System Usability
–a case study at
the County Council of Blekinge

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Abstract

The human factor constitutes a major element in the interaction with computers and computer systems. Responding to cognitive, social and organisational issues, the user of a system becomes an important part in system design, which earlier was paid very little attention to. These are the basics in the field of Human Computer Interaction (HCI) developed in order to enhance computer system usability. The theoretical framework applied our thesis is thus based on the principles of Human Computer Interaction.

This thesis includes a case study at the e-commerce project at the County Council of Blekinge. We have chosen to focus on system development, technical and organisational approach within the e-commerce project. Our research is based on project documentation, literature and interviews with users of the system. The conclusion of our thesis shows that system usability is achieved within the system development and organisational approach. Within the technical approach verification of system usability cannot be made.

Keywords:

- Human Computer Interaction
- System Design
- System Development
- Soft System Methodology
- System Usability
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Chapter 1. Introduction

1.1. Background

System development is a technical area that has grown due to the expanded use of Information Technology and the increased complexity of Organisations (Andersen 1994). The human factor is a major element in the interaction with computers and computer systems. Responding to cognitive, social and organisational issues, the user of a system becomes an important part in system design, which earlier was paid very little attention to. Users are expected to learn and cope with techniques and it is often difficult to use computer systems to their full extent. If people’s actions and reactions within their working environment are taken into consideration in the context of system design, system functionality will increase and user needs can be supported. These are the basics in the field of Human Computer Interaction (HCI) developed in order to enhance computer system usability.

Today’s emerging development of technique and communication tools makes it important to recognise the need of a human aspect of system thinking since the users of the system contribute to its benefit. The County Council of Blekinge carries out a major project together with its users and we found it thus interesting to analyse their system development approach to investigate if system usability is achieved.

1.2. Limitation

We have chosen to analyse if system usability is achieved in the County Council’s e-commerce system. This e-commerce project is included as a case study in our thesis.

The thesis is limited to three concepts within the theoretical framework Human Computer Interaction. The concepts we have chosen to analyse within the e-commerce project are System Development, Technology and Organisational.

The County Council of Blekinge’s electronic business system ranges from order to invoice. We are thus analysing their system development method from the alteration analysis to the implementation of the system since the system is in the implementation phase and the project is not completed.
1.3. Purpose

The purpose of the thesis is to perform an analysis to evince if the e-commerce system has achieved system usability. This thesis also constitutes an evaluation and guidance for the County Council of Blekinge through this and other system development projects. We will investigate the project through the following three approaches; system development, technical and organisational.

1.4. Target group

This thesis addresses businesses and organisations both in private and public sectors, which are involved in system development projects. The report also targets future system development project groups.

1.5. Hypothesis

If HCI principles are applied in the e-commerce project then system usability is achieved.

![Diagram of Hypothesis]

Figure 1. Hypothesis
1.6. Method

We have used a deductive approach to accomplish our thesis since we base our theory on collected information from literature, interviews and our case study. To gain information from our case study we have attended project meetings, studied project documentation and talked to the users, the project leader and the technical representative from Marakanda. Information has been collected through:

- Literature studies
- Case Study
- Interviews

The interviews are conducted in a qualitative approach in order to draw the final conclusion from the analysis. The interview questions cover the three areas in our investigation, the system development, technical and organisational perspective. Interviews are carried through with the users of the system and the project leader to make the analysis as correct as possible.

We have chosen to shape the interview questions in a standardised way with similar questions following the same order to each of the interviewed. We have left the answers open leaving the interviewed to express their opinions. After collecting the answers from the survey we have analysed them to draw conclusions in relation to the theoretical framework of HCI.

1.7. Reading directions

We suggest this thesis to be viewed as follows. The report is divided into three major sections.

- Section 1 – Human Computer Interaction
- Section 2 – E-commerce project
- Section 3 – System Development, Technical and Organisational approach

The first section treats System Development in a HCI perspective and serves as a framework for this thesis. Section one and two will together serve as a foundation for section three, our analysis of whether system usability is achieved in the County Council of Blekinge’s e-commerce system. Technical or medical terms or phrases marked italic will be explained in detail in the glossary at the back end of this thesis.
Chapter 2. Human Computer Interaction

In the process of approaching system development as a field and make an analysis involving different aspects, we acknowledge the field of Human Computer Interaction (HCI) to be multidisciplinary and thus applicable as a theoretical framework. Preece et al. describe HCI as a subject which “is about designing computer systems that support people so that they carry out their activities productively and safely” (1994). HCI applies social science methods for analysis according to Preece et al to achieve ”a more accurate description of the interaction between users, their work, the technology that they use and the environment in which they are situated” (1994).

Social science methods contribute to the social aspects of human-computer interaction and involve analysis of how people communicate with each other and interact with the variety of artefacts that constitute their work environment. A main assumption for social science methods is that “since most work occurs in a social setting, computer systems that are designed on the basis of organisational and social knowledge will be more successful in supporting it” (qtd. Preece et al. 1994).

It is of great importance to apply a theoretical framework to system development, which embeds all disciplines involved and found in the subject of HCI. HCI design includes all methods and tools placing the user at the core of the development process. This covers the different perspectives we close up to in our study. Disciplines contributing to HCI are; Sociology, Anthropology, Design, Engineering, Ergonomics and human factors, Psychology, Computer Science, Artificial Intelligence, Linguistics and Philosophy.

HCI is applied in system design to improve reciprocity between human and computer systems. To reach a state of enhanced interaction, knowledge of human capabilities need to be applied. HCI design emphasises functionality with usability meaning adjustment of the development process to match the users’ needs. To place important issues supporting usability in a wide context the HCI model of Eason 1991 is applicable (qtd. in Preece et al. 1994). The model below shows how people, work, environment and technology interact and affect each other. In this model the subject addressed in the following chapters are placed, to give the reader an overview over the connection between the subjects.

![Figure 2. Based on Preece’s et al. Human-Computer-Interaction. 1994.](image-url)
2.1. System development approach

2.1.1. User-Centred design

Over the years user-centred system design has evolved and includes almost any approach that emphasises different methods, techniques and representations for software systems which place the user at the core of the development process. Any use of a method does not guarantee user-centred design if the method does not consider the people and organisational structure in the context of the projects goal. “System design is important to system participants because they care about the ways systems affect them, their acceptance of a system or resistance to it is a key determinant to its success. This acceptance or resistance is often tied to involvement and commitment while the system is being designed and implemented” (Alter 1996).

It is also important that different techniques are applied in a competent way. Placing the user at the core of the development process includes using methods and techniques appropriate for the users to work with. Producing high system quality becomes difficult if socio-emotional aspects are not taken into consideration (Hägerfors 1999). System development projects involve a continuous learning process where the members create organisational changes. Different methods and models might be used for different stages in the system design process.

The Soft System Methodology (SSM) is a method contributing to HCI applying a social science approach for the planning phase of a system in a holistic way. Applying a holistic system description facilitates understanding a situation rather than solving a specific problem. IS is a field or a research area overlapping different disciplines which contributes to HCI design, defined as four streams of thinking and activities (Checkland and Holwell 2000):

- Information systems stream
- Systems stream
- Technology
- Organisational understanding

Basic IS components working together within these streams are e.g. data, system development methodology, system thinking and organisational change. Since SSM is build upon these different streams of thinking the method is concerned with several aspects when analysing a problem situation. These aspects derive from the different sciences contributing to HCI and put focus on the user’s actions within the system boundaries.
SSM describes an approach of applying IS and organisational problems based on people taking purposeful actions in organisations. A description based upon the principles of any information system therefore consists of for example: groups and individuals, the perceived world, accommodations and technology. The following model of SSM is used to plan a computer system and consists of six stages derived from the method.

![Diagram](image)

Figure 3. Based on Preece’s et al. Stages in the soft system methodology. 1994.

Stage three identifies the people involved with the system and gives an exact definition of the system, which is used in stage four to build a conceptual model to serve as an abstract representation of the system. The work in stage three and four is carried out outside the system environment while the processes in the other stages reflect the “real system”. The root definition is a concept that identifies the various people in contact with the system (clients) who will either suffer or benefit from it, the people involved with it (the actors or users) and finally the commissioners of the system (the owners).
2.1.2. Star Life Cycle Model

The star life cycle model is a model that encourages iteration and is thus a model well suitable for HCI design. The model focuses on evaluation, and is “viewed as being relevant at all stages in the life cycle and not just at the end of product development as the *waterfall model* tends to suggest” (Preece et al. 1994). Various evaluation techniques are required to support the different phases of design. Evaluation is the central phase and the following design activities are also essential:

- User, work, task and environment analyses - the human aspects of requirement analysis.
- Technical analysis, which aims to match user requirements with the technology.
- Requirements specification.
- Design and design representation, including coding.
- Prototyping and use of other design support tools and techniques.
- Coding or implementation.

![Figure 4. Based on Preece’s et al. The Star Life Cycle. 1994.](image)

The arrows indicate entries to the start of the development process followed by any of the stages with a double arrow. A good use of this model is to create an overall picture of system design, which shows that evaluation plays a major role in the process. It is thus noticeable to observe how the planning methodology of SSM fulfils the stages of requirements specification and *conceptual design*.
With the use of this model the human aspects of requirements analysis are considered as well as a technical analysis with its aims to match technology with users’ requirements. Prototyping improves feedback and the use of different techniques to settle users’ demands. Applying the soft system approach is fundamental in HCI design and the use of the Star Life Cycle Model brings along important issues from a cognitive, organisational, social and technical perspective.

### 2.1.3. Design Principles

In order to produce a system the designer need to recognise and understand the special requirements for that particular system. It is important that the users are consulted and problems with the current systems are discussed from the start. Analysis of similar systems followed by testing and prototyping with frequent evaluation are important issues taken up in the Star Life Cycle. There is room for creativity but engineering principles shall thus be employed. Focus is put on people, their work and environment where the challenge becomes to deploy and design the technique to support people’s actions in the best way.

