A typical trigger could be a telephone call, an e-mail or some happening in the system of use. They can be based on time, e.g. the last day in the month for a grocery store to make an inventory or of more abstract being as a pile of paper on the desk or an e-mailbox full of unread messages. In the systems there is often a need for an action to tell the user that something needs to get done e.g. a notice that a credit checkup is completed and the order filling can proceed. This is a typical trigger in the system environment. (Beyer & Holtzblatt 1998, p.101)

Intents is from the sequence model an explanation why the work represented by a sequence matters to the user and why they will complete tasks. The primary intent for finishing the task is immediate but there are also secondary intents that move the sequence on the way to completeness. This model reveals not only the basic information about how work-practice carries out but also shows the structure of the work and the intents the users do in manage the work to complete a task. How well the systems fits into the overall work-practice will be an important step in understanding the dissatisfaction from users toward the system. (Beyer & Holtzblatt 1998, p.101)

3.5.2 Contextual data to personas
The Rapid Contextual Design by Holtzblatt, Wendell and Wood (2005) gives some guidance on how to create rich personas from contextual data, and is said to be leading in contextual analysis and design (Gulliksen & Göransson 2002, p. 50).

First a definition of the persona. It is a one page description of the average user in the user population. The persona has been developed and consists of fragments from all users that share the same job role, demographics, needs and characteristics. The persona will be given a realistic name, but not one of the names of the user population, because of the integrity of the users involved in the study. The persona will also have a head-shot picture and a textual description. This textual description will cover who they are, a little of their background and their goals. It is meant to summarize their tasks and the primary roles they play. (Holtzblatt, Wendell & Wood 2005)

The other key concepts of creating personas are:
- A user-scenario, which is a description of a particular task performed by a persona, told in a story as it was observed from outside.
- A goal is a high-level achievement a persona is working towards or strives to achieve in their work.
- Task is a unit of work that the persona is responsible for, often in a sequence.
- Role is the primary act the persona manage or play, the hat that they wear to get the job done. (Holtzblatt, Wendell & Wood 2005)

The work of writing the personas is concluded in the following steps:

**Choose the personas to write**
The first to decide is which of the real users the persona will represent. This is for setting the target of the job role to cover. It is a good way to cover the most important job roles
in a small number of personas by which one is the primary persona. This category of
users will share a number of characteristics that probably are highly related to the
business goal of the system in use. A user group defined through user roles, user goals or
user segments that are important in the business (Pruitt & Adlin 2006, p. 176). The
primary persona is the most important user to consider for the project, the rest will be
secondary and more of a supporting character. People might feel reluctant to design for
just one person but it’s important to understand that the aim of the persona is to focus on
the user development and that the persona is always an average representation of a
multiple set of users. To have many personas as the ground for development might
confuse the designers in the design process, and this will not benefit the user-centered
design process. In fact, if you have to design more than three primary personas, your
scope is probably too large (Cooper & Reimann 2003, p.235). When focusing on a job or
user role paying attention on the different skill, a different tolerance for technology and
power in the organization can be crucial in the creation of personas. (Holtzblatt, Wendell
& Wood 2005)

Identify representative users for each persona
When recalling the interviews and the interpretation of these you will soon decide which
persona to write. By remembering the interviews which had rich stories and was more
representative of the overall consolidated data you can concentrate on the users that gave
a lot of insight or they that had an unique perceptive in an important way. Among them,
pick the best user to build up the persona. This user will be the one which story is closest
to everyone’s story and whose data is richest. By integrating the data from the other less
important users the persona receives some of their characteristics as well. (Holtzblatt,
Wendell & Wood 2005)

Identify goals, roles and tasks for each persona
When identified which user that will represent which persona, start to identify the
following for the users.

Goals: For every users to the persona, ask the question; what are they trying to
accomplish? What do they care about in their work? What makes them feel satisfied in
the end of the day? Not only goals related to the focus of the study but a wider set of
goals that characterize them and their life experience in general. Focus on high-level
goals related to the user’s overall goals. List three to five goals per person. (Holtzblatt,
Wendell & Wood 2005)

Roles: Think of the roles the users play. A user might have different roles completing
different tasks. Which hats do the users have? How would they divide up their
responsibilities? Identify and list the primary roles each user plays. No more than five
roles and choose the most important. (Holtzblatt, Wendell & Wood 2005)

Key tasks: What are the most important tasks for this user. Since it can be many tasks,
choose the most important. Which sequences were captured for this user? If there were
many sequences collected the consolidated sequence should be in focus. In addition,
when these data has been collected for the base user and the other users, check that the
data across the users is consistent and enough to create a coherent persona. Look for substantial overlaps between the users in matter of goals, roles and key tasks. If there are differences, check if the different-ness can complement each other and fit together in a persona. Also look into the data of the other personas, does the goals, roles and key tasks represent that persona? If there are data in a persona that does not fit, it might be better in another persona. (Holtzblatt, Wendell & Wood 2005)

Write the persona
First of all, name the persona. In addition to this, choose a realistic name that stakeholders can connect with. Give the persona a job or position title that reflects the base user. Review the data by rereading the list of goals, roles and tasks. Reread the user profiles from the interpretation section. Start writing about the user. Start with an introduction as the users present themselves or you present the users in third party. Summarize the user’s job including demographics information. Describe a typical day in the user’s work life or how they complete a key task in their day. Integrate other user’s quotes or tasks on the way. Important is to keep the persona short because the persona should be a focusing document and not more than a page. List the personas goals briefly and describe their roles and key tasks. When the persona is finished, attach a photo to represent the persona to the reader. Try to express the feeling of the users when doing the work through the photo. (Holtzblatt, Wendell & Wood 2005)

Write a user-scenario
The user-scenario is an extended task description and a user-scenario can help the developers to understand the work of the users in a specific task. The user scenario is a detailed description of how a persona manages a particular task. It presents the information as it where the story of one user doing the task on a particular day. The user-scenario can be created in the same manner as the persona. Start to collect the sequences of for each task to be characterized. Then write the scenario by walking the persona through the sequence. The aim is to give a story of a person doing this task on a typical work, using examples from the observed data. If there is more than one trigger, choose the most common or if there are different paths in the sequence choose the most typical. If there is a need to tell the other strategically path, tell a story of a second event where the users follows a different strategy. (Holtzblatt, Wendell & Wood 2005)

Check the personas
The last step in the creation process of the persona is to check if the users behind the personas fit into the real users. Are there any user characteristics that you have not represented? Does the characteristic come from the data or from insight from the interpretation? Identify any missed element and try to apply them to the persona if possible. (Holtzblatt, Wendell & Wood 2005)

These are the steps which will help to build the personas, and they are now ready to be communicated to stakeholders like the managers and the developer team.
3.6 The user-centered design for purchase and procurement of systems

How does the user-centered design (abbreviated UCD) process fit into the existing software methodology? Many software methodologies are defined by a series of stages, each with deliverables and milestones (Holtzblatt, Wendell & Wood 2005). The aim of the software methodology and system development process has historically been to describe the different stages and which criteria that allows the developers to continue into a new stage in the process (Gulliksen & Göransson 2002, p. 137). Every stage provides an output to the coming stage as an input and this is followed through the process. The natural data and the design artifacts of contextual design can easily be used as inputs into any methodology (Beyer & Holzblatt 1998).

When studying how approaches can be integrated in existing system development there has seldom been discussed how a given approach might be more or less useful in different development contexts (Markensten 2005, p.1). There is also a lack of research on how the user-centered design activities are related to the overall procurement-development process (Markensten 2005, p.1). When seeing the real situation where companies are developing in-house products side by side with purchase of standardized software of first vendors, the need for UCD activities supporting both development processes is obvious. These two development processes share some common characteristics in despite of the different boundaries between them. In the relation between a supplying organization as a first- or second-part vendor and the procurement organization there is a contract which specify what goals to achieve and function as a boundary between these different organizations. In in-house development, the relation between a core organization and the supporting organization as the IT-department are similar to the procure-supplying relation above, in the fact that the gap between the departments may be as big as in the procurement-supplying relation (Bloomers 1997, p.18-26). There is also often a contract, which lies as a ground for the requirements fulfilling, which separate the organizations. With the similarities between the development processes, and that quite a few projects in the industry are contract-based the need for better integration of UCD activities are huge. (Markensten 2005)

Figure 4; The procuring and supplying organization (Markensten 2005, p. 21)

3.6.1 Integrating UCD in system development

The approaches to deal with integrating the UCD processes in the existing system development so far is often the usability champion (Mayhew 1999, p. 423), which address the work of usability from a business perspective. The procuring organization try to go from business objectives to technical requirements and the user’s perspective is seldom
included professionally in either procurement or later development.

The other approach is to integrate the usability in the system development process, for example by bridging the usability and requirement or software engineering. These two approaches have quite a different way of raising the awareness and interest for usability. Usability is however not entirely a matter of either software development or strategic business development. In software development the issues could be related to which programming language and system development method to use and because the usability is concerned with a particular system in use it could not entirely be seen a matter of an issue in strategic business development either. You could therefore claim that usability is a matter of both these perspectives, see Figure 5. (Markensten 2005)

![Usability perspective](image)

*Figure 5: Usability perspective. (Markensten 2005, p.17)*

### 3.6.2 The stakeholders in the development process

The focus in the HCI research has been to enable developers and users to come closer in the development of more usable systems. In both the in-house development process and in the procure-supplying contract-based development, it is usually the IT-department or the supplying organization which has the usability competence and the lack of usability competence and activities in the procure organization is often a fact. Figure 6 shows the relation between the stakeholders in system procurement and system development. The solid line represents the relation of work in the present process. The business representative in the developing organization works with the management in the acquiring organization and the developer’s works with the users, to some extent. The lack of relation and work between the management in the acquiring organization and the users in the organization, illustrated with the dotted line, lies as reason for the coming models. (Markensten 2005)

![Organizational perspective on procurement](image)

*Figure 6: The organizational perspective on procurement. (Markensten 2005, p. 18)*

### 3.6.3 A procurement approach

The model suggested from Erik Markensten is a tentative model for the procurement and developing of software systems in general and usable systems in particular. It demands three main changes to the way procuring organizations work today.
First, it requires the procuring organization to divide the systems development project into two parts. One for defining what system to acquire and one for develop the system. The work of procuring organization today often consist of the management laying down a budget and signs an agreement with a supplier who define, implement and evaluate the system. Secondly, the procuring organization should define the system requirements themselves using user-centered design, and let the result of this process guide the contract and budgeting of the development process itself. The requirement definition should be based on both business and user requirements. And this definition of the requirements is not a static requirements specification that must be followed in a slave-wise manner, it is more a vision of what system to have in mind. This vision will change during the iteration of the requirements specification and later after the prototyping with the users. This is instead of a static contract that works as a frame for the affairs between the procurement organization and the supplier organization. Thirdly, the procuring organization need to have professional usability competence for managing the user centered design process. The tentative model is presented and described below. (Markensten 2005)

Figure 7; The Tentative Model (Markensten 2005, p. 32)

The first illustration in Figure 7 is about the procurement process and shows what it can contribute to contemporary procurement processes. This is from a requirements point of view. This view leads to the second, which shows how the model is supposed to change the relation and communication between the management, the users and the supplier. Remember that the supplier could be seen as an IT-department within the own organization. The third picture reveals the model from a process perspective where the procuring organization creates a contract which functions as ground for the development process. (Markensten 2005)

