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Tailor the System or Tailor the User?

How to Make Better Use of Electronic Patient Record Systems

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Tailor the System or Tailor the User?
How to Make Better Use of Electronic Patient Record Systems

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Abstract

Health care organisations are extremely complex because they consist of heterogeneous groups of people (clinical professions, patients, managers), use advanced technology (medical devices and patient record systems), and apply many organisational and clinical routines. When introducing Electronic Patient Record systems (EPR) in health care organisations, all these aspects get affected. Using a sociotechnical perspective is necessary in order to get a “successful” EPR usage.

The aim of my PhD studies is to provide health care organisations with knowledge and insights into how they can improve their organisation and practice in relation to usage of EPR systems. In my research I have used a grounded theory methodology for studying, analysing and reflecting on how electronic patient record systems are used by professionals in their practice. Studies have been conducted during a 2.5 years collaborative research project. Within the studied health care organisation there are differing opinions if an EPR system is mainly a technical system or a tool to support the clinical organisation. This conceptual division leads to an uncertainty in who is responsible for the proper function of the EPR system and have a major effect for the clinicians in their clinical practice. During the research seven potential problems areas, *mandate, usability, education, participation, improvements, support and evaluation* have been identified as crucial for the health care organisation to manage to achieve an effective EPR usage.

The main results are 1) The health care organisation needs to establish a problem-solving strategy that questions the reasons behind the problems occurred, 2) The different stakeholder groups need to interact, create a better understanding for each other’s perspective and agree on the same goal for the EPR system, 3) The clinical organisation needs help to improve their clinical practice in relation to the EPR system, 4) The EPR deployment and usage affect the clinicians in different ways. Their attitude towards the EPR system is dependent on the usability of the EPR system, the deployment process, their experience of participation, education, support and possibilities to improve the system.

List of Papers

This thesis is based on a number of papers, which are referred to in the text by their roman numerals.

- Paper I** **Three Key Concerns to a Successful EPR Deployment and Usage.**
- Authors Rebecka Janols, Bengt Göransson and Bengt Sandblad
- Publication Accepted for presentation at MIE 2011 (International Conference of the European Federation for Medical Informatics)
- Short summary This paper analyses how EPR management and the clinical managers within the studied organisation understand and work with their EPR responsibility. The paper describes three areas, *education, evaluation and support & improvement*, which we considered to be key concerns to a successful EPR deployment and usage. The main result is that the studied stakeholder groups have contradictive understanding about what the EPR systems are and what their own responsibilities are. This had a negative affect on the EPR users in their clinical practice when they needed support from the EPR system, EPR management and clinical managers.
- My Contribution In this paper I am the main author. I had main responsibility for most activities described in the paper.
-
- Paper II** **Physicians' Concept of Time Usage – A Key Concern in EPR Deployment**
- Authors Rebecka, Janols, Bengt Göransson, Erik Borälv and Bengt Sandblad
- Publication In Proc. WCC 2010 (World Computer Congress), 71-81, 2010
- Short summary This paper is based on an interview study with 19 physicians. The aim was to analyse their attitude and experience of adopting EPR systems. The main result was that they split their time into two parts, patient time and administration time. They considered EPR tasks to be administrative tasks that they did not consider to be their main work. It was considered a task that you do not need to be a physician to perform.
- My Contribution In this paper I am the main author. I planned and conducted the interview study together with Erik Borälv, analysed the data and wrote the paper together with Bengt Göransson.
-
- Paper III** **The New Clinical Practice: How Nurses and Physicians Experience Electronic Patient Records**
- Authors Rebecka Janols
- Publication accepted to FALF (Conference for work environment research) Swe. *FALF Forum för arbetslivsforskning* 2011, Luleå. The paper is not peer-reviewed.

- Short summary This paper is based on interviews with 19 physicians and 17 nurses. It describes how they experienced the EPR deployment and their EPR adoption. Both groups expressed that the EPR system had many benefits, but that it did not support them in their clinical practice. The main result showed that the physicians were more frustrated than the nurses because they thought that the EPR system affected their profession in a negative way. The nurses on their hand thought that the EPR system gave them benefits that increased their professional performance and that their responsibilities became more visible for the other clinicians.
- My Contribution In this paper I am the sole author. I planned and conducted the interview studies with Erik Borälv and Bengt Göransson.

Paper IV Obstacles to the Establishment of A User-Centred Perspective in Two Organisations.

- Authors Rebecka Janols, Åsa Cajander, Elina Eriksson, Holger Karlsson and Bengt Göransson.
- Publication To be submitted to "Advances in Human-Computer Interaction"
- Short summary This paper analysis how different stakeholder groups within two different organisations experienced the establishment of a user-centred perspective. The studied stakeholder groups are users, core business managers, IT/EPR coordinators and system developers. To analyse how they were influenced we have used communities of practice (CoP) theory. The result is that all four CoP were effected in different ways and that they need to understand that and be willing to change their practice in order to establish a user-centred perspective.
- My contribution. Åsa Cajander and I are the main authors. The paper is based on data from my research project and her research. I have done the studies in organisation B and taken part in the discussions and the analysis as well as written parts of the text in the paper.

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I also would like to thank Uppsala County council for financing the research project. Especially, I want to thank to the members of the steering committee and the individuals that have participated in interviews, observations and during seminars.

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Finally I would like to thank my husband Peter that have supported me and never stopped listening about the physicians, nurses and managers... I love you and I'm looking forward to our (research) adventure in New Zealand!

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Abbreviations and Groups

CoP	Communities of Practice
EPR	Electronic Patient Record
GT	Grounded Theory
HCI	Human-Computer Interaction
IVAN	The collaborative research project between the university and the County Council. 'IVAN' is a Swedish acronym for "Information system in health care – usability and benefits" (swe. Informationsystem I vården – användbarhet och nytta)
Stakeholder groups	
Users	Clinical professions: physicians, nurses, medical secretaries, assistant nurses, and paramedics. The various clinical professions have strong intra-professional identities. Their main task is to provide health care to the patients, they use the EPR system as a tool.
Clinical managers	Managers at different levels within the clinical organisation. They are responsible for the quality of the health care and the clinicians work environment. They are often educated clinicians and some of them are still working part-time with patients.
EPR management	Responsible for deploying and testing the EPR system and support the users. They are educated clinicians that now work fulltime with EPR issues.
EPR coordinators	The role is created to be the link between the EPR management and the clinical organisation. Their tasks are to coordinate deployment of new EPR modules and to support the users in their own division. They are educated clinicians.

Part I: Introduction

The purpose with this part is to introduce the topic of the licentiate thesis and my research perspectives.

1. Introduction

“The first five years [with the EPR system] we have managed to develop the clinical organisation despite the EPR system, but I hope that in the next five years period it will change to be a development thanks to the EPR system.”

- Nurse

I have chosen to begin my licentiate thesis with this quote because it illustrates how the care professionals and clinical managers feel about the electronic patient record (EPR) system. The idea with using an EPR system is to have one complete patient record for every patient – not several. The benefits are considered to be a more structured clinical practice, increased possibilities for the clinicians to overview the patient information, saved time and money for the health care organisations, county council and society.

Today EPR systems and other health information systems are becoming a natural part of the daily work for all care professionals and as the quote illustrates, it is not obvious that the benefits will appear. Local and national newspapers have for many years followed the EPR deployment:

“Physicians are protesting against the EPR system”¹

“The EPR system is causing chaos”²

“Less time for the patients”³

“The new EPR system is not saving any money”⁴

The mentioned headlines describe different kind of problems: 1) usability problems, 2) clinicians that are fighting for their right to a EPR system that supports them, 3) consequences such as that the EPR systems did not reach the money savings as the health care organisation had hoped, 4) critics

¹ “IT I vården” (2009-11-11) <http://itivarden.idg.se/2.2898/1.268815/lakare-i-protest-mot-cosmic>

² UNT (2010-04-26) <http://www.unt.se/uppsala/cosmic-skapar-kaos-921697-default.aspx>

³ UNT (2006-09-06) <http://www.unt.se/startsidan/mindre-tid-for-patienterna-389723-default.aspx>

⁴ UNT (2008-07-16) <http://www.unt.se/startsidan/nytt-journalsystem-visar-ingen-besparing-303874-default.aspx>

against that the EPR system do not support laws and regulations. These headlines are not unique for Swedish EPR deployment and usage; it has been seen for decades all over the world. This issues have been addressed but not solved by several researchers (Aarts and Peel, 1999, Aarts et al., 1998, Nilsson, 2007, Lorenzi and Riley, 2000, Lorenzi and Riley, 2004, Kitzmiller et al., 2010, Davis, 1993, Davis, 1989, Effken, 2002, Callen et al., 2007, Callen et al., 2008, Berg, 2001).

The Purpose

The purpose with my research is to provide health care organisations with knowledge and insights in how they can improve their organisation and practice in relation to electronic patient record systems' usage. This is done by studying, analysing and reflecting upon how electronic patient record systems are used by professionals in their practice.

In order to fulfil this purpose we⁵ have studied the usage of electronic patient record (EPR) systems in one of Sweden's largest health care organisations. The research is based on a grounded theory methodology and aims to identify *what* the potential problems are, *where* and *why* they exist and how to deal with them.

This licentiate thesis will

- Identify potential problems that prevent the studied health care organisation's EPR usage.
- Illustrate how the EPR system affect main stakeholder groups within the studied organisation.
- Give a broader picture of the complexity of the health care organisation and a better understanding of why problems often occur during EPR deployment and usage.

For me, writing the licentiate thesis also serves as a way of summarizing the research process, reflect on my research and the future.

What is so Special with IT in Health Care?

IT is more and more becoming a main work tool in most occupations and in all parts of working life. This makes the functionality and the design of the information systems extremely important. Systems with high usability will

⁵ When I use the word 'we' I mean the research group.

support efficiency, safety and a good work environment. Systems with low usability will lead to the opposite. How people perform, the benefits for the organisation, the quality and safety in services provided and the benefits for the customers all depend on the properties of the information systems. If this is generally true in working life, it is even more so in the health care sector. There are many reasons for this.

The most obvious reason is that the work of the health care professionals concerns vulnerable people, patients that are ill and whose medical situation can be very critical. The care of the patients requires empathy, adaptability, sensitivity and other important very human skills that may not be hindered or disturbed. The technology that supports this nature of work must fulfil many different requirements with regard to usability, efficiency, safety, and integrity. It must not hinder the professionals' possibilities to use their medical and human skills in any way.

Another important reason is that health care work sometimes is very critical with regard to time and quality. When very ill people are treated, the activities can be very time critical and require high quality and precision, e.g. concerning medication. The technology must support this and contribute to improvements rather than introduce problems and safety risks.