To reach a successful User-Centred Design approach designers must “focus on the users and their tasks early in the design process, including user guides, help and ensuring that users’ cognitive, social and attitudinal characteristics are understood and accommodated” (Preece et al 1994). It is important to use prototyping in order to measure users’ reactions to the system as well as to conduct the design process in an iterative way.

Fundamental principles of design are to understand the requirements of the product/system and the development of the product. These issues involve investigation of similar products, discussions with the users and analysing existing systems to discover problems with current design. The development procedure includes several representations until a suitable artefact becomes the final product. It is thus important that the user is involved in the testing of the computer-based prototype.

### 2.1.4. System construction

The process of designing the system is derived from the approach of system thinking, which includes hard or soft system methodology. When applying the hard system thinking expert design is used where focus is put on the technical design. The user perspective is not of importance since the design process is a question of technical and economical development.

On the contrary, while applying soft system thinking participative design includes the users planning for technique which will support organisational and individual needs. When using participative design the system designers and all users of the future system need to co-operate and communicate. This method constitutes a continued process involving variable discussions and processes of change. The outcome of this work is a changed organisation and information system.

The choice of in-house development or purchasing a standard system also affects the approach to system design. When using a standard system it is important to let an expert guide the users through the design phase. This implies that this method can only be used if the organisational and political climate is suitable. The next section addresses therefore standard systems.
2.1.5. Standard system

A standard system is a program or several coherent programs that has been developed for usage in many organisations. It is common that the program is developed by machine suppliers or software stores (Andersen 1994). The developers of standard systems assume certain prerequisites of how the end product should be used which can be divided into the following different adaptation intentions:

- Total standardised system
- Strict standardised system
- Standardised system
- Standardised foundation for own system

Total standardised systems are software where the developers’ intention is that there should be no adaptation to the elaged organisation, for example operative systems. With a strict standardised system the developers’ intention is that there should be no need for adaptation but some alterations are possible. In a standardised system there are possibilities for extensive alterations to a certain extent. When a standardised foundation for own system is used the developers’ intention is that the system will serve as a frame for the organisation but the issues that are specific for the organisation and the special application has to be adjusted by the organisation itself.

The traditional development life cycle consists of analysis and design in the system development phase. The system development phase in the development life cycle based on procuring a standard system consists of choice of standard system and adaptation of chosen standard system (Andersen 1994). The comparison of procuring a standard system or in-house development is described in the picture below.

Figure 5. Based on Andersen’s picture, the development life cycle on in-house development and on procuring standard system. 1994.
2.2. Technical approach

2.2.1. Input device

In this section a description follows of what is meant by input device and what critical factors need to be taken into consideration when designing input technologies. An input device is “a device that, together with appropriate software, transforms information from the user into data that a computer application can process” (Preece et al. 1994).

Important issues regarding the selection of input device and the decision of its control mechanisms is to aid the users in making their work safe, efficient, effective and enjoyable. The selection of input device should support the usability of the system and the most appropriate input device should have the following properties.

- Match the psychological and physiological characteristics of users, their education and their expert knowledge.
- Be suitable for the assignments that are to be executed.
- Be appropriate for the contemplated work and environment.

An input device must not only be “easy to use and the form of input be straightforward, there must also be adequate and appropriate system feedback to guide, reassure, inform and, if necessary, correct users’ errors” (Preece et al. 1994). User characteristics, is as mentioned before an important issue when selecting the appropriate input device. Elements of importance can be whether the users are inexperienced or restricted physically. The following paragraphs will address some input devices and their characteristics.

Input devices can be placed into two different categories, discrete- and continuous entry devices. Keyboard and mouse are placed in the first category since these devices “involve sensing essentially one of two or more discrete positions (for example, keys on keyboards, touch-sensitive switches and buttons) which are either on or off” (Preece et al. 1994). Devices that involve sensing continuously such as moving joysticks, roller balls, sliders or pens with digitising tablets are placed in the second category.

Touch screens are an example of a continuous entry device that permits the user to enter information into the computer by touching an expedient section of the screen or a touch-sensitive pad near the screen. In this manner the computer screen both receives information from the user and presents output from the system, which makes the computer screen a bi-directional device. The benefits of using touch screens are that they need no additional workspace and are easy to. The touch screens can supply a direct interaction and since they are easy to learn they are “ideal for domains in which use by a particular user may occur only once or twice, and users cannot be expected to spend time learning to use the system” (Preece et al. 1994).

Practically any chosen property of any input device can form an advantage in one aspect and a disadvantage in another. It is thus important to consider the specific manipulation that has to be performed to carry out the task in question. A device interfaced to a special program in a special may be inconvenient or impossible for certain manipulations. Device adjustments may be necessary to control the program.
It is also important to set up mappings between the manners in which the device can be handled, the feedback presented by the software and the purpose of the outcome regarding the user’s mental model. It is “important to take into account how natural any particular manipulation or mapping is for the people who will have to carry it out” (Preece et al. 1994).

Special work environments with for example cramped space, outdoor surroundings etc. require devices with different properties than a normal office workstation. Pen systems are adequate for these kinds of working environment and it is “intended in such systems that the pen should replace both the keyboard and the mouse” (Preece et al. 1994).

### 2.2.2. Output device

Users require knowledge about the processes within the computer when human computer interaction takes place. To make sure that the users are informed about and in control of the system the provision of high quality and timely response needs to be supplied (Preece et al. 1994). This includes “providing both information about normal processes and warnings if there is a problem” (Preece et al. 1994).

If feedback is not correct, current or clearly presented the response from the user may not be correct. Lack of feedback on the other hand will result in that the user will wonder if she/he is in control and what is happening in the system.

Sounds can be used to evince the occurrences within a system (Preece et al. 1994). It is suggested that complex system may benefit from the use of sounds. Sounds can be important as feedback and within the following areas it has according to Preece et al. proven to be valuable (1994):

- Medical applications, where attention is required away from the screen.
- Standard visual interfaces that requires complements of sound.
- Process control applications where alarms must be dealt with.
- Applications for blind or partially sighted users.
- Data sonification

### 2.2.3. Interface design

A human-computer interface is “the hardware and software through which a human and computer could communicate” it also consists of the users’ cognitive and emotional perspectives (Laurel 1990). The primary concern of interface design is to improve user usability regarding communication, decision-making, debate and design. Improving scroll bars and the integration of sound, voice and colour comes second. In order to achieve human factor goals in user-interface design an accurate determination of the following human factors are central (Shneiderman 1998):

- The period of time it takes for the users to learn the system and to carry out its functions.
- The user error rate and what kinds of errors are made.
- User retention of system knowledge.
- The users’ system satisfaction regarding using various aspects of the system.
It is essential that interface designers do not think of themselves as typical users since they know too much and can not understand the average user. Users are often fearful in terms of fear of destroying the computer or data. It is thus important to learn to observe users in how they perform their tasks. Observe them using the system prototype and describe their performance. “Users should be involved in interface design” to create system value and to facilitate the design (Laurel 1990). The computer systems are for the users and excellent design starts thus with asking the users what the system can do for them and what they need.

It is important to notice how humans apprehend interfaces. This understanding is basic to interacting with computers. “To be able to use a computer, you need to perceive the information that is presented at and through the interface” (Preece et al. 1994). Humans have the capability of receiving information from display devices that are considerably varying in size and quality, but the efficiency and speed will differ accordingly.

To comprehend the physical, intellectual and personality divergences amongst users is of great importance. To understand user personality and cognitive styles aids in designing systems for users (Shneiderman 1998). Psychological experiments have been performed to determine if the use of colour has an effect on cognitive tasks. Colour is important when presenting data. Too many colours can increase search times and should thus be used prudently. The following guidelines are proposed by Travis 1991 (qtd. Preece et al.1994):

- Use different colours to distinguish layers
- Use colour to make features protruding, for example active files can be coloured orange.
- Backgrounds should be coloured dark or dim and foregrounds bright.
2.3. Organisational approach

During the last decade, information technology (IT) has developed rapidly and information systems (IS) become more and more advanced. If organisations want to use IS to facilitate their work and gain financial and operational benefits, it is important that they realise the organisational effect IS will have on the business. IS users must adapt their work to the system which leads to reorganisation of working processes, making IS development in its essence to an organisational issue.

The relationship between organisations and IS development can be described by quoting Österle as he states “Organisation establishes the principles of information processing, determines the global structure (organisational structure) and produces generally applicable rules. Software development further refines the organisation, by computerising those parts of the organisation that can be formalised” (1993). IS and IT as well, are issues not only involved with technique but also consider people, processes and business strategies. Several definitions of an organisation have been made but in relation to the concept of HCI Preece et al. state that an organisation includes (1994):

- The people in them.
- The technology used and created.
- The work organisation.
- The organisational culture.

When applying HCI a major key point is that organisational issues such as distribution of work and who benefits from the introduction of new technology are taken into account in the design and implementation process. IS development makes impact on organisations from the aspect of how the required people and skills to perform the development process, are to be deployed. History shows that IS development has been much of a battle of controlling resources (Edwards et al. 1991). IS development creates new activities and movements in an organisation, which often lead to disposition of power involving both users and managers (Checkland and Holwell 2000).

It is argued that most work of IS is done in the context of an organisation. New technology, policies and working tasks change members’ knowledge and positions which constitute a framework for the IS development process. Most organisations today put together a special group for the IS development project which contributes to organisational changes, called the project group. The project is a work organisation and is valuable in situations when the area of responsibility not quite belongs to any specific department of the organisation. The next paragraph will therefore address project management.
2.3.1. Project Management

The activity of IS development goes back over a long period of time. System development managers still have to face many project failures. The largest cause of project failure is that the project end-date is not held. This implies that the management of the amount of time, effort and resources put into the project is important (Beynon-Davies 1993). It is important to involve the users as a resource in the project organisation. “The issue of project management can be divided into three interrelated areas: project planning, project organisation and project control” (Beynon-Davies 1993).