The UCD is about defining requirements for what to build or purchase. This is not clear spoken and often the UCD is involved after the requirement process in the development when the opportunities to affect the requirements are limited (Carlshamre & Rantzer, 2001).
In this approach illustrated in the high-level Figure 8 above, the requirements are defined through a process that focuses on both business and users qualities. This is a focus from start to finish and this serves to understand the usage and business needs and to integrate these into the requirements specification. The specification defines what services that seem necessary to support and which the business objectives are. The requirements about the users current use and the wishes and assumption of future use is gathered through interviews, observations and in cooperation with users. This can be seen in the “what”-part in Figure 8 above. From a skilled designer this information can be transformed to high-level requirements for a service to support both user and business goals. (Markensten 2005)

The second part, the how-part, aims at describing and visioning how the system should behave and how the interaction with the service should be designed. During this phase there will be new requirements found and earlier defined requirements may be skipped. The design process is as much about problem exploration as problem solving and in the way this model are iterative, the project is allowed to change. (Markensten 2005)

**3.7 Motivation for working user centered**

Many stakeholders must be convinced to work in a user centered manner and it is not an easy task to convince the business of the benefit. Bloomer and Croft discuss the different groups in an organization that you need to convince and suggest ways of convincing them. They focus on in-house development which could be applied in the procurement context. In-house software development supports organizations whose core business is not software development. Often these support units have to work against tight budgets and deadlines to produce software that is then used by large groups of users. Working with usability as “user advocates” the mission is to deliver the best software tools for end
users to apply to their jobs. Yet, as obvious as this sound, this message is not easy to convey. (Bloomer & Croft)

### 3.7.1 Stakeholders to motivate
Within an organization there are several groups of key people who need to understand the benefit of usability in development of software. The group of people includes senior managers, potential allies, developers, client and users and other internal groups. In the senior manager group both IT-managers and other business manager exist and both will be difficult to convince. IT-managers may see usability as a threat to budgets and schedules and a senior business manager is less likely to see the benefits of usability beyond well-laid-out screens. Bloomer and Croft claims that usability is often perceived to increase the time and cost of development and to convince an IT-manager, you must first demonstrate that the usability activities you are proposing pose no threat to the IT manager’s current objectives. The development group and other IT members is probably the most important to convince in the benefits of usability because it is their development method that might change when the user centered design is introduced. They might feel that the user centered design will result in development delays and overspending of budget. Therefore the developers will need to be reassured that usability won’t blow out their budgets and deadlines or take the fun out of their jobs. (Bloomer & Croft 1997)

The clients (as owners for the software) and users group should be relatively easy to win over to usability when it comes to the users, because they are really the ones who can benefit from usability. Although users should be relatively easy to convince for usability, clients may take more convincing and one of their main concerns may be that usability will lead to higher development costs. (Bloomer & Croft 1997)

### 3.7.2 Usability to reach key business goals
Bloomer and Croft claims that usability can help organizations to meet their key business goals. To convince the senior management that the support for better usability enables the achievement of the business goals you should created usability goals that are tied to the organization’s corporate goals and that clearly state how usability can help the organization achieve these goals. (Bloomer & Croft 1997)

### 3.7.3 Other Business Improvement Initiatives
There might also be other business improvement going on at the organization that highly correlates with usability activities. E.g. the user centered design can assist in a Business process improvement and lead to internal systems that are better designed to support new processes. And to motivate a user centered design in the solution for this improvement might help the management realize the benefit usability has to the organization. (Bloomer & Croft 1997)
3.8 Synthesis

A synthesis over the literature is presented here and the literature definitions and models are compared against each other. Here a comparison of the usability definition and the user-centered design methods are conducted.

3.8.1 Comparison of usability definitions

When comparing the usability definitions you see that the ISO definition is the only definition that claims that usability is affected by which context the systems is used within. The Nielsen definitions have a lack of seeing the usability in the context of use which I feel is a disadvantage for his definition and it can’t describe the usability in full terms. According to Gulliksen and Göransson (2002), an interactive system doesn’t have any inherent usability in itself; it’s in the use of the system within the context where the users interacts and create the attributes which can be measured. Not seeing the use in its context may lack the aspects of social aspects which could affect the usability opinion of the system. On the other hand, Nielsen attributes ‘easy to learn’ and ‘easy to remember’ that are not covered in the ISO definitions and they are likely to be important attributes when it comes to usability. You could claim that the easy to learn and easy to remember is included in the efficiency in the ISO definition, that a high efficiency in the system is highly correlated with a system that is easy to use and easy to remember.

Both definitions have attributes that are measurable which is said to be important to see usability as an own field of science. And when measure the ‘easy to use’ and ‘easy to remember’ you could end up with measuring the same data point as when measures the efficiency. E.g. for users to complete tasks in a accurate or satisfactory way due to the resources that are used they will likely need to be supported by an system that are overall easy to learn and easy to remember. In that sense you could claim that the Nielsen’s attributes are included in the ISO definition. The ISO definition is concrete, is international and is measurable, even if it’s hard to realize how the satisfaction criteria can be achieved. And you could also see that it’s hard do realize and concretize what lies in the efficiency, effectiveness and satisfaction because of the dynamic context which the system is used in.

The methods I have chosen are based on qualitative research, thus is conducted in real life context and system in use by real users. Therefore my research must have an approach of seeing the usability definition with the context aspect. Therefore I have chosen to use the ISO definition as guidance in my research.

3.8.2 Comparison of user-centered design.

The existing usability UCD models all claim that the users should be in center of the development process, and the ISO definition claims that understanding the user group and its goal and context is important, which is in aligned with the Markensten procurement approach when seeing persona as an input for creation of user requirements. Both user and business requirements are important attributes when considering both the models and both believe in user evaluation of prototypes in an iterative manner.
When examining the models it came clear that they share the same characteristics as the foundation, except on one part. The procurement approach is expressed to be applicable on in-house development as purchase and procuring of software from external software supplier, which could be seen as an extension from the ISO definition. The ISO definition doesn’t cover this aspect of procurement. The approach of Markensten is a result of almost pioneer work in the field of research up to this date, suggesting that a procuring organization should specify user requirements in the procurement of new software systems. Because of this extension the study uses both the models in the analysis and later conclusion.
4. Empirical findings

The empirical study regarding the interviews and observations and the context of the use of the system are described here. This is important to understand when reading the findings in the scenarios and personas.

4.1 The context and business of ICOMP

A context description of the ICOMP business is necessary for the reader’s further understanding of the way the system is used throughout the organization.

The business of ICOMP as referred to earlier in the introduction section is to develop and trading raw materials, components and fittings for the IKEA range which embraces purchase and sales of raw material; development, purchase, distribution and sales of furniture components as well as packing bags of furniture fittings. The trades are either conducted as commission, direct delivery or warehouse delivery. The direct and warehouse delivery are referred as buy and sell where ICOMP is legally responsible for the trade. In commission business, ICOMP only acts as an intermediary between the supplier and the customer. The business is global, based in Sweden, Slovakia and China and represented around the world through co-operation with IKEA Trading Offices.

The organization of ICOMP is characterized as flat and the co-workers code is to show prestige less, openness and straightforward in cooperation at work. (Co-workers manual, Inter IKEA Systems B.V 1999.) This was shown and realized throughout the study and helped to conduct the interviews and observation. It was easy to arrange the bookings of the interviews and while conducting them the work was met with openness from the interviewees.

The goals for the business are clarified in the following points; creating substantial cost- and quality benefits in our trade with raw materials, components and fittings and developing IKEA unique and customer-friendly components.

These goals are the overall business goals which the stakeholders and co-worker at ICOMP are working towards in their daily activities and this might be fruitful for the reader to have in mind when assessing the use of the system by the users to reach their goals. Because of the fact that the IKEA range, in its products to the customer is wide, the business have been divided in five different business areas.

4.1.1 The groups within ICOMP

The business is divided in five areas called business areas, which are explained further below.

Business Area 1; Assembly and Open&Close
The Assembly and Open&Close are responsible for reaching the overall goals in the Assembly area and the Open&Close area. Assembly is concerned with purchase and sales of fittings for the IKEA product range. The range in Open&Close is mainly drawers,
slides and hinges to the IKEA furniture products. The activities in the assembly area are carried out in Sweden, Slovakia and China. In Sweden lies the strategic development and in Slovakia and China the operations in both production and warehousing are carried out.

**Business Area 2; Lighting**
This business is substantially smaller within the areas and is involved in sales and purchase of components for electric components in the IKEA products. The sales are made in commission and are carried out in China.

**Business Area 3; Packaging**
This business is a smaller business and is responsible for the sales and purchase of material for the packaging solution for IKEA; which includes cardboard, solid paper board. The area is also involved in sales and purchase of packaging machines. The trade is conducted as commission business.

**Business Area 4; Comfort**
The business is involved in sales and purchase of bed components as springs, latex, bed motors and the business is conducted in a commission setup. This is a smaller business area for ICOMP.

**Business Area 5; Raw Materials**
The raw material group within this business area is involved in sales and purchase of raw material for the whole IKEA range. The raw materials are plastic and metal which are traded as direct delivery and glass is traded as commission. The plastic trading is conducted in Älmhult office and the metal in both Älmhult and in Slovakia. Because the group is trading raw material on the worldwide market and needs to have a short lead time the purchase price for the trades are changes during the trade, which impact the use of the system in a more complex manner. The Business support are therefore working more overall in the system, which is different from the other business areas.

**The Trading Areas**
Around the world are ICOMP’s customers, which are referred to as IKEA-suppliers that manufacture furnitures for the IKEA stores and end-customers. The work of buying the goods are manage through trading areas over the world which are responsible for the contact and the trades to the IKEA-supplier. This affects the work in the business where the teams in the business areas are working towards the teams at the trading areas as a counterpart.

**The Process Improvement Group**
This unit within the organization is a supporting unit to the business. Here the support and procurement of software systems is conducted from system owners and SMR co-workers (explained further below), and the work of the group is mainly to monitor the system and to work with changes in the system environment throughout the company. This is done through in-house expertise and external consultant expertise from partners and the work of the group is aimed to be 50% reactive and 50% proactive working with
development of the system. But the work as proactive is not close to 50% and the team is often constantly out and fighting fires.

4.1.2 The job roles within the business areas
Within the different teams around the business areas there are a set of co-workers which will work together to achieve the intent of the team. Here the co-worker’s work and responsibilities are stated.

Business support
The business support work and responsibility is to secure the capacity with respective supplier and to supervise and improve the lead time for specific products. The supplier is evaluated by business intelligence figures which are called KPI, key performance indicators. The business support works in a team with a technician and a purchaser and are in close co-operation with supply planners and the strategic purchaser, ISTRA (explained below).

ISTRA – Strategic purchaser
The purpose of the role function is to secure the best business potentials for IKEA. This should be done by achieving the highest quality at the lowest cost by reaching the best possible agreement with the most effective supplier. The ISTRA is responsible for evaluating the price, quality and delivery performance for each supplier in order to decide the best strategic purchase for each product and product portfolio. To close cooperation with respective Supply Planner analyze the forecast in relations to capacity and re-prioritize in case of out-of-stock/over-stock situations and in over-/under-capacity situations.

Customer Relations and Services
The aim for this job role is to support the future development between ICOMP and IKEA by developing and supporting the business with IKEA’s suppliers. The goal is to make the IKEA Supplier even more competitive and hence be able to offer a lower price, better quality and higher availability to the IKEA end-customer.

- Co-operate with Trading Areas, ICOMPs Business Developers and Customer Service in order to develop the business, maximizing IKEA benefits and secure and strengthen the information flow.
- Search and study market information in sales areas to evaluate and develop new business potentials.
- Create agreement (i.e co-operation, prices, etc) with IKEA suppliers.

Supplier Services
The aim of the supplier service is to support the future development with ICOMP and the suppliers by serving and acting on operational level. The work is carried out in the following assignments:

- Handle supplier orders and confirm it.
- Communicating supply deviations
• Co-operate with customer service, business support, supply planner to strengthen the information flow.