A third reason is that very often the technology, the information systems such as electronic patient records, imaging systems in radiology etc., can be difficult to adapt to local organizational and individual requirements and needs. If the technology is designed in such a way that it controls the tasks and activities in a way that is not accepted by the health care professionals, the result can be that they refuse to use the systems or that they are severely hindered to work efficiently. The trust and acceptance of the technology has always been a key factor for successful deployment of IT in health care. Everything that is considered to disturb, or not supportive enough, can easily be either rejected or cause irritation and stress.

Outline of the Thesis

The thesis is divided into seven parts. The order of the parts illustrates my research process. This has had the consequence that theories informing my research (chapter 10), that are used to analyse the result, are described after the results are presented. The reason for this is because the purpose with the grounded theory methodology is to generate theories that are suited to perfectly fit its supposed use, and later compare the results to relevant research and existing theories.

Part I: Introduction (chapter 1,2) introduce the research aim, gives a background to the research perspectives that the research is based on.

Part II: Background (chapter 3-5) description of the studied health care context, the research project and relevant research about IT/IS deployments in health care, EPR usage and clinicians experience of EPR deployment and usage are also described.

Part III: Methodology (chapter 6,7) describes the different steps in the used grounded theory methodology.

Part IV: Results (chapter 8,9) describes the different stakeholder groups and the seven “potential problem”- areas.

Part V: Theory (chapter 10,11) introduces theories about group processes, organisational learning and communities of practice. The theories are also used to get a deeper understanding on results.

Part VI: Conclusion (chapter 12) concludes the thesis.

Part VII: Epilogue (chapter 13) discussion about future studies.

2. Research Perspectives

In this chapter my research perspectives are described. The purpose is to provide the reader with an understanding of the different perspectives that have served as a guide throughout the research process.

HCI and Usability

“Human computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and the study of major phenomena surrounding them”(SIGCHI, 1992)

The quote is the curricula for HCI from 1992 by Association of Computing Machinery – special Interest Group for Computer-Human interaction (SIGCHI, 1992). This definition has been used in several theses as a common ground for understanding what HCI is and what is included in the HCI research field. The HCI-field is a multi-disciplinary research field with roots in several different disciplines including computer science, cognitive psychology, sociology, anthropology, design and ergonomics. I have chosen to refer to HCI as a multi-disciplinary research field instead of inter-discipline, because several different criteria need to be fulfilled in order to be called a inter-disciplinary research field: 1) a willingness to cooperate and an understanding of the potential for misunderstanding, 2) all parties have to work hard at creating inter-disciplinary understanding, 3) scientists from different disciplines needs to come together. (Monk and Gilbert, 1995). I do not consider these three criteria as fulfilled because the HCI research field is continuously growing and including more and more of the surrounding phenomena. In the beginning HCI was considered to be *one* computer – *one* human that interacted. This has grown to be networks of computers that are suppose to support several individuals or a whole organisation.

A major concept of the HCI field is *usability*. Several researchers have tried to define usability in order to evaluate and measure systems usability. In this thesis, I will define usability according to the ISO 9241 standard, part 11 (9241-11, 1998).

“Extend to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (9241-11, 1998)

In my research the product is the EPR system and the users are the different clinical professions. The EPR system’s goal is to support the clinicians in their clinical practice to perform high quality care. The EPR system supports for example reading and writing medical documentation, ordering lab tests, referrals and X rays, managing drugs and patient administrative tasks. Some examples of usability problems in the EPR system are

- Lack of patient overview especially for the physicians
- Cumbersome navigation, “lot of mouse clicks”
- Response time: e.g. downloading lists of lab results can take minutes if a patient have many tests
- Flaws in design leading to hazardous situations: e.g. unclarity about dosage in the prescription module

This thesis focuses on the EPR development and adoption within the organisation and not to evaluate or measure the usability of the EPR system. Studies show that even though the systems usability and the development process are important it is not everything (Croll, 2010). The health care context that the EPR system is going to be used in also has a major effect on the EPR deployment and usage and acceptance among the users.

Sociotechnical approach

The health care organisation is complex since it consists of heterogeneous groups of *people* (clinical professions, patients, managers), *technology* (medical devices and patient record systems), *organisational and clinical routines*. (Lorenzi and Riley, 2000) Using a sociotechnical approach means that all these factors are considered to affect the EPR deployment and usage (Berg, 1999). According to Aarts, “*Clinical work changes as ICT [Information communication technology] are implemented as much as these technologies change as a result of local clinical practices*”(Aarts et al., 1998). The quote illustrates that when deploying an ICT or EPR system into a sociotechnical system it affects the organisation as well as the clinical professions. The ICT system affects all clinical professions’ in their clinical practice *and* because of the clinical professions’ different tasks and needs they will use and experience the ICT system in different ways. In Figure 1, I have chosen to conceptualise the sociotechnical system with four wheels: *clinical practice, EPR system, users and health care organisation*. The figure

illustrates that the four wheels are connected to each other and when one of the wheels moves the others follows.

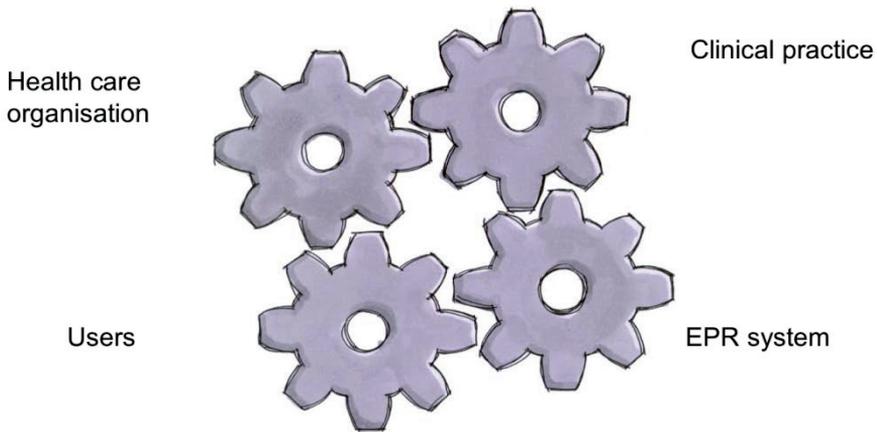


Figure 1. The wheels in a sociotechnical system. When one wheel moves the others follows.

Berg (1999) has done a different conceptualization of the four wheels where he considers the health care practice as a network of *people, tools, work routines* and *documentation*. He argues that it is required to understand the network before strategies about how to make a “successful” EPR deployment and usage can be planned and this process should start with an empirical bottom-up approach. (Berg, 1999)

Action Research

Our research group has a long tradition of action research as for example Cajander (2010), Eriksson (2009), Hardenborg (2007), Göransson (2001) Action research has dual purposes in that the aim is not only to perform research, but also to make improvements in the organisation (McKay and Marshall, 2001).

Within the research project described in this thesis action research has worked as an important research perspective that have affected the used data gathering methods for example. The framework has also influenced the results, and is therefore briefly mentioned in this section. The use of action research is somewhat further elaborated in the section describing the research project. According to Susman and Evered (1978, Oats, 2006) action research has five steps: *diagnosis, planning, intervention, evaluation* and *reflection*. Within the research project we have performed several smaller action research cycles. One action research cycle has for example been to

diagnose how the clinicians and clinical managers experience the EPR deployment and usage. The results and suggestions for improvements have been discussed with individuals responsible for the deployment process with the aim to improve the deployment process. The overall action research objectives as they were described in the beginning of the action research project are not completely fulfilled. These objectives were to implement our hypothesis about combining developing EPR working routines and the EPR deployment process with the clinical organisation's ongoing organisational changes. We have had continuous discussions with several stakeholders within the organisation that have led to some changes in the existing deployment process, but unfortunately we have not had the opportunity to test our hypotheses. Changes in the action research process are a natural part of the action research process as discussed in for example (Reason and Bradbury, 2006).

Part II: Background

This part provides the reader with a background to the research project, the health care context where the research is performed and related research.

3. The Research Project IVAN

IVAN (swe. Informationsystem i vården – användbarhet och nytta) eng. “Information system in health care – usability and benefits” is a collaborative research project between a Swedish County Council and researchers at HCI division, Department of Information Technology, at Uppsala University. The project started in 2008 and continued until the end of 2010.

The primary goal of the research project was to study the organisations’ EPR situation with regard to usability issues and make suggestions that could lead to changes in how to work more effectively with the EPR system. Our intention was to work in an action research setting and together with different stakeholders find methods for improving the usability of the systems and create an organisation that supported the clinicians. This intention has partly been fulfilled in that we have had continuous discussions with several stakeholders within the organisation that have led to some changes in the existing deployment process. Unfortunately we have not had the opportunity to test our hypotheses of how to work more effectively with the EPR system.

The research project was financed partly by the County Council and partly by the IT department at Uppsala University. During the project, researchers have had continuous meetings with the steering committee (EPR system owner, chief physicians, chief of the EPR management and Development Director) where results and future studies have been discussed. During the project empirical data have been collected at the county’s four main health care organisations: a university hospital, several primary care centres, a smaller hospital and a habilitation unit. Results have continuously been presented to the different roles within the organisation.

The Research Group

Several researchers and master thesis students have participated in the research project:

One PhD student (me). I have a Master of Science in Sociotechnical Systems Engineering, with HCI as speciality. My master thesis was in the area of HCI and medical informatics: *A usability study in primary care - Conceptual design of the representation of health problem in computer based medical records.* (2008).

One HCI professor has participated during the whole project. His background is in system engineering and his research has been about improving work environment in computer-supported work.

Two senior researchers, one participated during the first year. His background is in computer science with a PhD in HCI focusing on medical informatics. The second senior researcher participated during the last 1,5 years. His background is in computer science with a PhD in HCI specifically User-Centred System Design.

Six master thesis students have done different individual studies (20 weeks each) within the project. The master students were from engineering educations in sociotechnical systems and computer science.

The researchers and master students have worked independently with a close connection to each other. We have also had a close cooperation with other members of the HCI research group at Uppsala University. This group is a mix of PhD students, senior researcher and professors. The HCI group is truly multidisciplinary where the individuals have different areas of expertise and experiences ranging from psychology, pedagogy, ethnography, engineering, sociotechnical systems and computer science.

4. The Health Care Context

This thesis is based on the IVAN research project that has been performed between 2008-2010 at various health care organisations within the same Swedish county council including a University hospital, several primary care centres, a smaller hospital and a habilitation unit. During the research project empirical data was collected at the four main health care organisations, but the majority of the data presented in this thesis comes from the University hospital. The purpose with this chapter is to shortly describe the studied health care context, the EPR procurement process and finally some of the problems that have been associated with the EPR deployment and usage.