2.3.2. Project organisation

Project organisation concerns the structure of personnel activity in order to assure that the maximum effectiveness is achieved. It also targets the organisation of personnel in order to accomplish the desired project result. If computer systems are integrated within the existing network of users and technical objects, they can be of use. If the organisational structure is ignored as well as the working practice and the culture of the organisation then it is “likely that the introduction of any new computing system will be used sub-optimally, or at worse discarded” (Preece et al. 1994).

This form of organisation only lasts until the problem is solved and the goal is achieved (Bruzelius and Skåravad 1999). The project organisation handles situations like product development, a considerable investment or the development of a production unity. Project Management is about people, like the entire system development process (Bronzite 2000).

2.3.3. Project planning

Project planning involves determining the probable parameters linked with the project and definition of the project result. The project can be divided into a number of phases. To support this process “adherence to a standard model of information systems development clearly aids” (Beynon-Davies 1993). The following points have to be made in order to achieve successful project planning:

- Personnel need to be assigned to the project and identification of responsibilities has to be executed.
- Identification of milestones and establishment of a schedule.
- At the end of the projects different phases a control point should be established.
- Project budget has to be conducted and resources allocated.

It is also important to calculate the probable project expenses. An effective tool for managing project progress is to “use milestones as points of audit to ensure standards are being adhered to and project is on schedule” (Beynon-Davies 1993).
2.3.4. Project Control

Project control ensures “that a project remains on schedule, within budget and produces the desired output” (Beynon-Davies 1993). Project control can be defined as process control and is designed and implemented to diminish risks. There exist five important functions in the control process: objects to be controlled, control standards, control authority, control mechanism and divergence detection. Process control is essential at every level and in every project activity. Kazmier 1969 states that “the success of a control system is determined by its effectiveness in getting people to make the necessary modifications in their own performance” (qtd. Forsberg et al. 1996).

Process control can utilise the concept of mental models regarding the reduction of human error in the control process. The purpose of mental models is to predict future incidents, detect causes of noticed incidents and decide suitable actions to cause reconstruction (Preece et al. 1994). The progress report is the primary documentation for monitoring project progress. The progress report includes information on time, appraised for each phase or activity compared with the actual time spent. Examples of project management methods are PRINCE and PROPS, both of which contain methods for conducting progress reports.

The most important objective regarding project control is “to focus attention on problems in sufficient time for something to be done about them” (Beynon-Davies 1993). The former means that constant supervision of project progress and risk analysis need to be obtained. Risk analysis can be defined as a “plan for the possibility that a problem will occur by estimating its probability, evaluating its impact, and preparing solutions in advance” (Bennatan 1995). It is an effective way of handling possible problems. The basic idea in performing risk analysis is that if a problem occurs a solution is already prepared.
Chapter 3. E-commerce project at the County Council of Blekinge

3.1. Background

The e-commerce project at the County Council of Blekinge started from governmental directions 1996. The background to this was the budget proposal in 1994 where the importance of working towards the operational development within the public sector, using information technology as a support, was highlighted. The purpose of the project is to bring about cost savings in the public sector. These savings will be made by the use of long-term standardisation and automation in order to rationalise the chain from procurement to invoice. A preliminary study indicates that enhanced work processes could cut costs in half at the same time as more efficient procurement processes would reduce prices.

With the support of this study the Swedish Agency for Public Management, along with the Swedish Association of Local Authorities and the Swedish Federation of County Councils, started the process of procuring services and products in 1995. The work behind introducing electronic commerce has been an ongoing process, which resulted in the project start at the County Council of Blekinge in 1996.

A project group was introduced in February 2000, responsible for overall establishment, system education, helpdesk and business analysis. The project vision is to make the procurement chain from order to invoice efficient and simple to support the 2000-century health care needs and to order 80% of products and services electronically by the first half of 2004.

The purpose of the e-commerce project at the County Council of Blekinge is to implement a system that:

- Most departments shall use Marakanda Inköp for procurement and invoices.
- Minimises administrative expenses for ordering and invoice management.
- Secures agreements and cost awareness.
- Secures the use of the right supplier, price list and account coding.
- Improves Departments’ procurement and ordering processes.
- Helps department managers and the accounting department to gain more capacity through automated invoice processes.
- Generates time for healthcare instead of in manual procurement processes.

The County Council of Blekinge chose not to apply MI in all wards simultaneously, but selected certain pilot wards. These pilot wards were Thorax and Medicine Clinic 45, since these have different prerequisites for their ordering process. Thorax places their orders in general three times a week and keeps a relatively small drug supply. Medicine Clinic 45 on the contrary keeps an approximately four times larger stock of medicine. This complicates the ordering process compared to Thorax. Orders might have to be placed continuously through the day since arriving patients need their medicine instantly. The pilot project ceased in 2002 when the project group considered themselves satisfied with the system. The system is currently running but under constant development.
3.1.1. The County Council of Blekinge

The County Council is controlled by the County Council Delegate. The County Council Delegate consists of 47 democratically elected politicians from the entire county. The Board is the County Council’s central organ for management of its finances, health and medical service, dental service, personal politics, building operation, property administration, material administration and culture. The Board has more over obligations according to Council ordinances the duty to lead the County Councils operations and to co-ordinate the different administrations through guidance to the different County Council administrations.

The County Council administration working committee consists of seven members and seven substitutes. The working committee is responsible for exposition of treaty list to the Board and constitutes negotiation delegation. The working committee is moreover decision instance in commission delegated by the Board.

The County Council’s main task is health and medical service. It takes up 80 % of the total organisation. Through the responsibility for a good health and medical service the County Council contributes to supporting and developing regional welfare. Other important components in that development are its contribution to the environment, public health, education, culture, public transport and industry. The County Council also supports the County’s international commitments above all by contributions in the Baltic area.
3.1.2. The County Council Organisation

The project influences the County Council’s organisation within several departments. Below follows a flow chart of how the project currently influences the organisation. These departments are in the picture below coloured grey.

Figure 6. Based on Organisational picture, http://www.ltblekinge.se.
3.1.3. E-service provider

Marakanda was founded on August the 18th 2000 by Telia and Föreningssparbanken. Management key persons together with an external party, Bengt Wallentin – present managing director, purchased the company on February the 1st 2003. The company develops markets for electronic-commerce and targets both public and private sectors. With Marakanda’s electronic services companies and organisations can purchase, pay and invoice more effectively. The two services Marakanda Inköp and Marakanda Leverantör help the client to rationalise their whole business process from order to invoice. At present Marakanda’s clients consists of some fifty municipalities, county councils, businesses and organisations.

Marakanda simplifies the trade of goods and service for both purchaser and suppliers. With Marakanda’s secure e-commerce services the clients will render their business processes more effectively from planning to billing. At present the company offers three comprehensive services: Marakanda Inköp, Marakanda Leverantör and Marakanda Tur&Retur. Jointly all services are founded on transaction charges. The clients are charged, based on usage.

Marakanda Inköp is a standard system with additional functions like palmtop connection and smartcard signing. New functions are thus continuously developed based upon customers’ demand and new purchase agreements. The service manages the whole purchase chain, from order to invoice, simplified and more effectively. In Marakanda Inköp there exist among others, functions for automatic account coding, surveillance, invoice review and certification. Through Marakanda Inköp the client becomes affiliated to Marakanda’s electronic marketplace, where a large amount of suppliers are to be found. MI is an ASP solution where the e-service provider handles maintenance and surveillance of the technical platform.

Marakanda’s electronic purchasing system is an extensive business support with functions from the start of the order process, following up with the received invoice. The system easily integrates with already existing administrative system solutions so that the invoice automatically transfers to the business’ economy system. The data transfer of the message is carried out over the Internet through IP and X400 protocols. The data is then stored in a safe way, which fulfils the requirements of authentication, integrity, confidentiality and non-repudiation. The system consists of purchasing processes based upon mutual agreements and thus suitable for the public sector.
Here follows a description over the entire system structure:

![System Structure Diagram]

In this paragraph follows a description over the order process carried out through MI as it functions at the County Council of Blekinge. The input device that transfers the data to MI is a palmtop with a touch screen. The order process proceeds as follows:

1. Turn on the palmtop.
2. Read in your personal code.
3. Read in the code for the chosen article.
4. If order completed, place the palmtop in the dock station and press the Hot Sync-Button. The order is now transferred to the web application.
5. Log on to the web application.
6. Place the ordered articles in the trolley and press the button for acknowledgement. Press the button Send order and the order is transferred to Marakanda Inköp.
3.2. Project structure

3.2.1. Project Procedure

A pre-study was carried out in 1996 in order to indicate what effects the introduction of e-commerce would entail. This pre-study targeted the prerequisites for e-commerce in the County Council in general, thus not specifically the County Council of Blekinge. The pre-study’s expected outcome was a description of the prerequisites for introducing e-commerce and how it would affect the routines within the County Council together with a description of the efficiency and savings potential.

The Value Added Control (VAC) method developed by Frontec was used in the pre-study to analyse processes and map different needs for the alteration analysis. The method integrates processes, people, organisation and IT to a wholeness to describe the processes today and future possibilities. The process description is then complemented with a problem/opportunity analysis. The project group has contributed with proposals for changes and are responsible for their implementation.

The method puts focus on project roles and their communication and co-operation. A complete VAC method in a project includes start, vision, design, implementation and follow-up. The VAC method has partial been used by the e-commerce project.

![Diagram of project phases](image)

Figure 8. Based on the County Council of Blekinge’s documentation over alteration analysis, MA-Service, August 20th 1999.

A mapping of the order-process was conducted in spring of 1998, with the purpose of serving as a foundation for the requirement specification to an e-commerce system. Then a decision to perform an exhaustive business analysis of the process from order to invoice was made and a consultant was hired to perform a business analysis along with the project leader, targeting the most critical commerce processes.

The Swedish Agency for Public Management (appendix 6) has concluded general agreements with three e-commerce system suppliers, which follows the SFTI standard and are thus applicable for e-commerce systems for the public sector.