Supply Planner
The purpose of the function is to support the future development between ICOMP and IKEA by developing and supporting the business with IKEA’s supplier, i.e. by serving and acting on an operational level. The Supply Planner works in a team with ISTRAS to manage its overall assignments, which are:

• To register and confirming orders from the IKEA-supplier, and handling of supply deviation towards the IKEA-supplier.
• Collect information about customer claims.
• Co-operate with Customer Relations and Business Developer in order to strengthen the information flow.
• Collect information about the IKEA-supplier buying pattern and update the Forecast co-ordination.

System Owners
The system owners are a part of the process improvement group and are responsible for maintaining and developing of the system. The system owner is responsible to work proactive with testing in the system for new features and for education in the system.

Solution and Methodology Responsible, SMR
SMR is responsible for the use of the system, that the work in the system throughout the organization is managed in a streamlined and proper way. They have the overall knowledge about the system.

4.1.3 Experience of working with procurement.
In the development of software and system, ICOMP cooperates with external software vendors and procure software from the vendor. Recently a new software project was carried out where ICOMP worked close with the vendor during the whole project and used expert users to represent the users and set the user requirements. The expert user is within the user population of the system today and the experience from ICOMP to work in this manner was positive. They felt that the result was more in alignment with the requirements and expressed that this was the new way of working in software procurement and project.

4.2 The M3 system at ICOMP
The M3 enterprise system at ICOMP is a system from the vendor Lawson. It is an enterprise resource planning system in position to serve the entire company with the handling of purchase, sales, production and warehousing. The system is complex, connected within the whole business and expensive to modify to business needs. There are modifications to ICOMP business in the system but the modifications has been reduced since upgrades because of the need for better support from the vendor. To describe the use of an enterprise system you could easily see the usage of a system, like M3, as generally taking out and putting in information in the system. This is generally the
case regardless where the user are working or what the users perform in the system. The M3 system is divided in subsystems e.g. sales and purchase which also is divided in subparts, called sessions. There are therefore several session in M3 system that belongs different subsystems e.g. the sales part. A session could be seen in the Appendix B for a visual understanding and also benefit the readers further understanding.

4.2.1 The use of the M3 system at ICOMP

The use of the M3 system from the selected user population is mainly carried out in three different ways. First it is used to handle the order-flow. Secondly it’s used to handle the strategically purchase and the supply and thirdly it’s used to evaluate the business, and indirect the supplier.

The order-flow
The nature of the order-flow consists of the following activities. Some IKEA-supplier (considered as customer to ICOMP) contacts the Business Support (who are responsible for setting up the business) with a customer order. The order is then entered in the system as a customer order and transformed to a purchase order proposal by a number of activities performed in the system. When the order is a purchase order proposal it can be released into a purchase order which can be sent to the supplier for delivery.

The strategic purchase
In the strategic purchase the system is used to give information and decisions which helps the ISTRAS and Supply Planner in their work to secure the capacity and quality on the tactical level. The system is used to decide if orders should be split on several suppliers to fulfill the demand.

Evaluation of the business
The system is also used to evaluate and develop the business and its suppliers. And to evaluate all of the information in the system an external Business Intelligence system named Kompis is used to generate reports and prognosis. The Business Support uses figures from the system which measures lead-time, order request fulfillment and price development.

Besides these main activities performed in the system it’s also used to register new articles and suppliers to create the product range. And to gather information to create offers and agreements which are sent out to the IKEA-suppliers.

4.2.2 The interviews with the M3 users
Interviews were conducted with co-workers from Business Area 1, 4 and 5. The user population consisted of co-workers as Business support, Supplier Service, Customer Service, Customer Relations, ISTRAS, Supply Planner and System Owners.

The Business support
The Business support co-workers were mainly using the system to evaluate the business from the business intelligence-figures they received from M3 through the business intelligence system and some worked with the order-flow in the system. But some of the
business supports were also responsible for setting up the business and they did also enter the price structure in the system.

The users revealed that they wanted to know more about what they could do in the system and that personalized education and training was necessary for this. The same users said that that they felt the process improvement group didn’t have time or resources to educate and that they don’t wanted to disturb them when they are overloaded of work and that sometimes they don’t have the time to ask them about some specific question regarding the system or used of the system. Some users said that they unconsciously accepted the work-flow in the system and that they don’t point out all the problems they encounter in the system, because they get use to the system. Some users from BA5 experienced that they didn’t know who system owner to turn to when encounter a certain problem. And when they did they used already established relationships within the process improvement group instead of seeking for the right person in the group.

They experience that they don’t find all of the system instructions for the system, but they also admit that they are lazy and don’t use the system instructions to often. They said that the system instruction often told them what to do in the system but don’t answer why some steps was demanded by the system, which they felt a need for, to better understand the use of the system and overall business. There were users who believe that they could improve their work by getting to know how they could use the system more.

**The ISTRAS and Supply planners**

During the interview with the supply planners and ISTRA’s some problem with the systems support of the work-practice was encountered.

Firstly, to be able to-do the capacity planning the Supply planner and ISTRAS are monitoring the capacity of the suppliers towards the demanded volume from the IKEA-supplier. This is managed through Excel sheets, with respective supplier’s capacity which is compared to the annual demand in the M3 system in the session MMS002. But because of the manual work-practice, the users saw advantages with a self-generated notification in the Kompis system when the capacity reached e.g. 70% of capacity roof. When a warning in the system was carried out action could be taken by the team and work more proactive.

Secondly, there is a situation where the demanded volume by the IKEA-supplier must be split on several suppliers to cover the demand. But the price for all of the orders can only get one price, which is the price that comes from the main supplier. The price from the sub suppliers is wrong and this effects the coming measurements in the KPI-figures, which co-workers are valuated on. The team needs to set the price for the individual supplier and this is referred by the team as working with split matrices.

Thirdly there was a desire to have a personalized workflow in the system so the sessions that were opened for the users are specific to the work of the group in the system. This was mentioned to make the work less complicated.
Customer relations, Customer service and Supplier service

The main activities in the work as Customer relations are to set up pricelists, offers and agreements for the IKEA-supplier. In the work with pricelist they enter article number, article name, price and issue multiple. The pricelist is often long and can be up to 50 articles and they gather price information from M3 about each article, which makes the work a lot of copy-paste. The Customer service place orders in the system, then they need the information of item number, quantity, issue multiple and delivery date. When the order is made the Customer service has to wait for the system to do then calculations for the material planning. This is done over night so in the next coming day they can control the material and confirms the order in the system, if there are enough articles in the warehouse or in production. If there are missing articles, the order can be split on several order and days. The work of the Supplier service includes to secure the orders so that it is on time and secure the material in right time and right quantity. This is done by checking so there are no shortages in the flow of the material. There is always a lot of communication with the suppliers and IKEA-suppliers in their work.

In the work of setting up pricelists, offers and agreements for the IKEA-supplier there is a need for the co-workers to see the information about every article in a more summarized way. Before the upgraded system there was an item information page in which they could enter the article number and receive all the necessary information about that article to set up the pricelists and offers. But without this page the work is more trying because they have to search the information in three sessions instead. The work of copy-paste is expressed to be frustrating especially when the system is sometimes very slow.

The work of Supplier service has been more trying after the new system, according to the interviewees. There is a problem with wrong delivery dates in M3. The system cannot accept weekend days as delivery days while the production are running on the weekends and can receive the deliveries in reality. So the system has a mismatch against the reality according to the Supplier services co-workers.

There is also a problem in the system when goods arrive earlier than expected. Before, the Supplier service could set the transport lead-time to 0 and then the delivery time date could be more precise to the reality. But they can’t do this in the new system and therefore the IKEA-supplier calls the Supplier service to check if the goods have arrived earlier. If it has, the Customer Service can change the order to the IKEA-supplier so that it can be shipped earlier. Then there is also a procedure called the receiving inspection control which according to the system takes two days but in reality usually takes one day. This takes up much of the Supplier service time and leads to frustration according the interviewees.

Besides this the interview gave a lot of demographics and descriptions of the activities performed in the system, context of the work and daily work which lies as a ground for the persona and scenario creation described in the sections 5. Analysis to personas, in page 44 and 6. Analysis to scenarios in page 45.
4.3 The AfterSale system at IKSC

The Aftersale system is a web-application for the IKSC call-center and the aimed users are the operator which has telephone contact with the customer. The system is used to order spare parts and fittings for IKEA furniture customers, which contact the IKSC operator at the call-center by phone. The system is new and has only been in use in two months.

4.3.1 The use of the Aftersale system

When a customer calls to order spare parts or fittings the system is used to order the specific fittings directly to the customer. When the customer knows which article number the lost fittings have the call-operator can enter the number in the search field and find the fittings easily. Otherwise they must use PIA Facts, an external program, to find the article by first finding the assembly description and in a two-way communication with the customer find the requested fittings. There is a possibility to save the email to the customer so further contact can be taken, if the requested articles would be missing and can’t be delivered. To follow up orders the call-operator can use a multi-search criteria database to find information about old orders; this search was not possible before.

4.3.2 The interviews of the Aftersale users

The context of the environment for the call-operator is split in two parts. One part is working in the office environment and searching for information for the customer and the second is working with the headset on and talking to the customer. When talking to the customer the work is focused and concentrated fully on the customer needs in a service oriented manner and when not the work is more free and easy. The users described how they put on the service minded hat to serve the customer and that they handle a lot of information which they referred to as information overload and that they worked hard to separate the information the customer needed to hear and the information they shouldn’t hear. The users expressed that they felt the PIA Facts as non-logical to the call-operator and that the use of PIA Facts demanded education before using it fully.

4.4 General topics during the interviews

There were topics that highly correlated during the different interviews and they were used to create the personas and scenarios. They are also presented to ICOMP because of the importance they might have for opinions about usability in the system at the company.

4.4.1 The slow response time

The number one finding which was revealed during every interview was the weak response time in the system. It was varying and occurred daily which the users found frustrating, some more, some less. Some said they had to wait for several minutes in the system and that there was one session, which they used a lot, which was especially troubled. It could take 20 seconds just to jump between two views. The Customer Relations and Customer Service complained the most about the slow response time, then came the ISTRAS and Supply Planners but there were complaining from the business support as well.
4.4.2 The need to understand the why question
Regarding the use of the system instruction and education in the use of the system some users expressed a need to know more about the why question. They said they knew what to perform in the system and how, but they didn’t know why they performed some steps in the system. The same co-workers thought they would do a better work if they knew more how they could use the system and if they had more of an overall understanding. One supply planner expressed the interest for education in the customer side of the system, for knowing the other side of the business. The system instruction was mostly used when the co-workers where new-comers and the users admitted that they where lazy of using them and asked the system owner for help instead.

4.4.3 The need for personalized workflow
When general opinions about the M3 system were discussed there were users which expressed that they didn’t feel that the system was logic to their work-practice. Some users expressed a wish for a personalized workflow due to their work in the system. This need was most significant in the ISTRA and Supply planner user group but also mentioned from the business support group.

4.4.4 The need for more sessions
The work of some user groups in the sense of multitasking and working in a service oriented manner demanded more sessions to be running at the same time. The system currently supports 7 sessions to be running simultaneously and in some situations in the daily work the co-workers ends up in a need to open more sessions. The need for this was more obvious in the Customer relations, Customer service and Supplier service user group than in the others. It became clear that the group is exposed for situations which are more stressful then normal when they encounter IKEA-suppliers and suppliers in telephone and are asked questions which they find answer to in the system. Because of the service oriented manner of the work the Customer Relation often abort their ongoing work to serve the supplier on phone. When the need for sessions exceeds 7 they close the sessions which they were working in and opens a new session to serve the incoming call from the supplier.
5. Analysis to personas

In this chapter I describe how I worked with creating the personas. I describe how I used the findings from the theoretical study to create the personas from the empirical finding and how the personas were structured to fulfill the requirements as tools in the software development process. The full personas can be found in the Appendix C Personas.