The University Hospital

The University hospital employs 8 000 people, 1 172 of them are physicians and 2 613 are nurses. The hospital is divided into seven divisions, fifty clinical departments and hundreds of units. Figure 2 illustrates the general structure of the divisions.

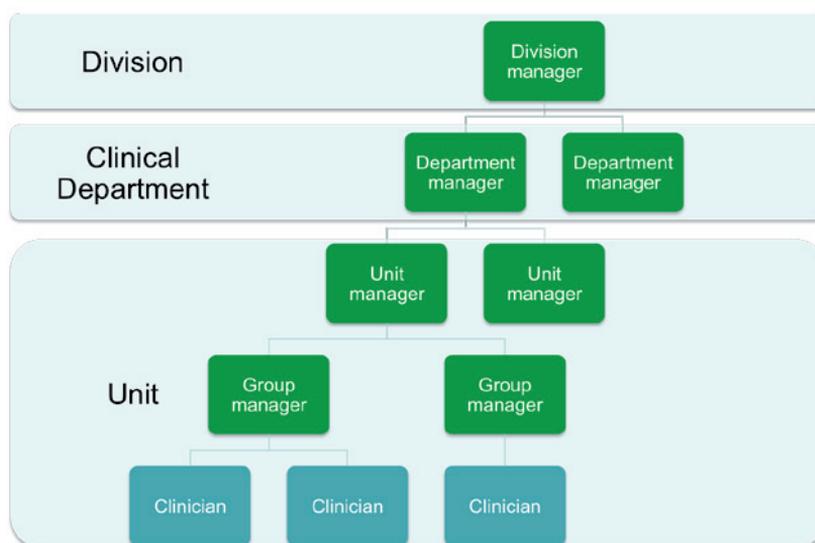


Figure 2. The structure of managers and units within the divisions.

The seven divisions can be seen as small independent organisations within the larger hospital organisation. They have their own management organisation, IT/EPR support, administration and budget. All divisions are divided into several clinical departments and units that each has their own managers that are responsible for the care quality and the work environment for the clinical professionals (Figure 2).

Within the studied university hospital several stakeholder groups are involved in using or managing the EPR systems. The four main stakeholder groups are illustrated in Figure 3. The largest square in the figure represents the studied health care organisation and the smaller square represent the company that delivers and develops the EPR system.

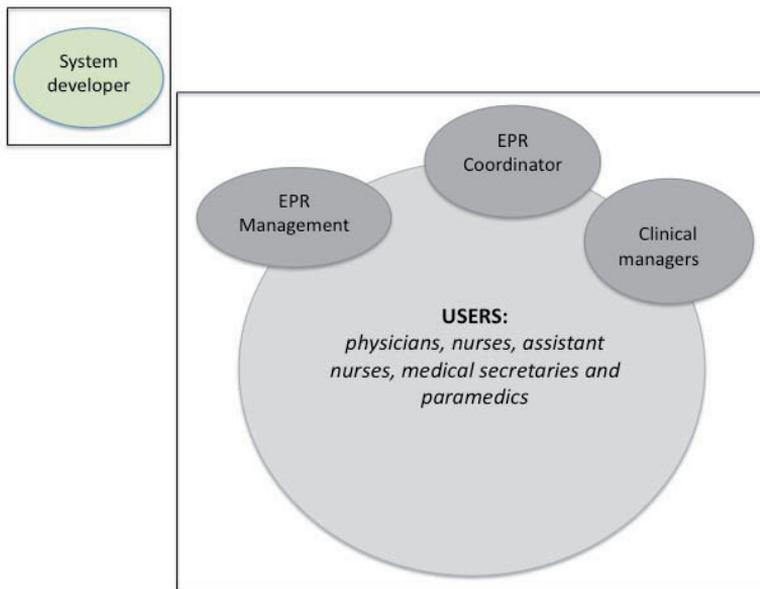


Figure 3. The stakeholder groups that use and manage the EPR system.

Users are the largest group in the organisation. The users have different clinical professions such as physicians, nurses, medical secretaries, assistant nurses and paramedics. The various clinical professions have strong intra-professional identities. Their main task is to provide health care to the patients, they use the EPR system as a tool.

Clinical managers are managers at different levels within the clinical organisation. They are responsible for the care quality and the clinicians

work environment. The clinical managers are mostly educated clinicians, that sometimes still works part-time with treating and caring patients.

EPR management are responsible for deploying and testing the EPR system. They are also responsible for supporting the users. They are mostly educated clinicians that now work fulltime with EPR issues.

EPR coordinator is the link between the EPR management and the clinical organisation. They are employed by the divisions. Their main tasks are to coordinate when new EPR modules are being deployed and support the division's users. They are mostly medical professionals.

The different stakeholder groups are connected in a “information flow-chain” that are used when the EPR management needs to provide the clinical organisation with EPR information and when the clinical organisation needs EPR support. The information flow chain is illustrated in Figure 4.

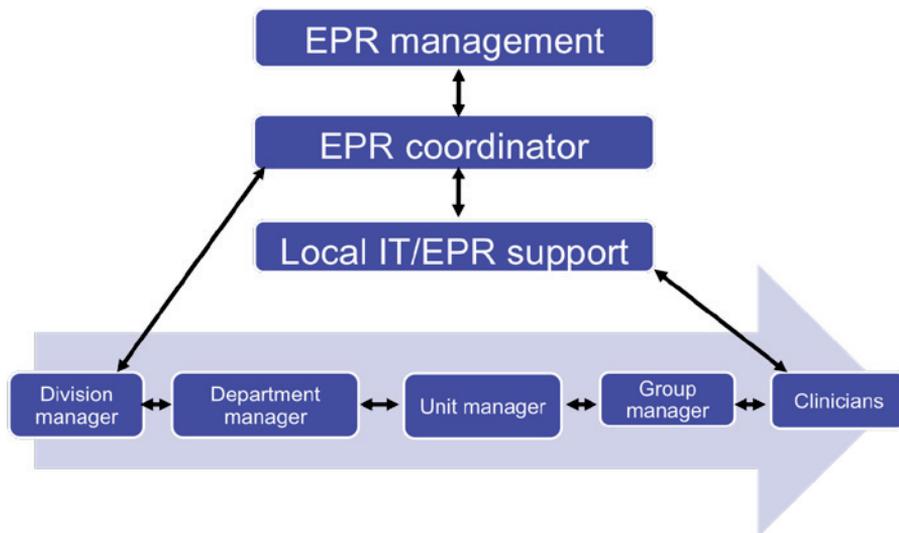


Figure 4. The information flow chain illustrates how the support and the flow information between the stakeholder groups are supposed to be. In reality, the members within the stakeholder groups found their own way to spread information and get support.

The information flows *from* EPR management *to* users as well as the other way. The information chain *from* EPR management is used when they need to provide the clinical managers or the users with news about the EPR system. In these cases they contact the EPR coordinators at the different departments. The EPR coordinators then spread the information to the users, either through the clinical managers or through the local IT/EPR support at the different units. The information chain is also used when the users need

support or wants to provide the EPR management with ideas for improvements. The chain of stakeholders was created so that the users should always have a local support person close to them.

EPR Procurement

2001 the county council initiated a project that aimed to investigate different EPR solutions for the university hospital. At that time the primary care centres had used an EPR system for the preceding 10 years that was specialised for primary care, meanwhile the university hospitals still used paper-based patient records and IT systems for x-ray and administrative tasks. During the procurement phase different clinical professions worked separately to identify requirements and finally the county council decided to invest in one EPR system for all health care organisations within the county council. The EPR system was module-based and developed to support the entire care process, from primary care to specialty care. The EPR system contained both clinical support (care documentation, order management and medication) and patient administration support.

EPR Deployment and Usage

Today the EPR system has 13 000 users that work at the different health care organisations. The deployments have been conducted for 9 years and are considered by the clinicians to be associated with a lot of problems and frustration. The clinicians consider the EPR system to have major usability problems, be non-intuitive and that they now work more with computers than with patients. The user acceptance problems have slowed down the deployment process, but the hospital top managers are convinced that an EPR system with usability problems is still safer than to continue using paper-based records.

Relationship to the EPR Supplier

Today the county is one of several customers using this specific EPR system. All customers are today collaborating in a group called the “customer group”. In that group all customers prioritise improvements, order new functions within the EPR system and communicate with the EPR supplier. The benefits of the “customer group” are that the customers can share the costs and responsibility for new modules. One disadvantage of the collaboration is that improving the existing system generally takes several years to carry out.

5. Related Research

“Complex problems rarely have simple solutions. During the many stages of the solution process, there are numerous opportunities to go wrong, whether the solution tends to be a technical one or not.”
(Lorenzi and Riley, 2000)

Problems regarding deployment and usage of different types of IT systems in health care organisations have been studied for many years. The quote above by Lorenzi and Riley (2000) illustrates that this kind of complex problems needs a broad sociotechnical understanding to be solved. For the last 20 years researchers have studied these issues from different research perspectives including Information Technology (IT), Information Systems (IS), HCI and organisational theories. This means that they use different methods and theories to address the problems and their solutions are of different types. In this part I will review research problems and solutions that are relevant for my research.

Different Terms for the Same Type of Systems

Research about deployment and usage of IT/IS systems in health care organisation, refer to the IT/IS systems in different ways, as information technology systems (Kukafka et al., 2003) (Nilsson, 2007), information systems (Lorenzi and Riley, 2000, Lorenzi and Riley, 2004), health information system (Effken, 2002), patient care information systems (Berg, 1999, Berg, 2001, Berg, 2004), clinical information systems (Callen et al., 2008, Callen et al., 2007, Aarts and Peel, 1999, Aarts et al., 1998), health information technology (Kitzmilller et al., 2010) and electronic patient records (Meijden et al., 2001).

Even though different terms and names are used the focus is on information systems that are developed to support a complex health care context. Researchers use both the terms deployment and implementation for the same process that we are studying. In our research group we have chosen to use the term deployment instead of implementation, to emphasise that we focus on the process when the IT system is introduced and adopted by the

organisation and users and not the coding and technical part of the implementation.