During the spring of 2000 the County Council of Blekinge concluded an agreement with Telia to use their Telia Inköps Abonnement (TIA) as an e-commerce system. This is at present called Marakanda Inköp (MI). Telia’s solution was the solution that was best matched with the County Council of Blekinge’s present and future demands and requirements. Constraint for the system and connecting suppliers is the SFTI standard, which the County Council of Blekinge and their suppliers are tied to.
The project is divided into different phases where the first is called introduction phase 1 and has the purpose of putting the finishing touch to routines and to discover critical factors in the system. Critical factors are to be taken care of before the system is integrated with the rest of the wards and to bring forth guidelines and manuals.

Introduction phase 2 is the next step and the purpose of this phase is to add additional clinics and to connect suppliers to the system. The integration of MI and the County Council of Blekinge’s accounting system will be executed together with the following implementations:

- Sesam connection
- Apoteksbolaget connection
- Periodic invoice
- Palmtop functions
- Additional clinics
- Additional suppliers

After the former factors are implemented the e-commerce project’s goal is to accomplish a diversification of MI. The decision to diversify was taken in March 2003 and leads to additional divisions being connected with MI. Within these divisions for example five Medicine units and seventeen dentist units are included. From the year 2004 until middle 2005 the largest units at the hospital as well as primary health care centers will be connected to MI.

The project has been carried out iteratively since it alters between the different phases. A follow-up in the form of an evaluation with a questionnaire for the users was performed in 2002, on the initiative of the project group. The head nurse for each clinic participated together with affected personnel and project group in this follow-up, where they could make suggestions for improvement. The follow-up was divided into three areas involving the project, MI and the palmtop.

There is also a partial project called the technical sub project. Its purpose is to tie one person from the IT-department to the e-commerce project in order to gain insight into how Marakanda Inköp functions. This person should also function as a technical contact person with Marakanda. During the project period this person should be responsible for co-ordinating activities between the project and the IT-department.

The introduction of MI also implies local administration and management for palmtops, software and connections to PCs, a special agreement is to be concluded for these. The purpose of the partial project is to contribute to the compilation of a service agreement.
3.2.2. Project method

PROPS is a method and model for project management developed by Ericsson. This method is used by the project leader to manage a single project but can also be applied in a multi-project organisation. The PROPS model constitutes a concept of structure and supports individuals as well as organisations to gain increased performance and organisational efficiency. PROPS includes several objectives which make the project leader work from different perspectives. The following four main perspectives exist to conduct the project from:

- Business perspective.
- Human perspective.
- Single project flow perspective.
- Project organisation perspective.

While conducting a project, three stages need to be covered: project steering, development model and quality insurance. PROPS support a common language for all of these stages which makes the project time and cost efficient.

It is important that the project method covers the whole project process in order to be effective. As Andersen states, “to utilise the project method as much as possible it is also desirable to integrate the method with the system development model of use” (1999). The way PROPS is used in the e-commerce project includes the following:

- Financial follow-up
- Leadership
- Steering group meetings
- Documentation
- Risk analysis
- Communication
- Description of current state / desired state

The e-commerce project emphasises a clear project plan, project directives and decision basis. The method forces the project to focus upon the project goal and follow-up as well as responsibilities and authorities. In order to follow up a reference group called evaluation/user group has been established. According to PROPS it is important that the group works with their different roles and conflict management. To keep track of activities an accumulating list of activities is used. The list contains of the activities and who is responsible for them together with current and end date.
PROPS also provide for the project administration, which includes documentation and methods for steering the project administration.

- Project directives
- Project plan
- Reports to steering group
- Follow-up in terms of time and money
- Agenda for meetings
- Minutes from meeting
- Progress reports

The project plan is known to be a “living document” and will therefore change through the projects lifecycle.

### 3.2.3. Project organisation

Below is a description presented of the e-project’s organisation.

![Project Organisation Diagram]

Figure 9. Project Organisation. Based on Documentation from the E-Commerce Project’s project plan.
Chapter 4. Analysis of the three approaches

In this chapter we have analysed if the e-commerce system achieves system usability. In order to perform our analysis we have, from the theory, extracted interview questions based on our three approaches. These questions were put to the project leader and the users of the system. The result of the interviews (appendix 1-5) was then compared to our theoretical framework (2. Human Computer Interaction) and the way the project was carried out (3.2. Project Structure).

4.1. System Development approach

Project documentation and the users’ answers show that the former ordering system has been described according to stage three in the SSM-model. This has been carried out through business analysis using a flowchart and a thorough process analysis. The order processes are continuously mapped since knowledge of the system constantly increases. This is carried out according to the essential design activities that take the human aspect into consideration (2.1.2. Star Life Cycle Model). Knowledge gained through the project leaders’ work experience facilitates the mapping of the order process.

Analysing users’ action in the system refers to the moment task-analysis in the Star Life Cycle, which is an essential part of the principles of HCI. In this way focus is placed on users and their tasks early in the design process. This procedure helps, as noted in principles of user centred design, the designers of the system to understand the system’s special requirements. When analysing the former system the users gain the opportunity to be involved from the start of the project ensuring that social, cognitive and attitudinal perspectives are accommodated. The mapping of activities in the former system also leads to facilitating the requirements specification according to the Star Life Cycle Model.

Users report they can as in SSM model stage 6 (2.1.1. User-Centred Design), make proposals for feasible and desirable changes as well as signals for when to introduce a new element. According to the project leader these changes are possible only within the constraints of the SFTI standard and the fact that MI is a standard system. Letting the users make proposals for changes in the system will make the design of the technique support people’s actions in the best way and increase their involvement in the development process. This way of working is part of the participative design approach and soft system thinking where the aim is for the technique to support individual and organisational needs.

The users feel that there is communication and co-operation between them, the project group and the system’s technical representative since they meet regularly. These meetings create an opportunity for the users to discuss their proposals from different angles. Understanding of the users’ situation and the mapping of how the users interact with the system is aided by the project leader’s former working experience (2.2.1. Input device). The users feel that the management and expert guide from Marakanda are involved in these meetings, which indicates that the risks from using a standard system are minimised. Thus the fact that one of the users recognises the need for more meetings indicates that the technical aspect is difficult to understand and it is important to recognise this need to keep the development process user centred.
Since the users feel that they are part of the development process and consciously included we consider that the methods and techniques used are following the principles of participative design (2.1.4. System Construction). The two clinics have worked with a prototype while testing the system, which is emphasised as an important tool in HCI design. Prototyping contributes to the Star Life Cycle model where the users are active in the process of continuously testing and evaluating the system. This method is also part of the soft system methodology where data and system development work together placing the users’ cognitive perspective at the core. To further emphasise the cognitive aspect of system development there is a special room with computers for testing the system which improves the settlement of user’s demands and feedback.

Through the VAC technique, which integrates technology, people, processes and the organisation, the system is matched with user requirements. According to the users there is room for discussions of the system’s problems with meetings for evaluation. Applying this method on the Star Life Cycle model where the human aspect of requirements is taken up, evaluation serve as the central phase of the model. Regular meetings also increase the iterative process being used according to the principles of user centred design.
To make the project’s system development method more distinct we have chosen to divide the e-commerce project into different phases according to the development life cycle used for standard systems (2.1.5. Standard system) and apply this to the Star Life Cycle Model presented in the following matrix.

<table>
<thead>
<tr>
<th>Standard system</th>
<th>E-commerce project</th>
<th>Star Life Cycle Model</th>
</tr>
</thead>
</table>
| Alteration analysis | Phase one: Pre-study  
Output: Description of the prerequisites for introducing e-commerce and efficiency and savings potential. | Task analysis/Functional analysis |
| Choice of standard system | Phase two:  
Meeting with the suppliers, which the Swedish Agency for Administrative Development had concluded general agreement with, applicable on e-commerce systems for public sectors. Choice of the solution that was best in agreement with the County Council of Blekinge’s present and future demands and requirements.  
Output: The chosen system Marakanda Inköp (MI) and a requirements specification | Requirements specification  
Prototyping |
| Adaptation of chosen standard system | Phase three:  
Introduction phase 1  
Put finishing touch to routines and discover critical factors. Take care of critical factors before the system is integrated with the rest of the wards.  
Introduction phase 2  
Add additional wards, connect suppliers and generate invoices.  
Output: Guidelines and manuals. | Conceptual Design/Formal Design |
| Implementation | Phase four:  
Diversification of MI  
Output: Implemented system | Implementation |

Figure 9. System Development matrix.
The project started with task analysis founding the base to the requirement specification but conducts an on going process to fulfil the systems ever changing functionality. Evaluation has been a central part of the development process in different forms like meetings interviews and an open communication channel between the users, project leader and MI’s technical representative. The system has according to our experience worked as a prototype and the two clinics have formed a pilot project. The conceptual and formal design was performed together with the users. The diversification of MI is applicable on the implementation phase and is an ongoing process. The system development has been an iterative process and is thus applicable on the Star Life Cycle model.
4.2. Technical approach

The users are of the opinion that the palmtop is easy to login to and to work with. The benefit of using this kind of device is that it can be used in cramped space and that they are easy to learn. Since the users’ main assignment is health care they require devices that interfere as little as possible with their main assignment. Palmtops with this kind of touch screens are as described earlier perfect for this kind of area when you can not expect the users to spend a lot of time learning the system (2.2.1. Input device).

Most system users believe that the palmtop device is efficient and does not take up unnecessary time. It is on the other hand important to stress that some users are of the opposite opinion and that it is important to satisfy the majority of the users. Occasional problems in reading the barcodes are experienced by users. Additional control is required since the wrong article number can be read by the palmtop.

The palmtop functions are perceived as being too small and narrow. One user out of four wants the medical name to appear the first time registered instead of just the number. This user need is unrealisable since the required database can not be stored in the palmtop. The rest of the users consider it easy to move between the functions. It is important to consider how the users experience the different manipulations (2.2.1. Input device). The users have been mapped as to whether the different input devices comes naturally for them, which is an important issue regarding HCI design.