5.1 The need for four personas

When I created the personas from the user population I looked at the subgroups of users and tried to find users that had the same characteristics which were highly correlated with the business goal in the system. When looking over the material it became clear that there were mainly four types of user groups which the personas later were created from.

5.1.1 The Business support user group

This group was one of the larger user group within the total population. Because that the characteristic and activities in the system were different from the other users and that there was no good alternative to include this user group together with some other user group, a Business support persona was created. The size of this group was also big enough to create an own persona for the group. The activities ranged from working in the order flow to evaluate and develop the business in figures from the system. The reason for the spread of work activities might come from the characteristics in the work of Business Area 5; which has a complex business and work-practice and is described in the section 4.1.1 The groups within ICOMP. I also controlled so the user group had common skills, tolerance for technology and power in the organization which otherwise could have been a problem to unite the users in one persona. There where 6 people within the total population representing the Business support user group.

5.1.2 The Customer relation and service and Supplier service user group

This user group is represented by a Customer relation persona. The characteristics for this group are the business goal to work in a service oriented manner to serve the supplier or IKEA-supplier. The work performed had almost the same characteristics but took place on two different sides of the system, on the customer side and on the supplier side. The Customer relation and Customer service were responsible to handle the customer and Supplier service the supplier. When they work in the system they share the same intent, namely to serve the supplier and IKEA-supplier with information and handling their orders. There were 4 people within the total population representing this user group.

5.1.3 The ISTRAS and Supply planner user group

This user group shared characteristics in the business goals to secure and maintain the capacity and supply. It was also a user group which had concrete user demands in the system which highly correlated and it was one significant group which couldn’t be combined with another user group. There were 3 people within the total population representing this user group.
5.1.4 The AfterSales user group

The Aftersales persona was created from one user in that population. Because of the fact that the persona is only created from one user, it can be a lack to this persona. The reason for this was the lack of time in the study. The persona was verified with the user population to confirm its trustworthiness.

After the interview and observation of the use of the system it became clear that the user group worked in a stressful and service oriented environment, which characterized the persona.

5.2 The structure of the persona

Thru the work with the persona, I worked with the task of getting the persona to come to life. I used quotes from the interviews, context descriptions and pictures which described the users to the readers. When I worked with the data I looked for common activities, business goals and opinions which didn’t contradict each other, so I could create a persona which had a strong connection to the data.

The persona starts with a presentation in third person over which work-role and experience the persona has. In this early state the readers should get to know the persona fast and the agenda is to set the values and attitude of the persona early in the description. Finally there is a brief declaration over the use and computer skill which the personas possess.

5.2.1 Role description and context

The role and context description is meant to give the reader an understanding for the surrounding context of the persona. By reading this description the user can realize the activities and work which takes place of the persona. The reader can also get an overall feeling for the environment in which the system is used.

5.2.2 A description of a working day

This description is for the reader to get an in action experience of a typical workday in the users work. Here the reader can get a picture on a more detailed level in which environment the system is used in.

5.2.3 The nature of the work

In the nature of the work there are offers which can bring the persona and context into life.

5.3 Verification of personas

The personas were verified by both the user population and external software suppliers. The user population responded positive to three of the personas and related scenarios but they were not fully satisfied with the Business support persona. They were not satisfied over the description of the work activities and justification was made to filter out the activities with was considered as atypical to the user group.
The software supplier responded positive to the Aftersale persona and scenario and they felt that it could contribute to the development process. They felt that the personas would help them develop the design solutions faster and that the solutions would have been more aligned with the expected result. The personas could contribute to help in the workshops in the development and enable the developer team to receive the same level of understanding, which was said to often be a problem. The only justification expressed was the need to have deeper knowledge of some specific requirements when a specific design solution was developed. The supplier claimed that they would like the procuring organization to handle the persona and scenario creation in-house or with external partners and in return the software suppliers could agree to fulfill the usability criteria of the delivered software.
6. Analysis to scenarios

The scenarios created are connected to the personas of the user group. There were scenarios created to every persona and a total number of 8 scenarios of various lengths were created. Some scenarios were created with a today scenario and a future scenario so the reader could realize the difference between the two scenarios and some were only created with a today scenario. The full scenarios can be found in the Appendix D Scenarios.

6.1 Scenarios based on user requirements

All of the scenarios are based on specific user requirements in the support of the system which was revealed during the study. Because of the great number of requirements that were revealed in the study and because of the differences in importance to the scenario creation, a documentation over all the requirements were made and can be seen in Appendix B Summary of User requirements. Because of the great number of collected user demands and the time frame of the study some where picked out to represent the scenarios. They were picked out because of the importance they play to the specific user roles, which the personas are based on. Below is a declaration over which specific user requirements that are behind each scenario.

6.1.1 The Business support scenarios

The scenarios for business support are made from demands found for the set up of the price structure and the order handling in the order flow. They can be seen in the Appendix B Business support 1 and 4. The demands were revealed during the interviews and the observation of the system in use. I observed the updating of a new price structure and a simulation of the order flow. In the observations a need to better combine the creation of customer and purchase order was revealed when the co-workers worked in the order flow and a more automatic way of updating the price structure was revealed.

In the updating of the price structure a need to transfer information from Excel to M3 was found. There were a lot of manual work of entering the price data in M3 and it was done between a large Excel sheet and the sessions in M3 and the work was considered trying to the co-workers.

The work of the order flow is split in mainly two parts namely the work on the customer side and the work on the supplier side in the system. When a customer order is created and sent to the customer, a supplier order is automatically generated in system. The order to the supplier must be handled in the system by a responsible on the supplier side, often a Business Support or Supplier Service co-worker and there was a need for better connection between these two parts in the system when the purchase order is created. The purchase order number could be sent to the responsible for the supplier side order handling in memo or displayed in the system directly. Today the responsible need to find the generated order in a list of all generated orders. This gave the feeling that the work flow was interrupted especially when there was a time lapse between the work in the system and the order was hard to find among the others. This concrete user-requirements was taken care of and covered in a scenario.
6.1.2 The Customer relations scenarios

For the user group of Customer Relations, Customer Service and Supplier Service there were three findings which lay the foundation for the scenarios.

First the users expressed a strong dissatisfaction with the response time in the system. Some sessions which they used a lot in their work where unacceptable slow with waiting time for minutes. The sessions OIS300 and OIS301 were such and there the Customer Relations and Service check information which the suppliers ask for on phone. This caused a lot of frustrations to the co-workers when they couldn’t serve the suppliers demand in a service oriented way. They expressed it doesn’t felt professional to work in this way and some expressed the general feeling towards the system as hatred.

The second finding was a lack of good system support in the work with pricelist, offers and agreement. E.g. when an offer is prepared and there are 24 articles to include in the offer before there was an item information view in the system where the information was displayed to handle the work with offers. The users only entered the article number in the system and then the information was displayed. But in an upgrade to the M3 system, this item information justification was lost. Now the users need to collect the information in several different sessions which is frustrating because it takes a long time to finish the job.

The third and last was a need for more sessions. When the daily work with offers is carried out there are already many sessions opened because of the lack of an item information view. Then a supplier calls on the phone and asks the sales Customer Relation if they have an article in range the maximum number of sessions is 7 and not enough so they need to close some of their ongoing work to satisfy the supplier needs. This interruption of work is exhausting for the co-workers and the dissatisfaction over this was expressed.

When I saw how these three needs interacted with each other in the use of the system, I decided this was an important topic to cover in the scenarios. The need to enter many sessions in the daily work for information, the switch to work in back office manner to front office service oriented manner and the slow response time of the system, all combined is a pain point in the use of the system. I realized I had to turn to the business goal of the user group and clearly describe the context in the scenario. The overall business goal is to handle the information and work between the supplier and ICOMP and the context is a switching work manner, from back office to front office service oriented. This was needed to be expressed in the scenarios.
6.1.3 The Supply planner scenarios
There were three demands found from the interview and observations with the users in the ISTRAS and Supply planner user group and they can be found in the Appendix C ISTRAS and Supply planner 1, 2 and 3.

Firstly the users felt the system to be illogical to the work practice of the team and they wanted to have a setup of the sessions and view needed from the team. The underlying reason for this demand in this user group might be that the work of the team is not as linear as work in the order flow or the work with setting up price structures and offers. The work is more in a discrete manner, working in system parts taken from their context.

The second thing the team wanted was a support for capacity warnings in the system. When 70% of the capacity roof is reach of a specific supplier a warning could be generated thru the Kompis system. Instead of doing it in the way they do it today, manually in Excel sheets. This solution could help the team to work more in a proactive way, by seeing when the capacity has reached 70% and take action. There were also findings from the interviews from Business Support which indicated for a demand for capacity warning in the system. E.g. Business support work-practice to evaluate and develop the business, when the business support works with the evaluation of the business and the supplier she monitors the KPI-figures for the order request fulfillment from the supplier. If it isn’t 100% the business support contacts the supplier and tries to find out why. The reason for this problem can be both from the supplier and from ICOMP but the most common problem is that ICOMP order to much from the supplier which doesn’t have the capacity to take that amount of order. When seeing this findings correlate with the ISTRAS and Supply Planner demand of better monitoring for the capacity, the need for this scenario and support of the system was increased and strengthen.

The third lack of support is in the work of order from multiple suppliers. Today there is not possible to get a cost-price on respective supplier and the cost price comes from the best supplier due to cost-price, often the main supplier. The same cost price on every supplier will result that the value in the warehouse are wrong and a mismatch to the reality. The supply team handles this multiple orders manually because of this lack in the system.

6.1.4 The Aftersales scenarios
Interviews and observations of the context in the call-operators work showed a stressful environment and a front office service oriented work. The need to work fast and always satisfy the IKEA-customers questions is the characteristics of the work.

There was a need for better support from the user group. There is today no possibility to order the complete fittings bags when a customer needs the fitting bag. The co-workers expressed that there was circumstantial to order the fittings separately and they wondered why they couldn’t order the complete fitting bag in the system. There was also a trying
work flow for the user group when a customer had lost the assembly instruction where the article number can be found. Then they had to turn to SAMS and go through a circumstantial work flow to get the assembly instruction. This work flow was observed and documented in Appendix G and the sequences pave the way to describe the today and future scenario of the after-sale scenario. The context of a stressful environment and a service oriented work combined with this way of working in SAMS means a scenario which covers these aspects. The scenario needs to describe the work context of the co-workers in a way so it’s possible for the stakeholders and development team to imagine and fully understand the need for the customer relation, plainly understand the users. This context and use of the system today led the way for the scenario creation regarding this user group.
7. Findings

This chapter will analyze and discuss the findings in theoretical frame of reference and empirical findings due to the thesis questions of research.

7.1 Usability definition for IKEA Components

What is a definition of usability that suits IKEA Components? When assessing the usability definition of the ISO standard it’s clear that a system which satisfies the usability criteria’s must fulfill the three requirements of effectiveness, efficiency and satisfaction in a specified context. According to me, all must be fulfilled to achieve usability in the system because they are highly correlated and a lack of effectiveness and efficiency will indirectly result in a lack of satisfaction from the users.