Sociotechnical Approach

Especially two researchers/research groups have been influential, Lorenzi and Riley, *Managing change: an overview* (Lorenzi and Riley, 2000) and Berg, *Patient care information systems and healthcare work: a sociotechnical approach* (Berg, 1999). They both maintain that the complexity of the IT system in health care has grown to affect a larger more heterogeneous group of people and additional organisational areas. (Lorenzi and Riley, 2000). Aarts (1999) describes the impact health information systems have on the health care organisations:

“More specifically hospitals are changing and becoming more and more a link in the chain of care delivery. Within hospitals the delivery of care is increasingly being organized around the patient. This will profoundly change the way that the care process is organized and how clinicians collaborate. This will influence how, when and for what purpose information will be used. Although changes take place in the processes of care, clinicians will still base their decisions on professional standards. How clinical work is done is highly localized. It is determined by professional peers and the social arrangements within the clinician’s group. Therefore the interest of the organization and the individual clinician may not converge” (Aarts and Peel, 1999)

Lorenzi and Riley (2000), Berg (1999) and Aarts (1999) argue that IT/IS development for health care settings are both a technical challenge and an organisational challenge and use the sociotechnical approach that “*sheds new light on the potential roles of IT applications in healthcare practices*” (Berg, 1999).

What is a ‘Successful’ Deployment?

Research regarding successful or failure deployments have been widely discussed and applying a sociotechnical approach means that the reasons for a successful or failed deployment has organisational, technological and behavioural explanations. According to Lorenzi and Riley (2000) the reasons for a system failure have different character: *communication, culture, and underestimation of complexity, scope creep, organisational, technology, training and leadership issues*. Berg (2001) argues that a successful IT deployment is socially negotiated and different depending on who is asked.

This issues are often not realised within the organisations and Berg (2001) argue that to begin a discussion about what a successful deployment process are will open the eyes of the organisation to the complex meaning of success and failure. This can also be seen in the studied health care organisation. When we asked different stakeholder groups and individuals if their EPR deployment were a success or a failure, they answered differently. The reasons for that, according to Berg (2001) are because they measure a successful deployment differently. For example, for some stakeholders economical aspects are the most important measurement and for others the usage is the most important. The success or the failure of the deployment can also change over time; for example the deployment can be considered to be a success by the users in the beginning and then after a few months the users experience that the system is not supporting them and then consider it to be a failure. Berg (2001) argues that even if you can come up with a measurement scale for a successful IT deployment it is impossible to use the same aspect in another context concerning another organisation. The organisations have different contexts, size and leaderships that affect how they react to the same IT system and the same deployment strategy.

User Acceptance

Davis (1989, 1993) considers user acceptance to be a key concern for a successful or failed IT project. He has developed a model called *Technology Acceptance Model* (TAM) that is a framework for explaining users acceptance of technology. The model focuses on **perceived usefulness** defined as: *“the degree of which a person believes that using a particular system would enhance his or her job performance”* and **perceived ease of use** defined as: *the degree to which a person believes that using a particular system would be free of effort”* (Davis, 1989). Unfortunately TAM cannot be used without modifications to predict and explain the EPR usage in my study, because it requires that the use is voluntary and not mandatory as the EPR system is.

User Adoption

Jensen and Aanestad (2007, 2007a, 2007b) have studied how different users groups adopt the EPR systems. They use theories such as sensemaking, Hospitality and hostilities to explain the users adoptions.

“It is essential for managers to be aware of how different groups of users develop different understandings on the same technology and thereby enact different practices around the technology. Doctors and nurses construct different sensemaking structures. These appear

to be linked to their identity, experience, as well as local practices” (Jensen and Aanestad, 2007b)

User Expectations

Meijden et al. (2001) have studied the users expectation of the EPR system. They comes to the conclusion that “*both experienced and inexperienced users had little defined expectations regarding the effects of computer applications on health care*” (Meijden et al., 2001). Before the deployment the interviewed users mentioned better accessibility, reliability and possibilities to overview patient information as expected benefits. The authors conclude that the “*future users had no clear view of what could be expected after introducing computers into their daily work*” (Meijden et al., 2001).

Implementation Models

In order to solve the problems that occur when implementing IT systems in health care organisations several researchers have tried to develop different implementation models. The models are based on a sociotechnical understanding of the IT system as an organisational system that is based on the goal to improve the clinical practice. Aarts, Peel and Wright (1998, 1999) argue that in order to get a successful implementation it needs to be an “effective” fit between the clinical work and the health care system in order to obtain the best outcome for the clinical care. The aim of the model is to “*...identify the relevant domains for organisational changes and to pattern the interaction each of the domains can have with clinical work and the healthcare system*” (Aarts et al., 1998)

Callen (2008) propose a model called *Contextual Implementation Model* (Kushniruk et al.). CIM are inspired by both TAM (Davis, 1989, 1993) and Aarts, Peel and Wrights model (1998, 1999). Callen considers the other models to have excluded an important perspective, the context where the system is being implemented. The model consists of three levels: the *organisational* level, the *clinical* level and the *individual* level that are all affected by the use of the IT system. The three levels all have *sub-dimensions of consideration* that influence clinicians’ usage and attitude towards the IT systems. The dimensions of considerations are *culture*, *clinical profile* and *ways of working*. CIM is based on field studies and considers the clinical environment and users’ requirements to be necessary for a successful deployment.

Making Sense of Deployment

Kitzmilller et al (2010) have studied how a multidisciplinary project team prepare and implement a hospital-based health information technology system. They use theories of sensemaking to explain the social processes that occur in a large-scale organisational change. They analyse how the members in the multidisciplinary teams sensemaking influence their actions and how the project teams change over time.

Part III: Methodology

This part describes the methodology and my grounded theory process.

6. Methodology

In my research I define methodology in the same way as Crotty (1998) do “*the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcome.*” (Crotty, 1998) In order to meet the research aim, to provide the health care organisations with knowledge and insights in how they can improve their organisation and practice in relation to electronic patient record systems’ usage, I have applied a grounded theory (GT) methodology. According to Glaser and Strauss (1967) GT is a suitable methodology if you want to understand an unexplored area or want to apply a new perspective to an established area of research. I have addressed a broad research aim because the EPR system’s purpose, to support a heterogeneous user group in their clinical practice *and* support the health care organisation in their health care, means that the EPR system affect all users, other stakeholder groups within the organisation and the whole organisation. These issues are extremely complex which has had the consequences that my grounded theory categories are much larger than grounded theory categories use to be. This could be an argument against using a grounded theory methodology, but I consider that in order to gain knowledge and insights for the health care organisation you need to understand the complexity within the organisations. For example, if I had focused on just one category, such as EPR learning, it would just give one small piece of the complex problem. Using a GT process will help me to identify *what* the potential problems are, *where* and *why* they exist. GT have been interpreted and used differently by many researchers. In my research I will use GT as a set of principles and practices as proposed by Charmaz (2006), and not as prescriptions of packages. In the next chapter, my grounded theory will be further described.

7. My grounded theory process

Figure 5 illustrate my grounded theory process, where the different parts will be further described in this chapter.

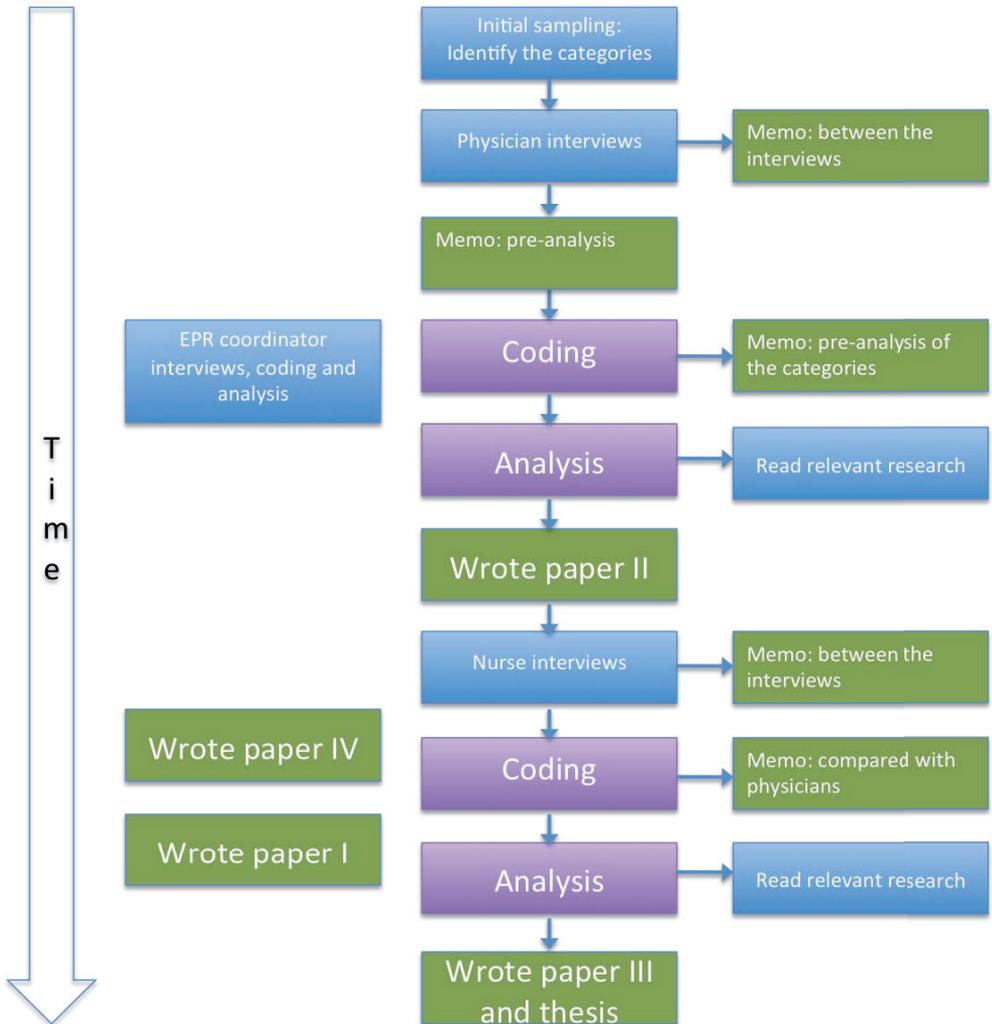


Figure 5. Illustrate my grounded theory process. Blue cells means data gathering, green means and purple means coding and analysis.

Initial sampling

“Initial sampling in grounded theory is where you start, whereas theoretical sampling direct you were to go” (Charmaz, 2006)

The research project started with a six-month initial study where the aim was to explore the EPR situation within the organisation. According to GT this initial study is seen as the *initial sampling* that provided us with a point of departure. (Charmaz, 2006) During the initial sampling we interviewed managers responsible for the EPR system, observed and interviewed clinicians and managers at wards, performed vision seminars (Hardenborg, 2007) with nurses, and participated in a variety of deployment activities. The initial sampling gave us an empirical ground for better understanding how the clinicians and managers experienced the EPR system, deployment and usage. Seven potential problem areas were identified that are further analysed in the other GT steps:

- **Mandate:** Unclear mandate and responsibility among different stakeholder groups within the organisation.
- **Usability:** Frustration among users about the systems usability.
- **Participation:** How the clinicians’ participation in EPR related activities, before, under and after the deployments affected their EPR usage and attitude.
- **Education:** Insufficient EPR learning.
- **Improvements:** Frustration among different stakeholders about the possibility to improve the systems usability.
- **Support:** Lack of contact between groups that are responsible for the EPR system and the users.
- **Evaluation:** lack of evaluations leading to unutilised knowledge about problems in the EPR deployment and usage and the reason why they appear.