The users believe that the palmtop is not suitably placed on either of the wards and causes unnecessary stress and running around. The workstation and the palmtop are not placed in the medical room due to lack of space, which prolongs the time it takes to perform an order. Work environment with specific needs like small surrounding need devices that are adjusted for the environment. The users are not content regarding the environmental aspect of the devices, which implies that principles of HCI are not fulfilled. An important property for supporting system usability is that chosen devices should “be appropriate for the contemplated work and environment” (2.2.1. Input device).

The users find the Webb application (MI) to be easy to login to. One out of four consider the application difficult to use because there is a lack of education and information about new functions. It is important to notice how the users execute their assignments. The users should be involved in the design of the application by observing them using the system, since the system is for them (2.2.3. Interface design).

A substitute for the order system for medical supplies does exist but the application does not have a backup for ordering laundry and supplies. The lack of system backup does not make for system usability. From this point of view user-friendliness in not taken into consideration according with HCI.

From a cognitive perspective the users feel that the palmtop is easy to learn. The training provided for the palmtop and MI is believed by the users to be sufficient. To accomplish human factor goals it is important to determine “the period of time it takes for the users to learn the system and to carry our its functions” (2.2.3. Interface design).
Palmtop and MI documentation exist but one user believes that this is not enough. The users find understanding and learning how to perform orders to be easy. This due to that most users place orders on a daily basis. Documentation and information about the palmtop have been given to the users. The information and documentation provided concerns placing medical, supply and laundry orders with the use of the palmtop. This information has been given to all by us interviewed users and current information is given continuously by the person responsible for Marakanda Inköp in every clinic (Marakanda Inköps Ansvarig, MIA).

Information about MI has been given in the form of user manuals and orally. A visual education has also been given in a computer room. The project leader has attended when the users place their orders, which is an important aspect regarding HCI design. Information has been provided in different steps since the functions of the application cannot be given at a single opportunity. The Marakanda Inköp Responsible holds the latest information and is accountable for informing the users. Since the users previous knowledge and interest differs it varies for each individual whether they can or want to take in this information.

It is important for the users to require system feedback so that they know what is happening in the system, this gives the users a sense of control. The feedback used should include information about both normal and abnormal processes (2.2.2. Output device). The users have different opinions regarding palmtop feedback where half of the users are satisfied and the other half prefer feedback to be presented when the palmtop reads the wrong code and one of the users wants the feedback in form of a message. The feedback given from the palmtop is believed to be comprehensible for proceeding with the order process.

The users are not of the same opinion concerning what kind of feedback is given. One user feels that signals in the form of sounds are given while some users are insecure if feedback is given. This implies in that the feedback given is insufficient. It is important to provide correct, clear and current feedback or user response will be incorrect. Lack of feedback will burden the user with uncertainty of being in control. Information about what kind of feedback the palmtop provides has according to the project leader been discussed thoroughly. Since according to our experience peoples’ cognitive learning process differ it is difficult to present all users with information they consider sufficient.

Webb application feedback regarding placed orders is sufficient according to the users. But there is still a lack of feedback since the same order can be sent twice and you can type the wrong date. Opinions differ ranging from the view that the feedback is enough to complaints that feedback comes too late.

Since the users opinions regarding which feedback is presented then feedback is not sufficient. This is important then “adequate and appropriate system feedback to guide, reassure, inform and if necessary, correct users’ errors” must exist (2.2.1. Input device). One type of feedback is sound, which has been found to be suitable for medical applications (2.2.2. Output device). On the other hand system feedback has been presented orally, in writing and visually in order to show the user how you can see if you have prepared an order. The purpose of this feedback is to let the users know where they are in the system and what they have done. When information about system feedback has been presented discussion of feedback level has been held.
4.3. Organisational approach

According to the users the e-commerce project has been introduced to the working organisations in the pilot clinics in a positive way, since the users do not consider the working organisation to be dramatically changed. This implies that the Marakanda Inköp responsible on each clinic has most likely served as a bridge between the users and the project group while transferring information and education. The users have taken their new working tasks involving meetings, education etc. with a positive attitude and do not consider these activities to interfere with their ordinary working tasks.

After discussions with the project leader, the users and reading documentation, we draw the conclusion that the County Council of Blekinge recognises that the technique of the e-commerce project affects the organisation and includes these effects in their implementation strategy. Hence the e-commerce projects’ definition of an organisation is applicable on the definition derived from the framework of HCI (2.3. Organisational Approach) confirmed by both users and the project leader. If the organisational structure is ignored it is likely that the introduction of a new system will be used suboptimally.

The users find the project form efficient when it comes to involving all hospital users and that it has increased opportunities for the users to discuss problems and solutions, this is important for the project organisation (2.3.2 Project organisation). It thus facilitates the accomplishment of the systems’ desired result. The fact that the users believe that the system is not 100% efficient today implies that further reorganisations are necessary especially at the Medicine clinic. The information flow at each clinic through the Marakanda Inköp responsible is well organised and implies that the user’s perspective is taken into consideration according to the principles of HCI.

According to the users, technical help is always instantly provided which indicates that the projects physical organisation is well situated. The communication flow is clear and efficient but some answers imply that due to cognitive aspects it is possible that the organisation around the Marakanda Inköp responsible might need further internal reorganisation so that each user of the system is updated and comprehends current system improvements.

The fact that three out of four users believe that the implementation of new technology has not affected their work tasks significantly, shows that the method to introduce the project over a long period contributes to system usability. The user who considers the order process to be extended, works at the medicine clinic where a larger amount of organisational issues are involved to gain users system satisfaction. Process control is established since the users are able to make necessary modifications and present a new element when ready. Through meetings and visual education, problem solving is captured at an early stage and constantly solved with mental models.

According to the project leader the users’ opinions and proposals are taken into consideration by both project leader and MI ‘s technical representative. In alignment with PROPS a user /evaluation group is settled to strengthen and improve the technological impact on the organisation. In this way the project targets the organisation and its personnel in order to accomplish the desired result. Systems integrated with the existing network of users and technical objects are in a good position to be used properly.
System usability is achieved in the sense that the work involved in the order and user information/education processes is well distributed through the organisational structure so the users feel that their opinions are important. Thus it is a matter of each individual’s interest and cognitive possibilities if these processes are sufficient or not. The disposition of power between the users is a matter solved in a democratic way as all users at the two clinics have opportunity to influence the implementation process.

**Chapter 5. Conclusion**

In this chapter we will present our conclusion whether Human Computer Interaction principles are applied and if thus system usability is achieved. This entails verification or falsification of our hypothesis.

We have analysed how the e-commerce project has been carried through and have found principles of the Star Life Cycle model (4.1. System Development approach). The system development methods the e-commerce project has used are applicable on HCI. The different development methods have been used in an iterative way with user evaluation at the core. The users have been brought into the development process of the e-commerce project from the start, which is essential to achieve system usability. It is important to recognise that the techniques and methods used are easy to learn and work with in order to achieve system usability. This has been achieved since the users have a positive attitude towards the used techniques and methods. This entails verification of our hypothesis, regarding the system development approach.

The technical approach constitutes a more complicated subject referring to the discussion of usability. The users are of different opinions regarding the usability of the input/output devices. The users think that the devices are easy to learn and work with and that implies that they are user-friendly (4.2. Technical approach). It is however important to point out that the users are not content with the presented feedback and the environmental aspects of the devices. Certain parts of the HCI principles are thus fulfilled others are not. This entails falsification of our hypothesis, regarding the technical approach.

Within the organisational area we have found applied principles of HCI, which contributes to system usability. We have found that the e-commerce project has used a project method (4.3. Organisational approach), which includes a user/evaluation group. This contributes to that the users have an important role in the project organisation, which increases system usability. The introduction of new technology conveys alterations within the organisation, which have been recognised. This entails verification of our hypothesis, regarding the organisational approach.
5.1. Discussion

We have not had the means to interview all users, presumably 2000 future users, of the system. We are aware of that this may have affected the result of our thesis. We are still of the opinion that the outcome of our thesis has high reliability due to that the interviewed users have great insight in the system. We believe that the result of our work is due to that persons within health put the human in focus and for them it is obvious to consider the users. The users’ participation in the project is due to the project leader’s former profession within health care.

A reflection on whether our thesis can be of use in other organisations is in place. Other County Councils have contacted the County Council of Blekinge’s e-commerce project seeking for information and counselling. This thesis can thus be used to achieve system usability regardless of choice of system and technology and the organisation’s working processes. The report is applicable even if standard systems are not chosen and for organisations outside the public sector.

5.2. Future Research

For future research it would be interesting to analyse whether user consciousness is due to that it is an organisation that has mankind in focus. Would the result have been different if we had for example analysed a technology driven organisation?

Marakanda is one out of three e-service providers that have a system following the SFTI standard and has agreements with the Swedish Agency for Public Management. All three were candidates for becoming the County Council’s e-service provider. It would therefore be of interesting to evaluate whether the use of any of the other two systems would give system usability to a greater extent.

5.3. Source criticism

We have founded our thesis on acknowledged literature and interviews, but we have also gathered information on the Internet. We are conscious that the information can be unreliable even if the information is collected from acknowledged organisations.

We are aware that the persons interviewed are a minority of the County Council’s users, but the users chosen come from clinics, which have different ways of working. We have chosen one user from each clinic that has been a participant since start of the project and one that has not. We believe that this makes it possible to present a fair picture of how the users experience the situation.
6. List of Illustrations

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7. Glossary

Anthropology: Anthropology is the scientific study of humankind.

Artificial Intelligence: Artificial Intelligence (AI) is concerned with the design of intelligent computer programs, which simulate different aspects of intelligent human behaviour.

Authentication: Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be.

Cognitive task: The knowledge that people have, or that they need to have in order to complete a task.

Conceptual design: Conceptual design concerns itself with questions of what is required, what the system should do, what data is required, what users will need to know and so on.