An example of how the system fulfills the criteria’s today is when looking in the sales part in the system and the users of Customer relations and Supplier service in their daily work with offers and work of service oriented towards the IKEA-suppliers and sub-suppliers. Looking into the first criteria of effectiveness and the work with offers the empirical findings discovered how the users needed to interrupt their current work with creation of offers when an IKEA-supplier contacted them, because the IKEA-supplier always comes first. When the users need to close some of their current work because a lack of support in the system for more simultaneously available sessions, you can argue for a miss in the fulfillment of the effectiveness criteria due to the lack of completeness to achieve the users intended goals. Efficiency as the ratio between the consumption of resources to achieve the completeness is not achieved either, considering the extra work to finish the work with offers when the item information is hard to find and when the work is interrupted by the IKEA-supplier.

Because of the lack in the fulfillment of the effectiveness and efficiency the system cannot meet the third criteria, the satisfaction. A system which fills the user’s satisfaction is a system that can support the users in the goal to work professionally in a service oriented manner to meet the supplier’s demand in their business relation. The system of today cannot meet this demand and therefore there exists dissatisfaction among the users. The fact that the system has a long response time is also working against the fulfillment of satisfaction in the system in use. If the system would allow the users to work in a service oriented way with appropriate response time, with more sessions and better way of collecting information in the work with offers, it would probably be considered more user friendly and the satisfaction from the users could be fulfilled.

This example shows how important it is to fulfill all requirements in the definition and how important it is that the fulfillment takes place in a specific context of use, otherwise the system could not be accepted as user friendly by the user group.

Seeing the personas and scenarios for the user group of ISTRAS and Supply planners when it comes to effectiveness the system had a lack of supporting this requirement in the secure of the capacity of the supplier and to reach flexibility in the order from multiple suppliers. All of the multiple orders got the cost price from the main supplier which is a
failure in accuracy for the other suppliers and will effect the measurements and create a mismatch to reality. When the system doesn’t support this flexibility of cost price on the separate suppliers it requires more effort to complete this by manual orders, which gives a lack of efficiency in the achievement of the specific goal, to secure the supply. This chain also speaks for the high correlation between the fulfillments of the requirements which I mentioned was important for the usability acceptance.

The usability definition for IKEA Components can be applied according to the ISO definition and it is important that the definition is applied in a specific context to understand the fulfillment of the three requirements in the context. By showing how the definition is applied in the sales and supply example above, an understanding of the use of the definition to evaluate usability can be reached.

IKEA Components usability definition in the sales context:

“\textit{The extent to which a system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.}” - ISO 9241-11, 1998 (Gulliksen p.40 2002)
7.2 Tools and how to use them

Which tools and how should IKEA Components use these tools to consider usability aspects in procurement system? Below I answer which tools and how they can be used.

7.2.1 Which tools

The tools I present in the study for working in a user centered manner is personas and scenarios. The personas are created for the purpose of understanding the co-workers business goals and their general and daily context. And the scenarios are to understand how the use of the system takes place in its context. The personas are created on business goals and context in the user’s daily work so they can represent the user group in this perspective, which according to Pruitt and Adlin (2006) in the theory section is important. The scenarios are created from specific user requirements in the system to further facilitate the understanding of the context in the use of the system.

That the personas and scenarios were verified positive from the users and that the creation of these artifacts found both general and specific user-requirements, which was considered important from the user groups indicates the power and strength of these tools. That the supplier has accepted the personas and scenarios as a tool in the software development process also argues for the use of personas. These three facts assess personas and scenarios as a valid tool for considering usability aspects in procurement system and give the study a valid answer the question of research.

7.2.2 How to use personas and scenarios

The use of personas is a way to understand the user’s business needs and requirements and really get to know the users. By reading a persona story a common understanding of the users is enabled in the developer team without the need to meet daily with the users. Scenarios can be used to understand the current use and vision for a future use in the system. By connecting the personas to the scenarios a full understanding can be reached, the personas describe the users and the scenarios describe the use of the system.

If personas and scenarios had been used, a number of needs from the users would have been revealed. Understanding the context of the sales department and their business goals, personas and scenarios could help the developer team to understand the need for the system to support the context of multitasking and work in service oriented manner. Item information view, more sessions and faster response time in sale side of the system would then have been considered important to the users of Customer relation, Customer service and Supplier service.

Personas and scenarios could help understand the needs for better capacity planning in the strategic purchase of the ISTRA and Supply planner user group by an understanding for the groups business goals. The need to work proactive to secure the supply could have been realized by reading and understanding the user business goals and their context in a persona and a scenario.
An understanding of the context for the call-operators and their business goal could help the development team to see the need for an easy function to display the pictures over the articles in the system, to serve the business goal of the user group, to serve the customer on phone. The use of personas and scenarios could facilitate the understanding for this need to support the business goals.

In the work with creation of personas and scenarios some general aspects could be found which affect the satisfaction of the system in use. If the interview script is arranged among topics not just concerning user goal, task and the roles they play, but also surrounding topics to cover the whole context like education, use of system instruction and general opinion of the system, the persona and scenario creation could find interesting problems surrounding the system.

**Slow response time**
The slow response time and how it affects the total satisfaction for the system would have been facilitated and realized when understanding the context of the users work and environment. This would have been prioritized for the users when working in user centered manner with personas and scenarios.

**The why-question**
The need to understand the why question which was expressed from the users gossips about an organizational need in shape of education and use of system instruction. The process and creation of personas and scenarios reveals more then specific user goals and requirements of the system and this can be the first outline for a project working with how to raise the user’s knowledge of the system in education and by working in system instructions. This can contribute to how ICOMP can work more continuously with education in the system, not just only with new employees and at new system implementations.

**The personalized work flow**
The feeling that the system isn’t logical which was expressed from the users was also picked up during the persona scenario creation and is an indirect result of working in this manner.

**Summary**
To summarize, working with persona and scenarios creation can contribute to more then to get to know your users and their specific user requirements. It can contribute to find surroundings and organizational requirements in the context of the system which is at least as important as the specific user requirements, in the work of fulfillment of the satisfaction of the users. Personas and scenarios can help understand the user’s business needs and requirements and really get to know the users. They can therefore help the development team to procure user requirements which function as input in the procurement process seen in the what-part in Figure 8 on page 31. By realizing the user’s requirements and why they are important for the users, the development team can
prioritize among them and select them in the procuring process according to user’s business goals, thus overall business goals.
7.3 Obstacles and enablers for working in this manner

This section is to answer the question what obstacles and enablers there are at IKEA Components for introducing and working with personas and scenarios in procurement of systems in a user-centered manner. There are several obstacles and enablers for IKEA Components working as a procurement organization in a user centered manner and here I outline the identified.

7.3.1 Obstacles

The three main obstacles are described below.

The complexity of M3

The M3 enterprise software is large and complex and hard to modify without large costs and the fact that the software is “off the shelf” software has large limitations. There will always be an aspect of cost in the trade off for a modification for better support of the users. This obstacle is mainly related to the M3 enterprise software and not to the other systems, like the procurement of a system like the Aftersales.

The lack of resources

The process improvement group doesn’t have the time, recourses or experience of working with personas and scenarios in this manner. The team is already overloaded and cannot work proactive; in fact today they often work reactive with fighting fires. The work of the group is according to Bloomers and Crofts description, a work against tight budgets and deadlines and with the structure of the group today there is no possibility to work proactive in user centered manner. It will be hard to continue the work as user centered after this study unless more resources are allocated. To work proactive in a user centered manner is best carried out in project based form where the responsible can investigate the users in their own environment. This role is hard to combine in a System owner role where the need is to always be available and monitor a specific system.

The management support

The management must realize which importance a well mapped IT support has to business output. The system cannot be seen as a support function for business, it should be seen in symbiosis with the business. The output from an investment in user centered design is hard to measure in an ROI but the personas and scenarios are created on the foundation of the user’s specific business goals and business activities in the system and would probably contribute to the output if being improved.

The external supplier of software must also accept this new way of working and see the benefits it contributes to the result. The request from the supplier to work closely with user representative in the design of solutions must be enabled by management and obtained in workshops between the developers and a user responsible or a user. That the response of the personas and scenarios from one external supplier was positive indicates that the obstacle from the supplier at first sight seems less then expected.
7.3.2 Enablers

A user responsible
To be able to work in this manner in the future, a responsible for advocating the user organization in the project must be selected. As a procuring organization IKEA Components should have professional usability competence for managing the user centered design process, which is said to be important from Markensten. The process should include both procuring of user requirements and prototype evaluation with the user organization according to the procurement process in Figure 8, see the how-part. The person should strive to advocate and represent the users in workshops as well in meeting with suppliers and management. The responsible for this should also represent ICOMP as the procurement organization to external suppliers together with the IT-Manager, to ensure that the user demand and will is satisfied in the procurement of software and systems.

Management has identified the problem as strategically important
The management has identified the problem of lack in the systems support of the users as a strategic priority. As a first step this study is carried out and there is a will to change and improve. If the management sees user centered as a way to improve the business in another initiative. The benefit with user centered design will increase and the will to work in this manner will have support from the management group, which is considered important according to Bloomer and Croft. The fact that the user’s goals are a part of the overall business goal and that they are included in personas indicates that working with personas and scenarios can enable ICOMP to reach key business goals. In addition the management has experienced positive effect from working close to users in development of new software, in the project with the software development of the APM system. One positive experience from this way of working and seeing the way to reach business goals might reduce the need to see a detailed ROI declaration on the investment in the work of user centered design.

The flat organization
The organization at ICOMP enables to work with users which are opened minded to participate. The organization is very flat for being a global business and I have never met a business more willing to cooperate in the way the users did during my study. The openness and flat organization makes a good fit to work user centered with users willing to share their thoughts and opinions. There was never a feeling that they kept something from me and they were open-minded for the work I performed. The flat and open organization makes the user centered design efficient to carry out in a project and easier for the process improvement group to work close to the user organization, which is a goal in the procurement approach according to Markensten, see Figure 6 in page 29. The flat shape also helps the creation of personas and scenarios for the procurement organization because of the will of the users to share their goals, intents and work practice.
8. Conclusion
This chapter will answer the questions of research and here I outline the answers from the previous chapter. The chapter also consists of a recommendation for IKEA Components.

8.1 Definition applied on reality
To get an efficient definition that stakeholders can unite among and easy understand it is important that the definition comes to life and can be applied in a real context. The ISO definition is suitable as a definition but it must be applied and connected to a system, a user group, specified goals achieved under effectiveness, efficiency and satisfaction and in a context of use. When the definition is applied in a real context it is possible for the stakeholders to understand the true meaning of usability. The definition can now be used to set the direction and strive to achieve usability in the systems.

8.2 Personas and scenarios to understand the users
Using personas and scenarios as a tool to understand the user’s requirements and their context can help the development team to develop more user friendly system, more in alignment with the requirements of the users. The development team can understand what the user-requirements are but also understand why they are important to the users. This helps the development team to prioritize among the requirements by understanding how important they are to the user’s business goals and in extension the organization business goals.

8.3 Obstacles and Enablers
The obstacles for working with personas and scenarios as a procuring organization are the complexity of the M3 enterprise software, the lack of resources and the support of the management. The tradeoff between cost and usability will always be present when the M3 off-the-self software is considered. The lack of resources will not make it possible to work user centered without external competence to the group and the support of the management is strongly tied together in the overcoming of this obstacle. The enablers for IKEA Components to work in this manner are tied to get a responsible for representing the users in the procurement of software. The management has realized that the system is a part of the solution for improving business strategic goals and it can help to motivate working with personas and scenarios. The last enabler is the flat and openness in the organization; it will be beneficial when working with users in user centered design projects.