During the initial sampling we experienced that various stakeholder groups (users, EPR management, EPR coordinators and clinical managers) within the organisation had a different understanding of their responsibility regarding the identified categories (see Paper I). One difference was that the EPR management, that were responsible for managing, deploying and supporting the EPR system and the clinicians, was aware of that an EPR system affected the clinical organisation and clinical routines, but they considered it to be the clinical managers’ responsibility to handle these aspects. The clinical managers on the other side considered the EPR system to be a technical tool and not an integral part of the health care process and therefore the EPR management’s responsibility to deploy and support. This confusion about whether the EPR system was a technical/IT tool or a tool to

support the clinical organisation and who's the main responsibility for it was had a major effect for the clinicians in their clinical practice. The identified categories and the differences between the stakeholder groups have worked as a starting point during the rest of the theoretical sampling.

Theoretical sampling

“Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes and analyzes his data and decides what data to collect next and were to find them, in order to develop his theory as it emerges”(Glaser and Strauss, 1967)

In the theoretical sampling several methods have been used. According to Glaser and Strauss (1967) different methods gives different views that are necessary in order to understand the categories and to develop its properties. In our research we have used these main data collection methods:

- Audio recorded semi-structured interviews with prepared question themes. The themes were used as a flexible guide during the interviews.
- Observations of the daily work, at hospital wards.
- Open seminars where the purpose was to present findings and get feedback from managers, clinicians and EPR management.
- Questionnaires to measure usability index.
- Notes from meetings and observations in a research diary and an internal project blog.
- Findings from interviews, observations and experience from meetings and seminars have been continually discussed within the research group.
- The empirical analysis has been conducted in the light of other relevant research.

Physicians (paper II and III)

During the theoretical sampling we started with interviewing 19 physicians. The reasons to start with the physicians were that during the initial sampling we had heard that the physicians' attitude toward the EPR system were used as an explanation by the EPR management for the cumbersome deployment and the problems in EPR usage. The total number of interviewed physicians was not pre-decided, we (me and one of the senior researcher) continued until we were confident that the categories were saturated. During the interviews we used a semi-structured interview guide with six themes that was based on the result from the initial sampling:

1. Background information
2. How they experience and use the EPR/IT systems
3. Their experience of the education and training process
4. Their participation in EPR/IT related activities
5. Their experiences of the IT support
6. The relationship between physicians and managers

During the interviews the six themes were used as a flexible base that framed the interviews. All were mentioned but the respondent's experiences and interests influenced how deeply they were discussed. The interviews were continually analysed between the interviews by the two interviewers. After all interviews were made all material were transcribed, coded and further analysed. The reason to transcribe the interviews was to get a deeper understanding for their attitude and experience. According to Charmaz (2006) fully transcribed interviews can be useful because it makes it possible to go back to the transcriptions during the research process. It means that your first reading and coding of the data does not need to be the final one.

Coding the Interviews

“Through coding we make discoveries and gain a deeper understanding of the empirical world” (Charmaz, 2006)

The quote from Charmaz (2006) illustrates the aim of the coding process. After the physicians were interviewed all material were transcribed and coded. During the transcription process all interviews got a unique marking that made information about the respondents name, gender, age, department and role possible to access later in the analysis process. The coding process was separated into *three* iterations and conducted by the other senior researcher and me.

In the first iteration we started coding one third of the transcribed interviews. During the process we called the codes “interesting findings” that we cut out from the transcriptions and put on a large wall. “Interesting findings” could for example be the respondents' answers to how they experience EPR systems and the reasons for that experience and attitude. We sorted the “findings” into different categories without any predefined title. Before starting the next iteration we rearranged and named the different categories.

In the second iteration the second third part of the interviews were coded and placed into the identified categories. In the cases when the codes did not fit well into the existing categories new categories were created. After that the categories were rearranged into new smaller sub-categories (Figure 6).



Figure 6. The coding process after the second iteration.

In the third iteration the last third part of the interviews were coded and sorted into the named categories.

Analysing the Interviews

Between and during all three iterations the categories were continuously analysed. When the coding process was finished we understood that in order to understand differences within the categories, a deeper analysis was necessary. Therefore we sorted the categories into three physician roles: 1) senior physicians, 2) specialist physicians and 3) resident physicians. We also tried to gender mark the categories within the different physician roles, but the analysis showed that the physicians expertise was far more significant than gender were, so we decided to focus on a deeper analysis of the three roles. An extended analysis of the physician interviews is presented in Paper II.

Nurses (paper III)

After, coding, analysing and writing about the physicians' interviews we compared the results with our earlier experience (from the initial sampling) of the attitudes of the other groups of care professionals. When comparing with the experiences of the nurses, we understood that the physicians had a different experience and attitude towards the EPR system and usage. In order

to understand why the nurses' attitude and experience were different we decided to go back to the health care context and interview nurses that worked at the same wards as the physicians did. During these interviews we used the same question themes as when interviewing the physicians, with one added theme about *their experience of the other care professionals' IT/EPR skills*. In total 17 nurses were interviewed until we decided that the categories were saturated. The nurses' interviews were also recorded and transcribed. During the coding process we used the same method, with some improvements, as we did when the physicians interviews were coded. During the first iteration we cut out "interesting findings" while reading the transcriptions. Between the first and second iteration we evaluated the categories and came to the conclusion that the nurses were more neutral in their relation to the EPR system and not as expressive as the physicians were. This knowledge resulted in some improvements of the coding process. In the second iteration we started listening to the interviews while cutting out findings. The possibility to hear how they expressed themselves during the interviews made it easier to find the most important categories. In the analysis of the interviews we divided the nurses into categories based on their responsibilities: 1) nurses that were managers, 2) nurses that had participate in documentation groups and in deployment activities, and 3) the rest of the nurses.

Memo-writing

"Memo-writing constitutes a crucial method in grounded theory because it prompts you to analyze your data and codes early in the research process. Writing successive memos throughout the research process keeps you involved in the analysis and helps you to increase the level of abstraction of your ideas" (Charmaz, 2006)

According to Charmaz (2006) performing memo-writing is important within the analysis. During the research process (see Figure 5) memo-writings have been done during the theoretical sampling both by me alone and together with the other researcher. In the memos, focus has been on what the categories are telling us about the health care context.

Relations to Theories and Relevant Research

During the theoretical sampling we realised that different stakeholder groups had different attitudes and experiences about the seven potential problems areas. These differences seemed to affect their attitude toward the EPR system and their own and others EPR responsibility. Theories about group

processes (Brown, 2000), Communities of Practice (Wenger, 1998, Wenger, 2000, Wenger et al., 2002) and organisational learning (Argyris and Schön, 1996) will be used in order to theorise the results. It will help me to identify knowledge and insights about how the health care organisation can improve both organisation and practice in relation to their EPR usage. During the ongoing analyses (see Figure 5) I have studied relevant research that relate to the ongoing analyses. This has been research on IT/EPR deployments in health care and EPR attitude among clinical professions that have allowed me to put my results in relation to other research in this area.

Part IV: Results

The results presented in this part is extracted mainly from the included papers (I-IV), but are also based on the empirical data from our ongoing research. The part is divided into two chapters, chapter 8 describes the different stakeholder groups and chapter 9 the different stakeholder groups attitudes and experiences of the seven “potential problem” areas.

8. The Stakeholder Groups

The studied stakeholder groups (see Figure 3, page 26) represent different parts of the health care organisation, *the clinical organisation* (clinical managers, clinicians and EPR coordinators) and *the EPR organisation* (EPR management).

Users

The users are the largest group with several thousand members that are employed by the different departments, clinics and units (see Figure 2, page 25). The user group is divided into different clinical professions that have different primary education and care responsibilities. The list below describes the main clinical professions and how they describe their EPR usage.

- **Physicians:** document, read and work with the EPR systems 4-5 hours a day.
- **Nurses:** document, read and work with the EPR systems 1-3 hours a day.
- **Assistant nurses:** read, and work with the EPR system less than 1 hour a day. They have no legal responsibility to document.
- **Paramedics** (psychologists, physiotherapists and welfare officers): read, document and work with the system 3-4 hours a day.
- **Medical secretaries:** document (transcribes the physicians documentation), support other clinicians and work with the EPR system 7-8 hours a day.

The focus of the research project has been on two user groups⁶, *physicians* and *nurses*. We focus on these groups because they 1) work several hours a

⁶ The reason for not focusing on the medical secretaries, even though they use the EPR system a lot, was because they use the EPR system to support the other clinicians, not as a tool in the clinical practice. I am also not focusing on the assistant nurses, because they were not using the EPR system so much and were not legally required to document. The paramedics were not included because they were a relatively small group compared to physicians and nurses.

day with the EPR system, 2) are the largest user groups⁷ and 3) are legally obligated to perform medical documentation.

How the users interact with each other

The physicians and nurses have different work situations and different collegial support from other clinicians. The nurses and assistant nurses are both employed by the same units and work closely together while the physicians move between units and do not have the same collegial support as the nurses have. (For further reading see Paper II and III)

Clinical Managers at Different Levels

The clinical managers are the second largest stakeholder group. They are responsible for the care quality and for managing clinicians at divisions, clinics, units and group level (see Figure 2, page 25). The managers are often care professionals with many years of clinical practice. Becoming manager is considered to be a carrier path, especially for physicians and nurses. The interviews showed that nurses were managers for the units or groups, and the physicians were managers for clinics or other physicians. The managers said that they used between 30-40 different IT systems to perform their work. Some of them use the EPR system when they perform clinical work, but in general they use the EPR system only to access patient information.

How the clinical managers interact with each other

The structure of the hospital organisation with seven divisions that had their own management and budget, led to the consequence that the managers within the same division interacted more with each other than with managers at the other divisions. The group managers (the managers that are closest to the clinicians) usually share rooms and have informal and formal contacts with both the unit's manager and the clinicians. The other managers within the same department do not share rooms or corridor, but they often have a formal cooperation with each other. The clinical managers said that during both the formal and informal meetings EPR issues were considered to be a small or absent concern.