Confidentiality: Confidentiality is the protection of transmitted data from passive attacks (eavesdropping or monitoring of transmissions).

Data sonification: The use of sound for the exploration and analysis of complex data.

Design: The process of developing a product artefact or system and to the various representations (simulations or models) of the product that are produced during the design process.

Device: In general, a device is a machine designed for a purpose. In a general context, a computer can be considered a device. In the context of computer technology, a device is a unit of hardware, outside or inside the case or housing for the essential computer (processor, memory, and data paths) that is capable of providing input to the essential computer or of receiving output or of both.

Ergonomics: Ergonomics is the scientific, interdisciplinary study of individuals and their physical relationship to their environment.

Frontec: An IT-consultant firm listed on the stock exchange, with focus on consultant services within eBusiness.

Integrity: Integrity, in terms of data and network security, is the assurance that information can only be accessed or modified by those authorised to do so.
IP protocols: IP protocols provide the functionality for interconnecting end systems across multiple networks.

Linguistics: Linguistics is the scientific study of language.

Mapping: Mapping is a technical term describing relationships or correspondences between the structure of two things.

Mental model: The model people have of themselves, others, the environment, and the things with which they interact. People form mental models through experience, training and instruction.

Non-repudiation: Non-repudiation prevents either sender or receiver from denying a transmitted message.

Sesam: SESAM is a complete MA-system built upon a standard OFLI-system adjusted to central supply and aid of assistance centrals.

SFTI-Standard: SFTI establishes a single set of specifications for interchange of electronic commerce. The standard is adopted at governmental, regional and local community level used by all public operators. These three levels have a common platform for co-operation where they meet with representatives for the suppliers.

Sociology: Sociology is the scientific study about the human being in different social contexts.

Thorax ward: The topic includes the anatomy, injury and/or surgical treatment of the chest region.

Waterfall model: (Development lifecycle) A System Development model that uses a prescribed sequence of steps (alteration analysis, analysis, design, realisation, implementation, administration and liquidation) and deliverables to transfer dependably from user requirements to a working system. Each subsequent step builds on the conclusion of previous steps and each step is completed in turn and carefully documented.

X400 protocols: Protocols adapted to Electronic Data Interchange (EDI) defined as the exchange between computers concerning trade transactions by using networks and formats approved. The series of X400 recommendations define an international standard for structure and transmission of electronic mail messages.
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http://www.ltblekinge.se  Date: 2003-05-07

Marakanda  
http://www.marakanda.se/  Date: 2003-02-19

SFTI – Single Face To Industry  
http://www.eh.svekom.se/  Date: 2003-02-19

Statskontoret  
http://www.statskontoret.se/  Date: 2003-05-09
9. Appendix

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Interview with: Britt-Louise Mårdh-Karlsson, Project leader

Date: 2003-02-26 and 2003-05-28
Place: Wämö-Center, the County Council of Blekinge
Present: Åse Larsen Andrén
Tove Mantzakanis
Britt-Louise Mårdh-Karlsson
E-commerce project: Project leader for the e-commerce project. Have participated for five years.

General questions

1. Is the project divided into sub-projects?
Yes, the project is divided into the following:
Introduction phase 1, from 2000-2001
The project will be concluded when the last phase, a so-called system diversification has been made.

2. To what extent has the project co-operated with Frontec?
Frontec made the process analysis with VAC, their self-developed method. They also helped out with the decision process regarding the introduction of MI for ordering supplies.

3. In reports, calculations of time- and financial savings are presented. Will measurements be made when the system is introduced in order to determine if these calculations are correct?
No, such measurements are not possible to make since the project is pursued during several years. It is thus impossible to know which effects have created the savings. On the other hand you will be able to make exact calculations at Apoteket.

4. Which persons are involved in the settlements of the project’s matter of success?
The users, the project group, IT management, the buyers and the economists.

5. What is the County Council of Blekinge’s aim with the introduction of electronic commerce?
The aim is firstly to save external money. Which is done since it is made possible to improve the general agreements with the County Council of Blekinge’s suppliers? The aim also concludes the control of regulations, which presents a raise in quality and simplifies the observation authorities’ work.

6. What is the purpose of introducing electronic commerce?
The purpose is not to have any paper invoices at all, everything shall be handled by MI.

7. How is the e-commerce project conducted and which project form is used?
The project is conducted interactively and the users have been involved from the start. The project group, Marakanda and the users all meet together. The project form used is PROPS, a project steering model.
8. **Who is system-orderer respectively system-assignor?**
System-orderer is Jan Larsson, The County Council Director and System-assignor is Leif Månsson, administration manager MA.

9. **Can you choose how many functions the application can perform to be adjusted especially for the users?**
No, the functions exist from start since it is a standard system.

10. **In which phase do you consider the project to be in at present?**
We are in the planning of the diversification phase. We have accomplished the first phase but not completed the second. We are simultaneously retrograding to certain parts of the second phase.

11. **Today the old fax system is used if MI is not working. When implementing a new system in the future do you plan to run MI parallel until the new system is working?**
This system switch concerns changing from manual procedures to electronic commerce and it facilitates that an entire new system development process is run parallel with old routines. At a future switch it will probably be about changing from one e-commerce system to a more advanced system, which I believe will be a considerably unsophisticated process.

12. **How are the users involved in the project?**
The users are part of the reference group.

13. **The user representatives at the meetings are they always the same or are the invitations public?**
The ward gets a public invitation where two optional users may participate.

14. **Where there possibilities for the users to participate in the planning of the design of the project?**
No, the users did not have that knowledge at the project’s start. The users have however participated the whole time.
Palmtop

1. Have you received any documentation/ been informed about the different ways to use the palmtop, which type of feedback you can expect and the purpose of this feedback?

The users have been given information orally and documentation. The e-commerce project has also attended during the palmtop ordering process. All the given information only concerns the use of the palmtop when performing medical, supply and laundry orders. The above description of given information have all the interviewed users received. Current information is given continuously by every clinic’s Marakanda Inköps Responsible (Marakanda Inköps Ansvarig, MIA). Whether the palmtop presents feedback has also been gone through thoroughly.

2. Have you asked the users if the use of the palmtop comes natural for them?

That question has not literally been asked, but we have asked; what do you think is good respectively bad? Follow-ups on both clinics with free scope for the users’ own evaluations and propositions were made in the fall of 2002. Concerned personnel and the e-project group attended. The follow-up was divided into three areas, where the palmtop, MI (the web-application) and the project was handled separately. The project leader initiated the follow-up and a compilation has also been placed at the steering group’s disposal.

Webb application

1. Have the users received any documentation/ been informed about the different ways to use the Webb application, which type of feedback you can expect and the purpose of this feedback?

Information has been given orally and in the form of documentation (user manuals) and also through a visual education at a computer room. We have also attended when orders have been performed. This information has been given gradually since you can not inform about all of the application’s functions at a single opportunity. The Marakanda Inköp Responsible possesses the latest information and they are responsible for informing the users. Whether the users can or want to take in this information is very individual due to previous knowledge and interest. The system feedback has been presented orally, in writing and visually in order to show the user how you can see if you have prepared an order. The purpose of this feedback is to let the users know where they are in the system and what they have done.

2. Have you asked the users if the presented feedback is enough?

When information about feedback has been presented this discussion has been taken.
Design

1. Have the users participated in the planning of the system development?
The users participate in the development process within the limits of the SFTI standard and for this standard system. The users have the possibility to give propositions at user meetings where Marakanda’s technical representative attended, regarding the parts adjustable in MI.

2. Do you think that the methods and techniques used in the system development process have been easy to work with?
The usage of the VAC method has worked reasonably but has been somewhat difficult to learn. PROPS has been very good but should work much better if it was introduced as a general project steering model in the County Council of Blekinge. I am the only person working according to that model today. Meetings with users, supplier representatives and Marakanda’s representative have been successful.

3. Have the users been asked how they use the old system?
Business analyses have been made at both clinics with flow-charts and deep-going analysis within every single process. Since we now have more knowledge and new questions arise continuous mapping of how orders are performed occurs occasionally to pick up suggestions for routine alterations. I have also acquired knowledge about the old system through work experience as I as assistant head manager was accountable for ordering medical.

4. Can the users suggest improvements/discuss problems regarding the system development?
Yes, we always ask them to describe their problems and suggest improvements.

5. Do you continuously participate in the testing of the system?
I consider the test period and the term pilot wards seized in spring 2002 regarding MI and December 2002 regarding the palmtop. We where then satisfied with the result and the system is now running but under constant development.

6. Is there time planned for meetings with users, project group and technical system representative?
We have continuously booked time for meetings. The system got started in May 2000 and our first meeting followed in September. During the first one and a half years we had this meetings every second month. After that the meetings have been further apart.

7. Do you feel that the result of the project is targeted towards a user-friendly system?
Yes, the result is aimed towards a user-friendly system.

8. Have you deliberately involved the users from the start?
Yes, we have deliberately involved the users from the start.

9. How great is the users’ influence regarding system design?
They have great influence within the boundaries of SFTI and that the system is a standard system.
**Organisation**

1. *Do you consider that the project form as a method of working has facilitated the system usability?*
   Yes, I consider that it has.

2. *Do you feel that the implementation of the new technology has influenced the working organisation on the two pilot wards?*
   Yes, there have probably been some alterations within the working organisation but differently on the two wards since the order processes differs.

3. *Will the project be completed when the users consider that the system is working and you are pleased?*
   No, this is not our goal. The goal that the County Council should save money. We are at present discussing the criteria for establishment of system administration. The system must be running at certain of units to be profitable. Furthermore a critical mass of our external suppliers must be connected to the system.

4. *Which units within the County Council’s Organisation does MI influence?*
   The system influences MA Blekinge, Primary Care Blekinge, Psychiatry Blekinge, the Blekinge Hospital and Dental Care of Blekinge.