8.4 Recommendation
The recommendation to IKEA Components if decided to work in user centered manner in the future is to create an action plan for the user-requirements found in the M3 system and to start investigate into the specific user requirements. The management must be motivated by the IT-manager to put effort in the work of user centered design. There must be a usability competence tied to the organization, internal or external, to work with representing the users. When a new software project is started the usability competence should be involved to advocate the users in the procurement of the system.
References


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Internet publications:


Pictures in personas:

Business support
http://www.inmagine.com/00176/00176015-photo
Customer Relations
http://www.inmagine.com/ins038/ins038111-photo
Call center operator
http://www.inmagine.com/cd282/352055rkt-photo
Supply planner
http://www.inmagine.com/fan2036888/fan2036961-photo
Appendix A Interview script

Tools:
Diktafon, anteckningsblock, pennor, post-IT notes. interview-script.

**Introduction 30 min**
Introduction, setting expectation.
Presentation om mig själv.

Förklara syftet, att jag spelar in och det är
för att jag ska kunna minnas intervjun, att jag förstör den efteråt.

Det är du som är expert på din egen användning
så var inte rädd för att uttrycka dina åsikter.

Intervjun kommer att vara strukturerad med ett
antal övergripande frågor som vi diskuterar kring,

Och att du berättar för mig hur du
upplever ditt arbete. Är viktigt för studien.

**Background 30 min**
Job role, job title, their interests and activities.

Namn Title
Kort beskrivning
Ålder, kön.
En slogan som du skulle vilja nämna på dig
Avdelningsnamn, gruppnamn
Personliga artefakter som, bil, mobiltelefon, handdator, filfax?
Datorvana (hemma?) och internetvana
År av erfarenhet av arbetet på ICOMP och i systemet (M3 eller AS)
År av erfarenhet av ditt arbete på ICOMP?
**Key topics 30 min (Roles and tasks)**

Huvudämnet, låt den intervjuade berätta om sina erfarenheter, tankar och opinion inom vissa områden; vilka områden? Gå igenom deras organisation och be dem förklara vilka de samarbetar med genom deras tidigare aktiviteter. Be dem förklara eller visa hur de genomför en viss uppgift i systemet.

Typiska aktiviteter i job-roll.

och viktiga atypiska aktiviteter

En beskrivning av det dagliga arbetet, kan beskrivas som en tidslinje från frukost på morgonen till hemkomst på kvällen.

Vilka typiska arbetsmoment är inkluderade?

Beskriv ett arbetsflöde som genomförs.

Om det finns många välj ett typiskt arbetsflöde

Utmanande områden inom ditt arbete, flaskhalsar och irritationsmoment. Beskriv mer.

Ansvarsområden i ditt yrke?

Interaktion och samarbete med andra Kollegor och system som kan förekomma under arbetet.

Mål, vilka korta mål finns det att sträva efter i dina arbetsmoment vi har pratat om tidigare.

Vilka långa mål finns det i dina arbetsmoment.

Vilka motivationsdrivare finns i ditt arbetsliv för att föra arbetet framåt?

 Arbetsrelaterade mål och system relaterade mål.

Vilka önskemål har du om M3,

Vad tycker du om M3 idag?

Vart har M3 sämst stöd för dig som användare?

Om vi ska studera ett visst flöde/arbetsmoment i M3 – vilket skulle det vara, har du tips?

Användning av ditt arbete i hela organisationen,
vilken influens finns det i organisationen av ditt arbete?  
Vilka påverkas av ditt arbete?

Generella livsmål, karriärsmål?

Personliga färdigheter och kunskaper du besitter?

Värden och attityder som påverkar.

Vilken träning har du fått i systemet?

Behov av träning?

Vilken miljö befinner du dig i?  
Utomlands, många besök hos kunderna!?  
Vart sker mesta delen av ditt arbete?!  

Vilka verktyg används I ditt arbete?
(Excel, nätuppkoppling WWW, operativsystem, 
mobil, laptop, filofax eller andra system)

Vilket arbete sker i help verktygen som t.ex. Excel

Mest kritiska verktyg i ditt arbete?

Speciellt användningsområde? Vart användsverktygen?

Closure 30 min
Avslutande, ta upp kontakt information,  
Hantera intressanta områden som uppkommit under intervjun.

Vad är ett användbart system enligt din åsikt?

Tacka för hjälpen, uttryck tacksamhet från ICOMP sida.
Appendix B M3 Sessions
Appendix C Summary of User Requirements

ISTRA and Supply Planner (Strategically purchase and supply)

1. Designed personal workflow
To have a workflow on a personal level. E.g. so MMS001 follows of PCS280. Wants to design own workflow in M3. MMS002, PCS195, PPS300, and within each program set the flow of the views, which is possible today.
A desire for a standard setting over the program used in the team or group.

2. Deliveries of multiple suppliers
In session PCS280. Be able to user shared matrices, ‘splittrade matriser’ to achieve flexibility in the capacity from the suppliers. So the main suppliers don’t stir the whole trade and no manual orders needs to be done. Need to have cost price on every supplier, and not the cost price of the main supplier on every order in the trade. The old system had a modification which supported this but in the upgrade it was lost.

3. Control over capacity
The control of the capacity from the supplier in M3, instead of control it in excel. When the supplier reaches 70% from its capacity roof, a warning could be generated in the Kompis system. The warning cannot be on specific article, do avoid the unnecessary warnings. Today this control takes place manually between the system in session MMS002 and the excel document. They compare annual demand (8 mounth * 1,5) with the suppliers capacity in the Excel document. The need for warning of unused capacity was also expressed, this is for working more proactive with the capacity.

4. Classifying of articles A, B and C.
There is no support in the system for classifying articles. The classifying is made of how many transaction the article is connected to. Article A has a high frequency and must therefore have a short ‘säkerhetstid’. The classifying should only consist of production related transaction. This work is today managed by work in excel for evaluating articles and their ‘säkerhetstid’ and can take two days work.

Business Support

1. Update the price structure
In the monthly work with updating the price structure transferring price-info from Excel to M3 automatically would help in the work.
  PPS101/B1 Create new record by, press F7 (Add item), fill in Starting date, Create/Ctrl+1.
  PPS101/E Add FCA price from the price list and quantity ‘1000’ and Enter
Here some transferring for information could take place from Excel to M3
  PPS102/B Press F12, twice,
2. Kompis; store previous attributes
Cannot move back one step in the flow for to create figures about different material. Gets back to the BA5 choice (start menu), previous attributes could have been stored for the future. Have to do this allover again, and in the long run, it’s frustrating and eats time.

3. Kompis, see forecast deviation from previous week.
In Kompis:
Want to compare the forecast against previous forecast sent out to the supplier. If Kompis generated report could include some column with the difference for the previous month. This could help Business support to see the trends in the forecast.

4. Purchase order number
When a purchase order is created from a customer order the Business Support, or the person working in the order flow would like to have a memo or notice of which purchase order number was created. Today they have to look in the list of all purchase orders and look for their created order. If there was a time lapse between the work it takes time to find the order in the list of all purchase orders.

Customer Relations, Customer Services and Supplier Services.

1. Need for sessions
It can be a problem with the lack of not able to open more then 7 sessions, when you need to open 3 new session. Only 7 sessions opened at the same time, so when a supplier calls and want to know if something is left or if an article is in range, they might have to close the existing sessions and start over again. Because the IKEA-supplier always comes first, when they are working service oriented.

2. Item information.
In M3 there is a lack of a function for item information. Before the item information was shown in the navigation bar which when you clicked it revealed all the information you needed. But now you need to open three sessions and type the item in each to see the information.

3. Mismatch against reality; change of lead-time, not supporting weekend-days.
In PPS250: When the supplier has confirmed the order the Supplier Service could change the lead-time. Supplier service was before able to change/edit the delivery date to the actual date it arrived. This was done thru changes in the transport lead-time from e.g. 2 day to 0. And the customer could receive faster delivered goods. This gives the problem that the system shows the lack of material in session MMS080, the day of availability of the material. Supplier Service knows for experience, that the material is here now, but the system shows it will be available in the 3 or 4 days. The sales department then sees that there is a lack of material so they call the Supplier Service and ask how it is because they
also know it could arrive earlier. Before the transport lead-time was editable in the previous Movex version. But there is also other problems contributing to this problem.

1. Receiving inspection control is in the system and defined for two days, but takes maybe half day.

2. The system don’t consider the weekend days while the production is going on weekends also. So there could be arrived goods in reality in the weekends but the system can only signal for arrival on the coming weekday.

The Supplier Service is now working as an information desk to the sales department, which is frustrated to them.

4. Lack of support for transportation in system.
The transportation department should fill in the transportation order, they do this in a Excel sheet which they edit and change the new data, loading date, issue date, different price to the pricelist. And this is sent to the transport company, which needs to confirm it in price, license plate of the truck and they need to confirm it one day before loading. And this is manually handled today. The transportation dept. also need to register transport cost invoiced to the customer and price confirmed to the transport company. So that they can check it up when it’s invoiced to ICOMP. This is done in an Excel sheet and is manually handled, at present.

The transportation co-workers couldn’t believe how they should be able to work in this manner for years.

5. Lack of info about collars in the system.
In session MMS060 (information about the pallets position in warehouse. Data: (the position, quantity per pallets,) here the info about the collars would be. Cannot see how many collars there are on an pallet, so the transport can arrange the transport. Today the transport arrangement is done by a call to the CS and then the CS call someone in the warehouse and ask how many collars there are. This is not only useful for CS, but also for transport dept. which prepare the transports and the freight cost. Also useful for transport to/from china, where the containers might contain these pallets and collars. The customer which might arrange the transport need to know this information and often calls the CS for this.

General experiences about M3 and organization.

1. Information in case of emergency
When the system freeze or not working some frustration is build up and the lack of information confuses the some co-workers. Sometimes the nightwork in M3 is not executed correct and all the work during the day must be done over again and contact with supplier are taken. The wish for someone controlling if the nightwork in M3 was carried out properly and notice the co-workers in the morning.

2. Short commands
One user asked where the information over the short commands I M3 is. So that they could learn how to use the system faster and more efficiently.

3. The use of system instruction.
The use of system instruction was limited from the users and there was an expression that the system instruction should also include a description or explanation over why they performed some action in the system. “You are told to do some specific in the M3, but you are not told why you should do that.”, some user said. Some users believed that their work could improve if they knew why some action was performed in the system and there was a need to know why some action was performed.

4. The slow response time.
The users expressed their dissatisfaction with the response time of the system and was by far the most expressed opinion of the system.
Appendix D Personas

In the personas there are specifics IKEA Componets which the reader should be aware of.

- Memo is the email client.
- Sessions is a part of M3 where actions can be performed in the system e.g. the OIS300.
- IKEA-suppliers are the customer of ICOMP but never considered as a customer, the customer is always in the store buying furnitures.
- Kompis is a business intelligence application.
Erica Andersson 31 years
Business Support. IKEA Components

“If the suppliers are performing well, so are we”.

Erica Andersson is working as a Business support at IKEA Components in a purchaser team consisting of her, a purchaser and a technician. In her work she is responsible to maintain and handle the operative order-flow for her 4 sub suppliers and 15 IKEA-suppliers. An important value for Erica is to be a team player and be open with sharing of information. – “The loyalty within the team is highly valuable”, and to be helpful and always there to help out it is something that Erica consider as a ground value for her. Erica describes her self as a person who has control and a need for structure in her work. When using computers at home she is surfing on the internet for e-shopping, internet banking and booking travel tickets. She is also managing her budget in Excel.

Role description and context
The work as Business support has many-sides and can easily be described as the spider in the net. The goal of the Business support is mainly to manage the order-flow between the supplier and customer side. To do this she’s in contact with both the supplier and the IKEA-supplier and evaluates them on KPI-prognosis like order request fulfillment and delivery security. This is to secure the availability to the IKEA-supplier on short term basis. Sometimes the IKEA-supplier wants to change delivery dates on the orders, so she works to correct purchase orders, all to enable an efficient order flow. To work proactive she has contacts with the suppliers and tries to develop and set a new routine for the order handling.