EPR Management

The EPR management consists of about 15 members with different roles such as: *system owner, support and deployment organisation*. Their responsibilities are to

⁷ In 2009: 1 172 physicians and 2 613 nurses worked at the hospital.

- manage the EPR system
- customise the EPR system
- be responsible for the deployment process
- support the users
- have a close cooperation with the company that develops and delivers the EPR system.

Most members of the EPR management have a medical background with several years of clinical experience. The members are not educated in IT, but they have a genuine interest and experience of the EPR system's benefits and problems. The majority of the members have worked in the EPR management since 2002 when the EPR deployment started, which means that they have not worked with the EPR system as clinicians. Members in the EPR management expressed that they are an un-used source of knowledge that the clinical managers and users should use in order to get an effective EPR usage.

How the members interact with each other

The members of the EPR management have a close cooperation and are located in a separate building in the hospital area.

EPR Coordinators

The EPR coordinators are the smallest stakeholder group with 10 members in total. Their main tasks are to

- be the link between EPR management and the clinical organisation
- receive information from the EPR management about the EPR system and spread it to the clinical managers and users
- support the users
- be the division's project leader when they deploy a new EPR module

The EPR coordinators are nurses, medical secretaries or physiotherapists that have an interest in IT-related issues. They have no education in IT and got the coordinator position because of their clinical experiences and their interests. The EPR coordinators are employed by the different divisions. There were no obligations for the division to have an EPR coordinator, but the EPR management considers it to be necessary so the users can access news and important information about the EPR systems. Some EPR coordinators have clear work instructions and experience that the division's clinical managers listen to them and use their experience and knowledge to improve the EPR usage. Others expressed that they are nearly invisible to the

clinical organisation and that the managers forget to invite them to meetings when EPR issues are on the agenda. These differences depend on that they belong to different divisions, lack written work instructions and have an unclear mandate and areas of responsibility. All EPR coordinators said that their workload had increased and that they now had less time to do what they consider to be their main work responsibilities.

How the EPR coordinators interact with each other

The EPR coordinators interact with each other during meetings that are organised by the EPR management. During the last years the EPR coordinators have become aware of that the other EPR coordinators have different responsibilities. This have lead to several meetings in order to gain an common understanding of what an EPR coordinator is supposed to do and an attempt to define their responsibilities.

9. The Identified “potential problem”- areas for a Successful EPR Usage

In this chapter the seven potential problem areas, *mandate, usability, education, participation, improvements, support and evaluation*, that have been identified as crucial for a “successful” EPR usage will be analysed further.

I. Mandate and Responsibilities

What is an EPR system? Is it an IT system *or* a tool to perform better care? Using a sociotechnical perspective means that the answer to that question is that an EPR system is both an IT system and a tool to perform better care. All studied stakeholder groups understood that it was both, but when problems regarding the functionality or use of the EPR systems occurred an uncertainty regarding responsibilities and mandate became visible. (See Paper I) This can be illustrated by discussing the different stakeholder groups’ answers to these questions: *Who’s responsibility is it to make sure that the EPR system supports the clinical practice and are used by the clinical professions in a effective way? Is it the EPR management or the clinical organisations?*

The EPR management considered the EPR system to be the clinical organisation’s tool to perform better care. They said that the EPR management’s responsibilities were to support the clinical organisation with an EPR system that works technically and to educate super-users at the different departments. They considered it to be the clinical organisation’s and the clinical managers’ responsibility to find well functioning routines and create learning opportunities so the clinicians could learn to use the EPR system in an effective way. The members of the EPR management considered themselves to be EPR experts and said that it was frustrating to have the knowledge on how to work more effective with the EPR system and not have the power and mandate to tell the clinical organisation to do so. They also said that if they got that mandate and responsibility for those issues they needed to expand the management group, otherwise time and resources would be taken from their main tasks. The EPR management said

that a solution could be to have a cooperation partner within the clinical organisation that could be responsible for those issues.

The clinical managers had a diffuse knowledge about their responsibilities about the EPR systems' usability. Some managers had participated in deployment and requirement groups and tried to change the EPR system and clinical routines, while others had delegated it to an EPR responsible nurse or medical secretary. Many managers considered that EPR management should be responsible for everything that was related to the EPR system. They claimed that it is ineffective if all departments, divisions and units created their own routines. They claimed that the EPR management had better knowledge about the EPR system and that it would be better if the EPR management developed routines that suited their clinical practice.

The EPR coordinators worked differently and had different understanding of what their responsibilities and mandate were. All EPR coordinators were engaged as the project leader of their division when a new EPR module was deployed. A few EPR coordinators also educated clinicians when they started to work at the units.

The users believed that they could improve the EPR system by providing the EPR management, clinical managers and EPR coordinators with ideas for improvements. Some also tried to find new clinical routines in order to get an effective EPR usage.

These descriptions illustrate the stakeholder groups' opinions on their mandate and responsibilities regarding these types of issues. This will be further analysed when the other categories are described and in the analysis.

II. Usability Issues

The clinical professions had different clinical practices and therefore they used the EPR system differently. The physicians used the EPR system to read and write documentation, managing referrals, laboratory tests, x-ray and pharmaceuticals. The nurses used the EPR to read and write documentation, administer drugs, read lab tests and some patient administrative tasks.

“... I don't see it as the most important task that I do, - to handle the patient record, because it is to treat patients. Then it [the EPR system] is a tool, a quite bad tool” (physician)

Almost all clinicians said that the EPR system had both benefits and problems. The benefits included increased accessibility and reliability and

the main problem was that it did not support them in their clinical practice. The problems are illustrated in the quote:

”It’s not intuitive, so it is hard to learn, it’s not obvious what it is and they introduce a lot of words that are not obvious for us in health care and it is not designed by people that work in health care. Then it is very hard for us to make improvements about functions that we consider lacks in the system” (senior physician)

Problems that they experienced were low usability, non-intuitive design, lack of overview and too many ‘clicks’. The quote below illustrates that despite the problems, the clinicians consider the EPR systems to be the future and that it is not possible to go back to paper records.

“...in the same time as you sit here and complain, you think, ‘do I want to go back? to have paper referrals, run and search for records as you did before, records that disappeared, it took time to complete the papers referrals too.’ It is hard to say, no I think. So it is on the right road. Of course we should have the computer systems. It’s helping a lot” (nurse/manger)

All managers and EPR management had experienced that the users complained about the EPR system’s low usability. They said that the users complained too much and that they needed to learn to use the EPR system in the ‘right way’. The EPR management expressed that the EPR system had usability problems, but a great part of them would be solved if the users participated in education sessions and used the system in the right way. The EPR management also said that they had been to open in the beginning and allowed the users and clinics to use the system in too many ways. Both EPR management and the clinical managers thought that the most usability problems would be solved if the EPR management had decided on the same routines for all clinics and all users.

III. Participation in EPR Related Activities

Some of the interviewed clinicians had participated in various deployment activities. The activities included

- educator when a new EPR module were deployed
- educator at the units local education
- local EPR support
- participating in requirement work in the procurement phase

- member in the local documentation groups where they improved the nursing documentation

The EPR management believed that successful EPR usage was dependent on representatives from the clinical organisation participating to improve their clinical routines. We found that the clinicians had different possibilities to participate. The physicians had experienced that managers asked them if they wanted to participate but they did not get any extra time to do it.

” I think that they often come and ask if you want to participate. You can participate in this [EPR related issues] instead of taking care of the patients, or postpone your consultations, **but** you need to take care of the patients afterwards. And then I think that, it’s not acceptable, but if you get time for it... (Specialist physician)

The situation was different for the nurses as they had local documentation groups and educated each other and the assistant nurses. For the nurses, participation was considered to be a carrier path, some of them had changed and become EPR coordinators or a member of the EPR management. This was not seen among the physicians.

IV. Education – EPR Learning

In the interviews we asked the users about their EPR knowledge. All physicians and the younger nurses considered themselves to be ‘*good enough*’ EPR users. The older nurses and the nurses that were managers felt unsure of their EPR knowledge and said that they could use the system adequately, but they needed more education in order to be advanced and confident users. The EPR management, EPR coordinators and the nurses that had participated in different IT related groups had a slightly different opinion about the other clinicians EPR knowledge. A nurse that had participated as educator in several EPR deployments said:

“It [learning the EPR system] has different parts, partly computer usage, and how you should think, maybe as much as it is to learn to use the system” (Nurse)

The quoted nurse expressed that the users do not need more knowledge about how to ‘click around in the system’, they need knowledge and educations about how to manage the documentation model that the system is based on.

When we asked the respondents about how the clinicians learned the EPR system these five ways were mentioned:

1. At education sessions when a new module was being deployed. This was the EPR management's responsibility and both physicians and nurses participated. (Figure 7)
2. At education sessions organised by the local units. This was the individual clinical managers responsibility and mostly organised for nurses and not for physicians.
3. In the physician or nurse education when they did practical training at the hospital. This was the individual clinical manager's responsibility. Both physicians and nurses participated.
4. Introduction education when they started working at the hospital or the unit. This was done by some of the EPR coordinators and was the clinical managers' responsibility. When it was the EPR coordinators' responsibility both physicians and nurses had the possibility to participate otherwise it was mostly done for nurses.
5. By using the system (both physicians and nurses)



Figure 7. Education session for nurses when a new EPR module is being deployed.

As the list above shows, some of the EPR learning opportunities were the clinical organisation's responsibility, others were the EPR management's.

In the cases where it was the clinical managers' responsibility we could see that if the managers considered it to be their responsibility they created learning opportunities for the clinicians. Otherwise it was up to the clinicians themselves to get an effective EPR usage. During the theoretical sampling we could see that the nurses had better organised opportunities to learn the EPR system than the physicians had. One explanation for this is that the nurses were employed by the same unit and worked with the same colleagues, while the physicians moved around. Another explanation is that physicians and nurses had different requirements for the EPR system. The nurses tried to customise their clinical practice towards the EPR system while the physicians tried to change the system. This quote by a senior physician illustrates some of their requirements that the physicians had:

“You should be able to temporarily work one week here, and one week at another place. You cannot afford a whole day to learn all administrative systems. I think that this kind of systems should be developed so that you can jump from one to another work place without feeling that the systems are so different. I mean we can do it in other systems, such as Word and Excel...//... maybe it will be slow in the beginning but you will find the right path after some time” (physician)

When it was the EPR management's responsibility (when a new EPR module was getting deployed) they claimed that it was important that the clinicians created EPR work routines suited to their own needs. They considered the education sessions to be an opportunity to learn new routines and give the clinicians an opportunity to practice the new EPR module before they were used in the clinic. The EPR management used an education model where they educated all EPR coordinators and a few super-users from the different divisions. Their responsibility was to customise the education sessions, instruct and support their colleagues. Some of the educators found it hard to customise the education and therefore they gave the colleagues the same extensive education that they got themselves (see Figure 6). The clinicians appreciated the education model and said that it was a good opportunity to get an introduction to the EPR module, although some of the clinicians found the education to be too simple and basic. Both managers and clinicians said that the education sessions should be an introduction to the system and that the learning should be achieved when using the system. In the interviews we could see that the nurses' managers had a slightly different attitude toward the EPR managements recommendations about the deployment education than the physicians' managers had. The nurses'

managers trusted the EPR management's recommendation for how long the education should be and tried to find time and money to carry out the education sessions. The physicians' managers on the other hand believed that the EPR systems should be easy to learn and not require more than a short introduction. Therefore they thought that between 20-120 minutes was a reasonable length for that.