5. *How do you define system success?*
   When the users say that: This system is grand! When the users feel that they are saving time. When the County Council of Blekinge as an organisation achieves a greater control over the purchase chain and saves money.
Interview with: Katarina Sundbrandt, Section leader, Thorax intensive  

Date: 2003-05-07  
Place: Thorax, The County Council of Blekinge  
Present: Åse Larsen Andrén  
Tove Mantzakanis  
Katarina Sundbrandt  
E-commerce project: Participated since start, when the ward signed up as pilotward. Is a user of Marakanda Inköp

Palmtop

1. Is it easy to login to the palmtop?  
No problems, since you read in your authorisation via a bar code.

2. Is the palmtop easy to physically work with?  
Yes, there exist no problems. It is easy to work with.

3. Do there exist any problems when reading the bar code?  
There exist problems occasionally if the palmtop does not take a bar code reading. This does not happen often and is perhaps due to the plastic case the bar code is placed in.

4. Did you find it difficult to learn how to use the palmtop?  
No, not at all.

5. Do you find it easy to move between the functions in the palmtop?  
No, not difficult. I think it goes off without a hitch, even if you do not have any computer experience.

6. Do you see the need for extra education, expertise to use the palmtop on a daily basis?  
No there is no need for extra education, one can teach each other. It depends on which attitude you have to the new system.

7. Is the palmtop suitable for the environment, workstation?  
The palmtop is suitable for the workstation, but it should have been better if it was placed in the medical storeroom. This is not possible due to cramped space.

8. Is it effective to use the palmtop, or do you think it takes up unnecessary time from your main assignments?  
When it is working as planned it is effective. Problems occur seldom. This does not take up time from other assignments since ordering is part of my assignments.

9. Do there exist alternatives to the palmtop if problems occur?  
You can carry out the order via Marakanda Inköp or fax a printed form.
10. Have you received any documentation/ been informed about the different ways to use the palmtop, which type of feedback you can expect and the purpose of this feedback?
   There exists a folder with palmtop documentation and one can always take contact with persons in the e-commerce project to receive feedback.

11. Have you been asked if the usage of the palmtop comes natural for you?
   We have meetings were you can discuss problems. At the meetings other wards and technical representatives for the system attends.

12. Do you receive immediate feedback from the palmtop if error when input of data?
   You can see at the palmtop’s screen that there is no data input.

13. How is feedback presented?
   An empty screen.

14. Do you feel that the feedback presented is sufficient?
   Yes.

15. Is feedback given easily comprehensible, so that you exactly know what to do immediately after?
   Yes.

16. Do you receive signals of what is happening within the system?
   No.

**Webb application**

1. Is it easy to login in the system?
   Yes, there exist no problems.

2. Is it easy to understand how to carry out an order?
   Since I carry out orders regularly, three times a week, I thin it is easy.

3. Have you received any documentation/ been informed about the different ways to use the Webb application, which type of feedback you can expect and the purpose of this feedback?
   Yes, a folder with documentation exists and information has been given.

4. Are you pleased with the layout (colour, design)?
   I have nothing to complain about.

5. Is the application easy to use?
   Yes.

6. How is feedback presented?
   You get a confirmation that the order is sent, with the text “you do not have any order to prepare”.

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7. **Do you feel that the feedback presented is sufficient?**
   Yes and one can even look at already placed orders.

8. **Is feedback given easily comprehensible, so that you exactly know what to do immediately after?**
   One constantly receives information about which step is carried out and if one should proceed.

9. **Do you receive signals of what is happening within the system?**
   Yes, I know that the order is sent.

### Design

1. **Do you feel that you have participated in the planning of the system development?**
   Yes, I have participated from the start together with the e-commerce group and representative from Marakanda Inköp. They listen and take in our remarks. We have been called to meetings, which I find positive.

2. **Do you think that the methods and techniques used in the system development process have been easy to work with?**
   Yes, in order to get an entire hospital involved so that you feel participated they are good and necessary.

3. **Have you been asked about how you use the old system?**
   Yes, in detail. Flowcharts were performed of how it was done.

4. **Can you as a user suggest improvements/discuss problems regarding the system development process?**
   Yes, completely. We can express when we want to wait with an introduction of a new element. I really feel participate.

5. **Are you continuously participating in testing the system?**
   Yes.

6. **Is there time deposited for meetings with users, project management group and technical representative for the system?**
   Yes, and we have also differently composed meetings.

7. **Do you feel that the result of the project is targeted towards a user-friendly system?**
   Yes definitely, that is the goal.
Organisation

1. **Do you feel that you have great participation in the project?**
   Yes, totally. It has been very positive to have participated since the project start. We have had recurrent information and meetings.

2. **Has the project form as a way of working facilitated the system user-friendliness?**
   Yes, in order to get an entire hospital along then this is the only way.

3. **How influential are you regarding the completed system?**
   Since the project management listens to both the positive and negative I feel participate.

4. **Have you participated in the planning of the project?**
   No, I have not been involved in the planning but I have continuously received information and been asked about different plans.

5. **Does the project affect your main assignments?**
   No, not if the system works.

6. **How do you think that implementation of the new technology has affected the working organisation?**
   The technology has not altered anything. You had to make orders even before the new technology was implemented.

7. **Will the project be completed when you consider that the system is working and you are pleased?**
   No, I do not think so.

8. **How do you define system success?**
   When we do not have to concern our selves with if medical is in stock. When timesaving are made. When you on the whole do not have to bother with orders. When you can keep a small stock and the system functions easy and smooth.
Date: 2003-05-13
Place: Medicine Clinic 45, The County Council of Blekinge
Present: Åse Larsen Andrén
Tove Mantzakanis
Eva Romberg
E-commerce project: Participated since the summer of 2002. Is a user of Marakanda Inköp and performs medical, laundry and supply orders.

Palmtop

1. **Is it easy to login in the palmtop?**
   Yes, no problems.

2. **Is the palmtop easy to physically work with?**
   Yes.

3. **Do there exist any problems when reading the bar code?**
   Yes, sometimes it misreads the article number. There is no problems in reading but it disconnects too fast and jumps to the next page, which requires that you control that the right amount has been inserted.

4. **Did you find it difficult to learn how to use the palmtop?**
   No.

5. **Do you find it easy to move between the functions in the palmtop?**
   Yes, I think so.

6. **Do you see the need for extra education, expertise to use the palmtop on a daily basis?**
   No.

7. **Is the palmtop suitable for the environment, workstation?**
   No, supply, medical and laundry orders are performed at different places, which leads to a lot of running about with the palmtop. It takes too much time for us and is stressful. We have discussed a probable solution for laundry orders that hopefully will solve that problem.

8. **Is it effective to use the palmtop, or do you think it takes up unnecessary time from your main assignments.**
   It is not effective and takes up unnecessary time.

9. **Do there exist alternatives to the palmtop if problems occur?**
   Regarding medical orders you can enter directly into the MI application and perform an order, not for laundry and supply. You can however always carry out an order via the phone.
10. Have you received any documentation/ been informed about the different ways to use the palmtop, which type of feedback you can expect and the purpose of this feedback?
   Documentation exists but I am not of the opinion that it is sufficient. Feedback is given orally amongst the users and with the e-commerce project.

11. Have you been asked if the usage of the palmtop comes natural for you?
   No, I have not been asked.

12. Do you receive immediate feedback from the palmtop if error when input of data?
   The palmtop peeps when you move it across the barcode and it there is no input the interface is empty.

13. How is feedback presented?
   It peeps and you see a beam, else empty window.

14. Do you feel that the feedback presented is sufficient?
   No, it should indicate when the wrong barcode is read.

15. Is feedback given easily comprehensible, so that you exactly know what to do immediately after?
   Yes.

16. Do you receive signals of what is happening within the system?
   Yes, in the form of sound.

Webb application

1. Is it easy to login in the system?
   Yes, it is easy to login but in can loiter if the computer is too slow.

2. Is it easy to understand how to carry out an order?
   It can be complicated at start but once you have made a few orders it works.

3. Have you received any documentation/ been informed about the different ways to use the Webb application, which type of feedback you can expect and the purpose of this feedback?
   Documentation exists but it is not sufficient. We have not had any education the information has been given orally. All system users should have education.

4. Are you pleased with the layout (colour, design)?
   Yes.

5. Is the application easy to use?
   It is not completely easy since no education has been given and you are not currently informed about additions in the application. There should exist a person at the ward who are responsible for education of the rest of the staff when new functions are added.
6. **How is feedback presented?**
   A text is presented with information about laid order but it is too small and can be missed if you are not experienced.

7. **Do you feel that the feedback presented is sufficient?**
   No, you can for example send an order twice without system warning. You cannot go in an edit one of the orders you have to call and stop one of them. If you do not notice that you have sent the same order twice you receive the double.

8. **Is feedback given easily comprehensible, so that you exactly know what to do immediately after?**
   No, not until something has happened. I think it is defective.

9. **Do you receive signals of what is happening within the system?**
   No, no signals bit I can read that the order is laid. The text however is so small that you can only see it if you know it is there.

**Design**

1. **Do you feel that you have participated in the planning of the system development?**
   Yes, I have felt participation since I started.

2. **Do you think that the methods and techniques used in the system development process have been easy to work with?**
   Yes, it works fine. We have received much help and the e-commerce project group listens to our problems.

3. **Have you been asked about how you use the old system?**
   I have not been involved from the start.

4. **Can you as a user suggest improvements/discuss problems regarding the system development process?**
   Yes, I can discuss problems but I can not suggest improvements.

5. **Are you continuously participating in testing the system?**
   Yes.

6. **Is there time deposited for meetings with users, project management group and technical representative for the system?**
   No, I have not attended any, only short meetings when we have called for them.

7. **Do you feel that the result of the project is targeted towards a user-friendly system?**
   Yes, if it is made working and it is not too complicated.
Organisation

1. Do you feel that you have great participation in the project?
   I have not attended from the start and I do not feel that I can influence it.