A description of a working day
She comes to the office and starts her computer, it often takes a while so she goes to the “fika”-room to get some coffee, meanwhile the computer has started. The first thing she does when she comes back is to check the memo for received emails and there is often a bunch waiting for her because her suppliers are positioned in China and have worked during the night. She starts to handle them that can easily be solved and put the rest up on a to-do list, to be solve later in the day. Then she starts the M3 and the Kompis system, because she knows that she is going to use them later, she starts to pick out the KPI-figures to evaluate one troubled supplier when suddenly a call comes in from an IKEA-supplier who ask her why some deliveries hasn’t arrived yet. The reason has to do with a capacity problem the supplier is facing so she’s decides to go for a support buy from another supplier. She cancels her previous work with the KPI-figures and thinks, “I have to remember to do this later, before the day ends” and starts to look in the Excel capacity sheet for a supplier that can meet the support buy. After calling the supplier and handle the buy she notifies the IKEA-supplier by phone and continues to work with the KPI-figures. The clock turns 12 and it’s time for a lunch-break. Because she know she will have a virtual meeting in the web-ex system after lunch she eats the lunch in half an hour are then heading back to set up the web-ex conference.

This day is the last in the month so she starts to set up the price structure for her suppliers, the new price structure can now easily be set up in M3 the coming days. Some of her colleagues go for afternoon coffee, she looks into her cold, half empty coffee cup and then she looks in the mailbox where there are 5 new unread emails. “This is just one of these days”, she thinks and continues her work from the morning of picking out KPI-figures from the system.

The nature of the work
“I dream of the fully automatic order placement system”
“A really good ERP system can combine the usability with the need for overall business needs”
Lucy Wang, 26 years.
Customer relations. IKEA Components

“The supplier always comes first, this is essential in our work”

Lucy is working as Customer relations at the Shekou office for which she’s been doing for 2 years now. Before she was working at ICOMP she was studying at university and started to work as Customer Service at a manufacturing company, before she became an ICOMP co-worker.

Role description and context
The environment where she works is in an open office landscape where she sits with other Customer relations and Customer Service co-workers. The main activities in the work as Customer relation are to set up pricelist, offers and agreements for the IKEA-supplier. In the work with offers she works together with Business Developers, ISTRAS and Forecast coordinators. In the work with pricelists she enters article number, article name, price and issue multiple. The pricelist is often long and can be up to 50 articles and she gathers price information from the M3 about each article “It’s a lot of copy-paste in doing the pricelist”. Another thing she does more ongoing in the system is to place orders, then she needs the information of item number, quantity, issue multiple and delivery date. When the order is made she has to wait for the system to-do the calculation for the material planning. This is done thru the night so in the next coming day she controls the material and confirms the order in the system, if there are enough articles in the warehouse or in production. If there are missing articles, the order can be split on several order and days. She also secures the orders so that’s it’s on time and secure the material in right time and right quantity. She’s doing this by checking so there are no shortages in the flow of the material. There is always a lot of communication with the suppliers and IKEA-suppliers.

A description of a working day
Lucy arrives at the office and the first in the morning she docks her computer and opens memo to check the mail for some important questions from IKEA-suppliers. A new email in her inbox is a question from a co-worker in Sweden which she helped yesterday. She always has a lot of emails from Sweden and Slovakia in the morning because of the time difference. She opens M3 to look for information about some articles which the co-worker in Sweden asks for. There are also some new orders for suppliers so she prints out the order and opens the OIS300 to enter the order in the system. “We are to a large extent memo driven” and because of the different ness of the work and the information overload she uses paper and pen to structure up the work and she uses memo to get help or to forward questions to the right co-workers. After lunch she starts to work with her offers, armed with a cup of coffee the copy-paste orgy begins. There are 27 rows to be filled in and this must be done before she ends her work today. In the middle of the work her colleague who sits besides her ask how she should do with some of her orders of which she cannot find the quantity for. Lucy stops with her work and starts to help searching for the quantity.
Michael is working as a Supply planner and has been doing so for 5 years. At work he sits and works closely in his team which consist of an ISTRAS and a Design engineer. Values that are important to him in his work are commitment and an openness to share information within the team. At home he’s using the computer to surf on the internet for purchasing of tickets and to search for price suggestions of products he want to buy. He also uses Excel to manage his monthly housekeeping budget.

**Role description and context**
The work as supply planner is mainly to secure the capacity at the supplier by monitoring and maintaining the warehouse levels, to fulfil the IKEA-suppliers demands. By the work of securing the capacity the team work closely with the business support on the trading offices so they can decide how to act in a certain situation, which can arise when the capacity of one supplier is threaten. The team receives the annual demand from the forecast coordination and Michael can then start to work with mapping the supplier’s capacity to meet the demand which is his mainly work. When not working with this he is occupied of evaluating the supplier and changes the suppliers that cannot meet the requirements. “Besides our mainly activities, we are working a lot with putting out fires”, Michael says. Some proactive activities are developing of the warehouse by monitoring the general turnover as well as the turnover of specific articles and also seeking for articles that are slow movers in the warehouse. “You know when a product expires and you have 80 days supply in the warehouse, it’s a huge cost”. The proactive work is important in the long run.

**A description of a working day**
He starts his day by logon to the wireless network on the bus to his job. Hi opens the mailbox to prioritize over the emails that have arrived during the night, “we are incredible memo dependent”. Some of them he can answer directly and some are structured in a to-do list in excel to deal with later. When arriving at the office he often knows what to start working with and today he checks the in-stock and status of the one demanded article. There is always some memo arriving during the day which is highly prioritised to solve. The questions are often small and takes no more then some minutes, but they takes me out of my context and therefore sometimes, “I close my memo so I can work more proactive and concentrated.” He is aware that his information is important for the ongoing work of the other so he tries to answer the memos as fast as he can when they arrive. A lot of the work is driven by memo and to structure the nature of the work, Excel is used to organize the incoming issues.

The day continues with the work of searching for slow movers in the warehouse. He enters M3 to gather information about the articles and exports it to excel to analyze it. He opens the Kompis system and checks for articles which have increases or decreases in stock, and how the warehouse level is going when Petra business support contact him because a supplier in France cannot meet the demand in the coming weeks, the team need to solve this issue instantly, so they stop doing their regular work and focus totally on this issue. By the end of the day there is still proactive work to be done, but he needs to finish the day off so he puts it up on his agenda for tomorrow. He runs to the bus that will take him home and while on the bus he answers some emails that have arrived during the day.
Jenny Eklund, 23 years.
Call-centre operator, at IKSC.

“-I see the possibility, not the obstacle when entering into something new”.

Jenny is notorious curious and open minded for change. At home she uses the computer to surf for information about commercial products and also do some e-shopping of products she knows of. She uses a Mac instead of PC at home, but she wouldn’t consider her, a computer expert, “-I’m not interested to know all the technical behind the computer, I’m a good user and I know were to find the information, that’s it”.

IKSC is call-centre and an IKEA owned company placed in Älmhult, from where they handle the after-sale service to the furniture customer of IKEA. When a customer have problem with lost or broken fittings for the furniture they take contact with IKSC. Jenny is working as a call-centre operator, which she’s been doing at the call-centre for one and half year now. She is responsible to handle all of the incoming calls from the customer and to solve their problems and needs.

Role description and context
The mainly activities Jenny perform in her daily work is to search for information about specific products in the IKEA range, and their components as fittings and screws, to serve the customer on the phone. There is a large information flow out there and it is up to the call-operator to filter the information and work in a service minded manner to the customer. “-A good quality to possess is the ability to read the customer in advance and know which tool from the toolbox to use to solve the problem.”

The environment is in an office landscape where she sits together with 8-10 other call-operators. In the corner of the office there are three monitors, visible for everyone to see, which displays the status of the call-queue and the other goals the team has put up to reach. “-This is our goal for to day, and we really have to pull together to reach it”, the team manager says. The display twinkles in red and green light and on one monitor it displays 32, this means that there are 32 customers in the queue. All the call-operators work focused with headset on and their eye’s attached on the screen, some having customers on phone others navigating in the intranet, searching for information and news about products. Laughter is heard in the buzz, and two colleague stands besides Jenny’s desk and discuss how to solve a customer’s problem.

A description of a working day
She steps in to the office in 07:40am and starts the computer up, and heads for coffee. “-The savior in the morning”. Meanwhile the computer has started and logs in the agent desktop which is the phone system and opens SAMS where she handles errands and search for articles, the memo and the intranet and at last she opens the notepad, which she uses to takes notes during the telephone call. Now she is ready to receive calls and work service minded to the customer. The phone rings and she is ready to start working down the call queue. There is a customer how has received a broken slide door, she takes the customer information and prints it down in notepad together with order number and a brief explanation of the problem. Now she needs to contact the transportations company to clarify the problem and to check if the slide door is in stock at the IKEA store, closest to the customer. So she tells the customer that she is going to call her back in the afternoon to confirm.

The nature of the work
-“This is information overload, it’s a lot about handling things simultaneously”
-“To be service minded is victorious, so when I’m in contact with a customer, I put on my service-centered hat.”
-“I’m using notepad in a slave wise manner, to handle the temporary information which arise during a customer call.”
Appendix E Scenarios

Scenarios of Business Support in the use of the M3.

Scenario "setting up price structure" today:

Context and background: Erica’s business area must change the price structure during the order lifetime in the system because they are trading in a monthly basis with a world price as base for the price structure.

It’s the end of the month and she prepares the price structure to be entered in the system. She opens the Excel document from the supplier which contains the price structure. She opens the Purchase agreement open, and here she sets the Inquiry type to ‘1-Supplier no’ to see the supplier number agreement and she sets the Status to ‘40’ in both status fields, to see the valid agreements. And after that she closes the valid price row and add new, for price follow.

Then she goes to the purchase session PPS101/B1 and marks the last line and double click on it, while in the PPS101/E the ‘Valid from:’ textbox are filled in for the closing date, which is the last date of the month, then she presses Enter. Then she comes to the PPS102/B and now she press F12, twice, to get back to PPS101/B1. In PPS101/B1 she creates the new record by pressing F7, add item, and fill in the starting date, Create/Ctrl+1 and then she comes to PPS101/E where she adds the FCA price from the price list and quantity ‘1000’ and Enter. Now she comes to the PPS102/B and by pressing F12 twice she comes to the PPS101/B1 and here she continues with remaining items.

Scenario “setting up price structure” in the future:

Future scenario is to in the monthly work with updating the price structure transferring price-info from Excel to M3 automatically would help in the work.

PPS101/B1 Create new record by, press F7 (Add item), fill in Starting date, Create/Ctrl+1.

PPS101/E Add FCA price from the price list and quantity ‘1000’ and Enter

Here some transferring for information could take place from Excel to M3

PPS102/B Press F12, twice,

PPS101/B1 Continue with remaining items.

Scenario “Customer order to purchase order” today:

Erica receives a memo from an IKEA-supplier who wants to order some articles in range. She goes to the printer to pick up the printed order and controls that it’s her order. When she returns to her desk she opens the customer session OIS300 and chose the new order alternative she enters the customer, she then review the default data and payments. Then she switches over to OIS101 B1 view where she choose article and fills in the sales price. Then switch over to the PPS100 B1 view and takes the purchase order and control the sales price against Excel document were the new month sale price is stored. Everything seems correct so she now switch over to add pre- and post texture to the order which controls by review the order, price, details and material. Now she goes to the memo and email the order to the customer for verify. Before she send the email away, Peter, a colleague comes by and asks her if she can set up a new business for a China supplier, because she’s is to only who can do that in helps him right away and goes to eat lunch. When she comes back after lunch she needs to create a purchase order. She goes to the PPS170 B view to see the
purchase order which were generated. She scrolls in the list where all the purchase orders are created, there are many order in the list so it takes a while to find her order. Finally she finds it and starts to finish the purchase in the system.