V. Improving the EPR system

The clinicians used different types of methods for improving the EPR system. They collected suggestions for improvements when a new EPR module was getting deployed, talked to the local support, EPR coordinators and with the EPR management. The suggestions for improvements were of different character where some would really improve the clinical practice and increase the patient safety whereas others were mainly of a superficial character. The clinicians experienced that their suggestions for improvements were rarely changed in the system.

“In the beginning we provided suggestions for improvements and thought that it would make a difference, but then we realised that the list of wishes were like 2 kilometres long. And it would take 4 years before changes could be seen in the system. Then you thought ‘I will have to live with this misery’” (nurse)

The physicians had experienced that when they suggested improvements that would make great difference for them in the clinical practice, the EPR management and clinical managers responded by telling them that they needed to participate in education sessions and learn to use the system in the *right way*, as it is suppose to be used. This response had the consequence that the clinicians saved their energy to solve other problems. Here is a quote from a nurse that had tried to improve the system.

“In the beginning you did that [suggest ideas for improvements], we put a lot of time and effort into that...//... but you get tired of it because not much have been listened to. They have not listened to that [our ideas for improvements] and it has been hard to make changes and improvements. So that energy, I saved it, and did other things instead of try to change the EPR system” (nurse/educator)

The users that had not tried to improve the EPR system said that it was because they thought it was impossible to change it. So the clinicians who tried to improve the system, and the clinicians that did not try, came to the

same conclusion; that it is nearly impossible to change the functionality of the EPR system.

The EPR management were as frustrated as the clinicians that the system was difficult to change. They collected ideas for improvement and communicated them to the company that developed the system, but it took years before anything was changed. The reason for this was that all customers using the EPR needed to decide what changes they were willing to pay for. The EPR management also said that a lot had changed in the EPR system since 2003, but the clinicians were never satisfied, because every clinician wanted different changes.

VI. Support for the Clinicians

The health care organisation and EPR management had a support chain (described in Figure 4, page 27) that was created so that the users should always have a local support person close to them. However, in reality the users must categorise the problems in order to get fast support.

“It depends on what kind of problem it is. Is it a problem in the EPR system -then we don’t call the IT support, because it’s an EPR problem, and then we’re supposed to call the EPR support. But if it’s something wrong with the printer or that you can’t access the hard disc, then you call our support” (Clinical manager)

The quote illustrate that there are different support options to call, 1) the local EPR/IT support, 2) the EPR coordinator, 3) the IT coordinator (if it is a technical problem), 4) the central support (the EPR management), 5) their closest clinical manager. The information chain *from* the users *to* the EPR management worked better in theory than in practice. In practice many users did not even know that they had a local EPR/IT support or an EPR coordinator, so instead they asked a colleague that was close to them for help when they needed or tried to solve the problems by trial-and-error.

The interviews and observations showed that the support chain did not work properly because the clinicians were not even aware of the existence of either the local support and EPR coordinators. Instead they used other strategies to get solve their problems. Problem solving strategies that came up during the theoretical sampling included

1. asking colleagues for help
2. using an EPR manual
3. trial-and-error

4. calling the central EPR support.

These four strategies were used to varying degrees by the different groups of clinicians. The nurses that worked at the ward felt that they had support from their colleagues when they needed help. Often they solved the problems by discussing it with colleagues and other times they called the EPR support. In some cases the colleagues that they asked were the same person as the formal local support but often it was “their own” informal local support person. The physicians felt more isolated and tried to solve the problems that occurred by using “trial-and-error”.

The EPR management had a support line that was open 24 hours a day, 7 days a week. Those who had tried to call them felt that they were helpful and had provided them with good support. When the clinicians and clinical managers talked about the EPR management they called them ‘IT people’, ‘the EPR system’ and the ‘support’. Even though the clinicians said that the EPR management provided them with good support some expressed that they thought that the EPR management needed better knowledge of IT.

VII. Evaluating the EPR deployment or usage

The health care organisation has deployed the EPR system either one module at a time or several modules at once. These deployments were rarely formally evaluated even though the deployment process was often divided into several smaller phases. We believe that evaluating the deployments from a user perspective would highlight problems and provide recommendations for improving the different steps in the deployment process.

During our project two types of evaluations with different focus were made. One was organised by the clinical managers and focused on the clinicians’ work environment. That evaluation excluded questions about IT and EPR system, which indicates that they did not consider the EPR system to influence the clinicians work environment. The second type of evaluation was made by the EPR management. It was an extensive questionnaire about the clinicians’ experience of the different EPR modules and what kind of problems they experienced.

Part V: Theorising the Results

This part is divided into two chapters. Chapter 10 introduces theories about group processes, organisational learning and Communities of Practice. These theories are then in chapter 11, used as different ‘glasses’ to analyse the stakeholders groups and the seven categories through, in order to get a deeper understanding for the emerging theory.

10. Theories Informing My Research

In my PhD research I have chosen to study the individuals within the health care organisation as members of different groups and professions, not as individuals. The reason for this is that during the interviews and observations it was clear that the clinicians and managers referred to the care staff as members of different stakeholder groups and medical professions, not as individuals. In this chapter I describe theories that I find useful to analyse the experiences of the different stakeholder groups in relation to the seven potential problem areas. The theories presented concern group processes, Communities of Practice and organisational learning. Their origins are in several different research disciplines and I will use them as a tool box, to explain some of the patterns that I find crucial to gain knowledge and insights about how to improve the EPR usage of the health care organisation.

Group Processes

All individuals are members in several groups. These can be groups that we are born into (gender, class and ethnicity), groups at work and recreational activities. The groups you belong to influence your behaviour, self-esteem, understanding of right and wrong behaviour, attitude toward others and much more. Using research and knowledge about group processes will give me a tool to explain behaviour within and between groups in the studied health care organisation. According to Brown (2000) *“a group exists when two or more people define themselves as members of it and when its existence is recognized by at least one other.”* (Brown, 2000)

It has been discussed (Brown, 2000) if a group is something more than the members, if the group have its own “group mind”. Researchers have come to the conclusion that group mind does not exist, but that a group do create own values, norms and a shared behaviour. According to Brown (2000), norms are crucial for the group’s existence in that it decides what is accepted and not accepted behaviour within the groups. The norms also determine how other groups experience your group and how your group experience others.

Conflicts between groups can be explained by “Relative deprivation theory” that suggests that *“people become discontented and rebellious when they*

perceive a discrepancy between the standard of living they are currently enjoying and the standard they believe they should be enjoying” (Brown, 2000, page 233). During the theoretical sampling and analyses we saw that even though the physicians and nurses experience the same EPR problem it affect their group identity differently. This will be further analysed in the analysis with help of relative deprivation theory.

Communities of Practice

A Community of practice (CoP) are a group of people that share a common interest or a problem. CoP can take many forms, they can be big or small, long-lived or short-lived, collocated or distributed, homogenous or heterogeneous. The theory of CoP is about social learning and *”The perspective that results is not foreign yet it can shed new light on our world. In this sense the concept of CoP is neither new nor old. It has both the eye-opening character of novelty and the forgotten familiarity of obviousness.”* (Wenger, 1998). Using the CoP theory provides us with a well-defined systematic vocabulary to talk about this social learning that occurs in different communities in the health care organisation. CoPs are integral parts of our daily lives and people can be members in several communities, such as family, hobbies, different CoP at work etc. A CoP is not the same as a group or a community, it requires a basic structure that is a *“unique combination of three fundamental elements: a **domain** of knowledge, which defines a set of issues; a **community** of people who care about this domain; and the shared **practice** that they are developing to be effective in their domain.”* (Wenger et al., 2002) CoPs cannot be considered as isolated from the rest of the world. It has relations and is depended on other practices. For example the CoP in the health care organisation has close connections with each other and other CoP outside the organisation.

Domain: The domain is a joint enterprise. It sets common ground and identity within the CoP that are shared among the members. The understanding of the domain distinguishes the members from other people. The domain can be more or less well defined and it shows the members and other stakeholders the purpose and value of the community. *“The domain inspires members to contribute and participate, guides their learning and gives meaning to their actions.”* (Wenger et al., 2002)

Community: The community in a CoP is not a synonym for group, team or network. Membership in a CoP is a matter of mutual engagement. *“Practice does not exist in the abstract. It exists because people are engaged in actions whose meaning they negotiate with one another”* (Wenger, 1998). It is mutual engagement that ties the members together and *“a strong community*

foster interactions and relationships based on mutual respect and trust.”
(Wenger et al., 2002)

Practice: Practice is a shared repertoire that holds the communities together. It is a process that helps us to experience the world and our engagement as meaningful (Wenger, 1998, page 51) . It is a shared language, routines, sensibilities, artefacts, tools and stories within the CoP. The members need to have access to this shared repertoire and use it appropriately.

Boundaries

According to Wenger (2000), a “*shared practice by its very nature creates boundaries*” (Wenger, 2000). Boundaries are important for two reasons: 1) they connect communities with each other and 2) they offer learning opportunities that are different from the learning within the communities.