2. Has the project form as a way of working facilitated the systems user-friendliness?
   Not that I am aware of.

3. How influential are you regarding the completed system?
   Nothing at all.

4. Have you participated in the planning of the project?
   No, I was not involved from the start.

5. Do the project affect your main assignments?
   Yes, it takes too much time from my work.

6. How do you think that implementation of the new technology has affected the working organisation?
   It takes more time but it has not effected the work organisation.

7. Will the project be completed when you consider that the system is working and you are pleased?
   I hope they finish it when everybody is pleased.

8. How do you define system success?
   When you have a system that offers ready-made templates to order from. When you do not have to run or wait with the palmtop. If the system alerts if errors or order duplicates are made. Stock should not bee too small or too large. Can all of this be achieved it is a good system.
Palmtop

1. **Is it easy to login in the palmtop?**
   I do not believe that I have any problems.

2. **Is the palmtop easy to physically work with?**
   Yes, it is easy and pliant.

3. **Do there exist any problems when reading the bar code?**
   No, I do not have any problems but I know that there exist those who have problems with reading the barcodes.

4. **Did you find it difficult to learn how to use the palmtop?**
   No, absolutely not.

5. **Do you find it easy to move between the functions in the palmtop?**
   Yes, no problems.

6. **Do you see the need for extra education, expertise to use the palmtop on a daily basis?**
   No, everybody has received a basic education. You can also ask other users and contact the e-commerce project.

7. **Is the palmtop suitable for the environment, workstation?**
   Yes, it is small and is not disturbing. The palmtop is not placed in the medical room because of cramped space. In order to perform an order we first have to get it. This is not experienced as disturbing but it should have been better if we were able to carry out everything in the medical room.

8. **Is it effective to use the palmtop, or do you think it takes up unnecessary time from your main assignments.**
   When it is working it runs smoothly and the palmtop runs efficient. The palmtop itself is not the problem. Problems can arise when you perform orders in MI.

9. **Do there exist alternatives to the palmtop if problems occur?**
   You can fax an order. You can also search an order via MI but that takes longer time so you rather fax.
10. Have you received any documentation/ been informed about the different ways to use the palmtop, which type of feedback you can expect and the purpose of this feedback? 
    There exists a folder with palmtop documentation. Yes we have information meetings and can point out both positive and negative things.

11. Have you been asked if the usage of the palmtop comes natural for you? 
    Yes, I can express suggestions at the meetings.

12. Do you receive immediate feedback from the palmtop if error when input of data? 
    I notice if there is anything wrong.

13. How is feedback presented? 
    If a barcode is read in twice, you can see this.

14. Do you feel that the feedback presented is sufficient? 
    Yes it is sufficient.

15. Is feedback given easily comprehensible, so that you exactly know what to do immediately after? 
    Yes.

16. Do you receive signals of what is happening within the system? 
    The palmtop itself presents no feedback in the form of signals, it does not simply receive any data input.

**Webb application**

1. Is it easy to login in the system? 
   Yes, it is easy.

2. Is it easy to understand how to carry out an order? 
   Yes, I think so since I use the system often. We also have the e-commerce folder to help us.

3. Have you received any documentation/ been informed about the different ways to use the Webb application, which type of feedback you can expect and the purpose of this feedback? 
   The documentation is placed in the folder. Prior to that we had loose-leaf system. I do not know if feedback is shown since I have never made a mistake. If the item you are searching for is not found the message “no matches found” are shown.

4. Are you pleased with the layout (colour, design)? 
   It is okay, I do not think about it.

5. Is the application easy to use? 
   Yes, there is no problems using it.
6. **How is feedback presented?**
   In the shape of a text message.

7. **Do you feel that the feedback presented is sufficient?**
   Yes.

8. **Is feedback given easily comprehensible, so that you exactly know what to do immediately after?**
   Yes.

9. **Do you receive signals of what is happening within the system?**
   Yes and there are means to double-check if the order is sent.

**Design**

1. **Do you feel that you have participated in the planning of the system development?**
   Yes, ever since I joined in they are listening to my opinions.

2. **Do you think that the methods and techniques used in the system development process have been easy to work with?**
   Yes.

3. **Have you been asked about how you use the old system?**
   I have not personally been asked, since I have not been participated from the start. But documentation of this has been made.

4. **Can you as a user suggest improvements/discuss problems regarding the system development process?**
   Yes.

5. **Are you continuously participating in testing the system?**
   Yes.

6. **Is there time deposited for meetings with users, project management group and technical representative for the system?**
   Yes, you are continually called to meetings. You can test the system on computers and perform orders, but not actually send them.

7. **Do you feel that the result of the project is targeted towards a user-friendly system?**
   Yes, clearly. It has to be user-friendly.
Organisation

1. **Do you feel that you have great participation in the project?**
   Yes.

2. **Has the project form as a way of working facilitated the systems user-friendliness?**
   Yes, options have been given to address problems and actions have been taken thereafter both in MI and the palmtop.

3. **How influential are you regarding the completed system?**
   I have ascendancy.

4. **Have you participated in the planning of the project?**
   No, I have not been involved from the start.

5. **Doe the project affect your main assignments?**
   No. If fellow-workers need assistance you find the time. You also find time for the meetings and they are interesting to attend.

6. **How do you think that implementation of the new technology has affected the working organisation?**
   The technology has been introduced smoothly.

7. **Will the project be completed when you consider that the system is working and you are pleased?**
   Yes, I believe that they are going to listen to the users.

8. **How do you define system success?**
   A timesaving system that will result in economical savings.
Interview with: Paul Johannesson, Assistant Head Nurse, Medicine Clinic 45 Appendix 5

Date: 2003-05-07
Place: Medicine Clinic 45, The County Council of Blekinge
Present: Åse Larsen Andrén
Tove Mantzakanis
Paul Johannesson
E-commerce project: Participated 8 months after start. Is a user of Marakanda Inköp and performs medical requisition.

Palmtop

1. **Is it easy to login in the palmtop?**
   Yes, since you scan your authorisation via a barcode.

2. **Is the palmtop easy to physically work with?**
   Yes.

3. **Do there exist any problems when reading the bar code?**
   Personally, I do not have any problems. I know those who have problems in reading the barcodes but it is difficult to say why.

4. **Did you find it difficult to learn how to use the palmtop?**
   No, that was not hard.

5. **Do you find it easy to move between the functions in the palmtop?**
   No. When you are going to edit in the palmtop I think it is too small and blurred. When you read in an article for the first time only the article number is shown, the second time the article is read in the name of the article is also shown.

6. **Do you see the need for extra education, expertise to use the palmtop on a daily basis?**
   No, it goes well.

7. **Is the palmtop suitable for the environment, workstation?**
   Good, the palmtop is placed in connection to the computer in the medical room.

8. **Is it effective to use the palmtop, or do you think it takes up unnecessary time from your main assignments.**
   If scanning is easy and under the prerequisite that all data is already inserted then it is effective.

9. **Do there exist alternatives to the palmtop if problems occur?**
   Yes, through article facts via the MI application.

10. **Have you received any documentation/ been informed about the different ways to use the palmtop, which type of feedback you can expect and the purpose of this feedback?**
    Yes.
11. Have you been asked if the usage of the palmtop comes natural for you?  
   No.

12. Do you receive immediate feedback from the palmtop if error when input of data?  
   I think it indicates by sound.

13. How is feedback presented?  
   The article number or name is shown.

14. Do you feel that the feedback presented is sufficient?  
   No, I think feedback also should be presented en clair.

15. Is feedback given easily comprehensible, so that you exactly know what to do immediately after?  
   That has not occurred to me.

16. Do you receive signals of what is happening within the system?  
   I am not sure.

Webb application

1. Is it easy to login in the system?  
   From a general point of view, yes.

2. Is it easy to understand how to carry out an order?  
   Yes, I have worked with it for a while.

3. Have you received any documentation/ been informed about the different ways to use the Webb application, which type of feedback you can expect and the purpose of this feedback?  
   Yes, e-commerce documentation.

4. Are you pleased with the layout (colour, design)?  
   I have no point of view, it works fine.

5. Is the application easy to use?  
   I think it is all right and has constantly been developed.

6. How is feedback presented?  
   Poorly, if you e.g. type the wrong date on an order it can be sent without system reaction.

7. Do you feel that the feedback presented is sufficient?  
   No, not quite. The system should signal if the wrong date is used.

8. Is feedback given easily comprehensible, so that you exactly know what to do immediately after?  
   No.
9. Do you receive signals of what is happening within the system?
   Yes, I receive a message that I have no orders to prepare. Then I know that I have accomplished an order.

Design

1. Do you feel that you have participated in the planning of the system development?
   Yes.

2. Do you think that the methods and techniques used in the system development process have been easy to work with?
   Yes, it has been a good way of working. It would have been desirable with more meeting together with Marakanda and Apoteksbolaget.

3. Have you been asked about how you use the old system?
   Even if this has been done before it has not been evident since these discussions constantly arises.

4. Can you as a user suggest improvements/discuss problems regarding the system development process?
   Yes, I think so.

5. Are you continuously participating in testing the system?
   Yes, constantly since we are one of the pilot wards.

6. Is there time deposited for meetings with users, project management group and technical representative for the system?
   Yes.

7. Do you feel that the result of the project is targeted towards a user-friendly system?
   Not yet, but they are working towards it.
Organisation

1. Do you feel that you have great participation in the project?
   Yes, I feel that I am participating.

2. Has the project form as a way of working facilitated the systems user-friendliness?
   Yes.

3. How influential are you regarding the completed system?
   They have listened to the issues indicated.

4. Have you participated in the planning of the project?
   No, not initially.

5. Doe the project affect your main assignments?
   No, the patients are not suffering. Medical orders have to be done anyway. If you need time for extra education, you find it.

6. How do you think that implementation of the new technology has affected the working organisation?
   Yes, it takes longer time to perform an order.

7. Will the project be completed when you consider that the system is working and you are pleased?
   I do not think that we will be completely satisfied from our perspective, which is to receive medical smoothly.

8. How do you define system success?
   A timesaving system that generates more time for the patients. And that the system in the end generates invoices.
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