**Scenario “Customer order to purchase order” in the future:**
Erica works in the order flow, everything seems correct so she now switch over to add pre- and post texture to the order which controls by review the order, price, details and material. Now she goes to the memo and email the order to the customer for verify. In memo she has received a new memo, it’s a memo with the generated purchase number. After the lunch break she sits down at her desk and goes to the PPS170 B view and takes the purchase order number and enters it in the text field. The order reveals first in the list, she select it and continues to finish the purchase order.

**Scenario “comparing weeks”, of today:**

It’s time to send the forecast to the supplier for evaluation so she opens Kompis to choose the right report. In Kompis she chose the row named trading and then she chose the supplier forecast. Inside the supplier forecast she can chose her name from a list of Business Support and when she does that she sees all of her suppliers in a list. She picks the supplier which she wants to receive a report on and goes to set the parameters for the report such as service class, frequency class and date range. Now she is ready to create the report so she does it by clicking on the ‘Slutför’ button. The report is displayed and now she chose to have to report in Excel format also (so she can compare) info, so she can send it to the supplier.

**Scenario “comparing weeks”, of future:**
Before she sends the report to the supplier she wants to check the forecast against the forecast she sent out last week if there are any large deviations. And to do this she need to compare the rows between the new report and old report which takes times and is frustrating. She would like to see the deviation between this week and last weeks report presented in the system. By doing this she can look for trends and deviation which could be there.
Scenarios of Customer relations in the use of the M3.

"It doesn't feel so professional, to put the customer on hold for 5 minutes just for checking some article"

“This is frustrating”

Scenario "Need for Item info page and need for speed” today:
Lucy Wang sits in her office at Shekou and prepares offers for some IKEA-suppliers. She has opened M3, Excel and the memo. The offers are prepared in Excel for each supplier and Lucy is looking for information to copy-paste in the offers. She opens the MMS080 by entering the session name ‘MMS080’ in the navigation bar and enters the item number in the item field in the session. The lead-time and on-hand information appears she takes the information and copy-paste it in the quotation. But she needs more information and therefore she starts another program MMS002 by entering the ‘MMS002’ and on the session she enters the item number and then the issue multiple appears. After copy-pasted the issue multiple in the quotation in excel she enters item number for the article and right click to display and then she clicks next until she comes to the F view where she collect the issue multiple. Sometimes she need to know the gross weight or the net weight to calculate the transportation cost for direct deliveries to the supplier, this times she need the net weight for the transportation and when she enters the MMS001 to find the net weight she receives a phone call from a very important supplier, the supplier needs to know if ICOMP has an article in range of which the supplier wants to buy in the future. Because she need to open more then 7 sessions to search for this information need to close some of the sessions that are opened for her work with the offers. She closes the MMS002 and opens the OIS301 to search for the article the supplier asks the status for but she can’t search because the system is very slow, the only thing she sees is the loading bar in orange moving on the screen. She tells the supplier to put on hold on the phone while the system tries to load the requested sessions. On the phone she hears the supplier working on their side, between the office buzz she hears phones ringing and she looks on the M3 screen to still see the loading bar. “It’s always like this when a supplier calls”, she thinks and she tells the supplier that she cannot reach the requested information and that she going to call the supplier back when she get reach of the system. “Is 5 minutes okay?” she asks on the phone. She finishes the conversation with the supplier and moves over to the MMS001 to continue the work with offers, suddenly the OIS300 has finished loading so she can reach the requested information, “Gaah! Why do you do this to me”, she complains to her colleagues, seeking for sympathy.

Scenario “Need for sessions and need for speed”, of the future:
Lucy Wang sits in her office at Shekou and prepares offers for some IKEA-suppliers. She has opened M3, Excel and the memo. The offers are prepared in Excel for each supplier and Lucy is looking for information to copy-paste in the offers. When she needs information about some articles she goes to the navigation bar and click on the item information. Then the item sessions opens in the main window and she enters the item number to see the item information for the specific article and starts to copy-paste the info in the excel quotation. When working with the quotation she receive a phone call from a very important supplier, the supplier needs to know if ICOMP has an article in range which the supplier wants to buy in the future. She goes to the OIS300 and search for the article in range. It takes 4 seconds to access the session and she answers the supplier on phone in a service oriented manner.
Scenarios of Supply planner in the use of the M3.

Scenario “Capacity planning”, of today:

The IKEA-supplier demand comes from the forecast coordinator in the M3 system and Michael start his monitoring work of securing the capacity. He opens the Excel sheet with respective supplier capacity on annual basis and compares it in the MMS002/F view and sees that the capacity can cover the demand. And now he need to do it for another supplier, so he’s doing it allover again and after looking in the Excel document he sees that the supplier might suffer from capacity problem if the demand increases slightly. Therefore, Michael contacts Anders, the ISTRAS in the team, and they start working on a plan B to cover the demand, in cause of an “out-of-capacity” situation.

Scenario “Capacity planning”, of the future:

The IKEA-supplier demand comes from the forecast coordinator in the M3 system and Michael start his monitoring work of securing the capacity. He enters the Kompis system to receive a report over the capacity cover from all the suppliers. The Kompis system warns in a report when the 70% of the capacity roof is reached. On the generated report it becomes clear that some of the suppliers have already 75% of their capacity roof reached. This will be a problem, especially when supplier B cannot meet the demand in the next month. Michael contacts Anders, the ISTRAS in the team and they start working on a plan b to cover the demand, in cause of an out-of-capacity situation. The report is also giving warnings of unused capacity so the team can evaluate their suppliers by this characteristic as well. The team set up an action plan if the situation of the capacity gets worse.

Scenario ”Delivery of multiple suppliers”:

Michael sits at his desk and works with his Excel sheets; he’s evaluating the articles in his search for slow movers in the warehouse when a new memo arrives in the inbox. It’s an IKEA-supplier which orders a huge amount of an article and he already knows this order must be split on several suppliers. He switches over to M3 and opens the session PCS280 and starts to simulate the price for respective supplier but when he adds the simulated cost price to the orders, all of the orders gets the cost price from the main supplier which is wrong of the other suppliers. Michael wants to allocate 30% of the order to one supplier and 70% on the other and that the cost price is for respective supplier. Now he needs to handle this order manually.
Scenarios of Call-operator in the use of the Aftersale system.

“Welcome to Customer Service, how can I help you?”

“Please hold on, a second!”

Scenario “order of specific fittings”, of today:

Jenny receives a customer call from a customer who lost a screw, and unfortunately the customer has lost the assembly instruction so the customer doesn’t know which the article number the missing screw has. She opens notepad and takes note of the errand, she takes customer information and finds out that the screw belongs to the furniture Börje. She put the customer on hold and switch over to SAMS and click on the ‘Artikelinformation’ icon, a new window appears and in a search field she enters ‘Börje’ and below a search result of furniture’s appears in a list and one of them is Börje. She clicks on the interactive name Börje and an additional window opens where a tab shows PIA Facts. She clicks on the tab and the product information of Börje opens under neat, she scrolls down to where she can find the ‘Monterings anvisning’ and opens the pdf-document over the assembly instruction she scrolls down to find the instruction and opens it in acrobat reader. Now she can start out to ask the customer of the screw, she asks of the shape of the screw because there are three different types of screws, belonging to Börje. After some two-way communication they find out together that the screws article number is 102220. She memories the number and starts up the aftersales in the web-browser enters the article no ‘1022..’ in the search field and the system shows a search result of the articles which match the entered criteria. She finds and clicks on the article in the list and then enters the quantity and click on the add-button and click next. Then she goes to the notepad document to copy-paste the customer information in the aftersales system and starts to ask the customer for additional information. Then she sends the order to the customer.

Scenario “order of specific fittings”, of the future:

Jenny receives a customer call from a customer who lost a screw. She opens notepad and takes note of the errand, she takes customer information and finds out that the screw belongs to the furniture Börje. She opens now the aftersales system and enters Börje in the search field at the system and gets a search result which matches the search criteria. She hovers over the article names with the mouse pointer and gets a picture over the article. By a two-way communication with the customer they find out which article to order. She chose the article and enters the quantity and adds the article. She clicks next and asks the customer for the additional information.

Troligen vet kunden vad möbeln heter och då ska man kunna skriva in namnet i aftersales systemet och få upp varje påse med artiklar och varje enskild artikel som man kan skicka hem till kunden. Sedan vore det ytterligare bra om en bild kan nås via systemet så att kunden och handläggaren kan ha tvåvägs information för att lista ut hur skruven/belaget ser ut.
Scenario "order of fitting bag" today:

A customer call and the customer has lost every fittings for the furniture Tromsö
Jenny starts to enter ‘Börje’ in the search field and a list with all articles related is shown, she starts to pick
the first article in the list, enter the quantity according to the assembly list and adds the article. Then she
picks the second article in the list and enters the quantity according to the assembly list, this continues until
all the fittings are put to the list.

Scenario "order of fitting bag" in the future:

A customer call and the customer has lost every fittings for the furniture Tromsö
Jenny starts to enter ‘Börje’ in the search field and a list with the fitting bag of Börje and all articles related
is shown. To the right of the name there is a status symbol showing of the articles is in stock or if there
exist. She picks the fitting bag by click in the article in the list, enters the quantity and adds it to the order.
She clicks next and start to take the additional customer information and then sends the order.

Background for the scenarios; User needs:
The users have a need to order for the fittings bags, instead of making the order for the 7-16 separate
fittings within the whole bag.

There is a need to see pictures over the articles found in the search criteria. So the call-operator can have
two-way communication with the customer and find out which fittings the customer wants to order. This
information is now found in PIA Facts.

There is a need to see which articles that is available in warehouse or in store, so don’t need to search for it
some elsewhere.

Error messages “This fitting is out of range”, man vill veta vilken artikel är det som saknas.
* Just nu vet man inte om det finns eller om det inte finns artiklar när man söker.
Acquiring usable systems

1. Business level
   - Business processes
   - Business case/motives
   - Business requirements

2. Activity level
   - Individual/group activities
   - Personal motives
   - User requirements

3. Interaction level
   - Individual computer actions
   - Design requirements

4. Technical level
   - System architecture
   - Infrastructure
   - Technical requirements

The Procuring Organization
   Business benefits,
goals & requirements

The Supplying Organization
   Business and user requirements are gathered in
   a research phase, and detailed and evaluated in
   an iterative design phase. The results are
documented both textually in a report and
visually in a prototype.

Development
   Development process
   Delivered product

Procurement & contact
   Users' goals and
   requirements
Appendix G Work-flow in SAMS

Från Startmenyn startar jag SAMS, Service Action Management System.
Sedan klickar jag på ”Telefonen” så får jag upp en ny dialogruta med nya alternativ.

Därefter klickar jag på ”Artikelinformation” om jag bara vill hitta numret på en skruv.
Då får jag upp en ruta där jag kan skriva in produktens namn eller en artikel.

Tex kan jag skriva in ”Tromsö”. Och sedan klicka på ”Sök” (en knapp som tyvärr försvunnit..?)
(Nu syns “Sök”-knappen.)

Därefter får jag klicka på den produkt som jag vill kolla närmare på.
Sedan får jag klicka på fliken PIA-Facts.
Och därefter får jag scrolla neråt för att få fram pdf-knappen. 
När jag klickar på den knappen får jag upp en monteringsanvisning i ett nytt fönster.
Om jag scrollar ner i monteringsanvisningen kan jag hitta numren på de reservdelar som behöver beställas.