Organisational Learning

In the previous part I discuss how individuals socially learn by being members in a CoP. In the health care context the CoPs are also members in a greater organisation that also learns, evolves and act. Argyris and Schön (1996) argue that even though the organisation is made up of individuals and the organisation learns when the members learn, the organisation and its members do not have the same knowledge. In one way the organisation knows less than their members because the members have personal experience that influence their knowledge and their actions. In contrast structures, procedures and memories are built in to the health care organisation, which means that the organisation knows more than the individual members do. (Argyris & Schön, 1996) According to Aarts (1998)

“Most researchers agree that implementing a system is an innovation and learning process. Therefore the most important aspect of implementing a system is to create a responsive mindset of the users. This means that it is not sufficient that the user learns how to use the system but understands how the system can support her or his clinical work and acts accordingly.” (Aarts et al., 1998)

According to Argyris and Schön (1996), organisational learning is close to organisational action because learning itself, thinking, knowing or remembering is a kind of learning. The organisation and its individuals actions can take two forms, **espoused theory** or **theory-in-use**. Espoused theory is how we think that we act in a certain circumstances and the theory-in-us is how the individual actually act in that certain circumstances. Argyris and Schön (1996) argue that in order to understand the organisational

learning and actions you need to identify its theory-in-use. Both espoused theory and theory-in-use can be identified by observing individuals when something goes wrong in the organisation. How the organisation act when something fails can also be explained by using **single-loop learning** and **double-loop learning**. Single-loop learning means that when something goes wrong you change the strategy of action in order to solve the problems. An example from my research is that if the management consider the EPR deployment to be cumbersome they try to change the deployment strategy over and over again until the EPR system is completely deployed. They do not question why the deployment process is cumbersome, they just change strategies. Double-loop learning on the other hand means that when problems occur the strategies are not simply changed, you also question the values that the strategies and assumptions are based on. (Argyris & Schön, 1996). So with double-loop learning the management tries to understand the reasons for why the deployment is cumbersome, why the users are complaining and if the system is supportive or not. That means that they question the values of their theory-in-use. If they do that they will get an understanding of the problems and change the deployment strategies and assumptions. According to Argyris and Schön (1996), double-loop learning is necessary if an organisation needs to change fast.

11. Analyses

In this chapter I will use theories described in Chapter 10 as different ‘glasses’ to see the stakeholders groups and the seven categories through.

- The different stakeholder groups will be conceptualised as communities of practice (CoP) to gain an understanding of how they learn and evolve their EPR understanding. This perspective will illustrate how contact between the CoP make the communities learn and change their practice. (Paper IV).
- Research and knowledge about group processes will be used to discuss for example why the physicians are considered to be the scapegoats for the cumbersome deployment process. (Paper III)
- Theories about organisational learning will be used to illustrate why the studied organisation still are struggling with an ineffective EPR usage.

Stakeholder Groups as Communities of Practice

During the theoretical sampling we have seen that the different stakeholder groups had different understanding of what their responsibilities regarding the EPR system and usage were. To illustrate how the different stakeholder groups learn and evolve their EPR understanding I have conceptualised them as different communities of practice (Table 1, page 68). Using this perspective has provided me with an explanation of why the responsibility issues still remain.

According to Table 1, the users are the only CoP that works with the EPR system in their daily clinical practice. The other CoP responsibilities are to support the users in various ways, technical support (EPR management), the clinicians work environment (clinical managers), local support and education (EPR coordinator).

Table 1. Description of the four Communities of Practice

CoP	Identity (who are we)	Joint practice (What do we do)
Users	We are users (physicians and nurses) of the systems. We are positive to EPR, but think that our EPR do not fully support us.	Our main task is to treat and care for patients, not use IT and EPR systems.
EPR management	We are originally clinicians that work fulltime with EPR related issues.	Our main task is to deploy, test and support the EPR system and the users.
Clinical managers	We are managers at different levels in the health care organisation. We are originally clinicians and some of us have patients, others do more administrative tasks.	We manage the health care organisation. We are responsible for the care quality and the clinicians' work environment.
EPR coordinators	We are originally clinicians that now work for the clinical organisation with deploying and supporting the EPR system.	Our main task is to educate and support the users.

Table 1 illustrates that the members of the four CoP often had the same origins, as different clinical professions. The clinical managers were mainly nurses or physicians and the EPR management and EPR coordinators were mainly nurses, assistant, physiotherapists and medical secretaries. In the health care organisation, having a clinical competence is almost seen as a requirement for moving on to other positions. My experience is that even though they had a clinical competence, it quickly fades away when they started to develop a shared repertoire, joint enterprise and a mutual engagement within the new community. Even though their responsibility was to support the clinicians in different ways *and* they consider themselves as clinicians they had a poor understanding of the clinicians perspective.

How the Communities of Practice EPR Understanding Evolve

During the study we could see that the different CoP changed their EPR attitude because of their experience of interacting with the other CoP. The users attitude toward the EPR system was depended on their experience of trying to improve it. For example, the users that had tried to improve the

EPR system and got a “you need to go to education sessions and learn to use the EPR system in the right way”- respond, experienced the system as impossible to change. That respond made the user CoP tighter against the other CoP. But those users that participated in EPR related activities and had the opportunity to interact with members from the other CoP (EPR management and EPR coordinators), had a better experience of the possibilities to affect their work environment. This interaction influenced their attitude and when they came back to their CoP, they spread their new positive attitude among the other clinicians.

This could also be seen within the other CoP. For example every time the EPR management experience physicians that were complaining about the usability of the EPR system and if the physicians did not participated in education sessions their understanding about physicians as a profession that were unwilling to participate and always complaining increased and tightened their CoP.

The conclusion is that the response the members of different CoP get when they interact with other CoP is important for their own attitude toward the EPR systems possibilities regarding improve the clinical practice.

Group Processes

The users have different education and there is an official and unofficial hierarchical difference between and within the clinical professions. In the empirical data we could see that deploying and using the EPR system had increased the hierarchic difference between physicians and nurses. The fact that they experienced the same type of problems and got the same response when complaining had made them feel closer.

Blaming the Users – The Relationship between the Groups

Why is it so hard to deploy a EPR system? Within the organisation the stakeholder groups blamed each other for the problems during the deployment process. When we asked the EPR management why the EPR deployments have had so many problems, for example they have tried to deploy the drug module three times before they succeed, they answered that the physicians and the clinical managers are to blame. When we asked the same question to the physicians and other clinicians they answered that it was the EPR systems fault, that it was not safe enough to use it. Why do the EPR management, clinical managers and users have different scapegoats for the deployment process? According to Dollard (ref. Brown, 2000 page 227-230) the chosen scapegoat is not always the real cause of the problems. In

the health care organisation the physicians are usually blamed for being unwilling to participate and that they dislike changes. According to Berkowitz “*the likely choice for a scapegoat is an outgroup with prior associations of conflict with or dislike for the ingroup*” (ref. Brown, 2000) so blaming the physicians is a natural choice for the management.

Why the Physicians are Frustrated

Relative deprivation theory can be helpful to understand why the physicians are frustrated by their situation. Relative deprivation occurs when you think that you have a worse situation than you think that you deserve. (Brown, 2000) The EPR system has led to changes for the physicians, both improvements and disadvantages.

- Increased access to patient records
- Decreased time with the patients, something that the physicians consider to be the *real* physician work.
- Increased the time spent in front of computers – something that the physicians consider to be administrative tasks
- Increased work responsibility
- The system controls what the different clinicians are responsible for. They cannot do what they consider to be their usual working routines.

A hypothesis for why the physicians are aggressive and frustrated is because of these (for them) uninformed and unplanned changes of the physician profession. So why are the other clinicians not as frustrated as the physicians are? Social comparison is a great source for relative deprivation. If a group is unsatisfied if depends on who they compare themselves with. The physicians are at the top of the hierarchy and have no other clinicians to compare with, so they compare with the historical physician profession’s status. The nurses are more likely to compare themselves with assistant nurses. Their status and profession have gotten increased visibility and the fact that the EPR system controls who are responsible for the different working tasks means that they cannot do tasks that are someone else’s responsibility.

Creating an Organisational Learning Environment

During the grounded theory process we have seen that the lack of responsibility for providing the users with an EPR system that effectively support them causes a lot of problems within the organisation. For example the reaction that the clinicians have experienced from the EPR management and managers when they try to improve the EPR system. According to

Argyris and Schön (1996) double-loop-learning is required in order to create an organisational learning. That means that the values that decisions and strategies are made on need to be questioned. So when the clinicians try to improve the EPR system a double-loop-learning should be used to ask why they want it and not simply suggesting another education session.

I think that it is important that groups within the health care organisation tries to systematically learn from their experience and improve the support, deployment and create a double-loop learning environment.

Part VI: Conclusions

In this part I conclude the thesis and provide the reader with a starting point toward the emerging grounded theory.

12. Conclusions

The aim of the grounded theory process is to create a theory. Different theoretical perspectives have different views of what a theory is. Positivism seeks for generality and universality meanwhile an interpretive theory emphasises understanding rather than explanations. (Charmaz, 2006; Crotty, 1998). In this part I conclude the thesis and provide the reader with a starting point toward the emerging grounded theory.

During the grounded theory process seven potential problem areas are identified as important for the health care organisation to handle in order to improve their EPR usage. The potential problems are: *education, mandate, usability, participation improvements, support and evaluation*. The analyses show that the responsibilities of the different stakeholder groups within the studied health care organisation are unclear.

- **The health care organisation needs to establish a problem-solving strategy that questions the reasons behind the problems.** For example by using a double-loop learning the management tries to understand the reasons for why the deployment is cumbersome, why the users are complaining and if the system is supportive or not. Instead of changing the deployment strategy over and over again until the EPR system is completely deployed.
- **The different stakeholder groups need to have the same goal for the EPR system.** Today different stakeholder groups have different ideas of what the EPR system will support and get frustrated because of the differences. The confusion is partly a result of that they have different understanding of what EPR systems are and what they are suppose to support: *Is it an IT tool or the clinical organisation's tool?* These differences about what the EPR system are supposed to support affects whose responsibility the systems are and who to blame if the system does not work effectively.
- **The different stakeholder groups need to interact with each other to create a better understanding for each other's perspective.** The interaction affects their attitude toward the EPR system's potential to improve the clinical practice.

- **The clinical organisation needs help to improve their clinical practice in relation to the EPR system.** The clinical organisation, managers and users, do not understand how they are supposed to change their clinical practice so they can get support from the EPR system. This is a process that they need help to manage.
- **The clinicians' attitude towards the EPR system is dependent on the usability of the system, the deployment process, their experience of participation, education, support and possibilities to improve the system.** How the clinicians were treated when they tried to improve their clinical practice has a great impact on their EPR attitude. Those who have participated have a better understanding of the possible benefits the EPR system can get than those who did not participate.
- **The EPR deployment and usage affect the clinicians in different ways.** Although both professions get more administrative tasks, the nurses consider their tasks to become more visible while the physicians get both new patient related and administrative tasks. The number of different tasks to perform increased for both groups, but they said that they did not get the extra time needed to compensate for the increase.

Part VII: Epilogue

In this part I discuss possibilities for future studies.

13. Epilogue

The name of this thesis is *“Tailor the system or tailor the user? How to make better use of electronic patient record systems”* My answer to this question is that you need to tailor *both* the user and the system to get a better EPR usage.

In the research project we have had a “user perspective” which means that we want to improve the clinician’s work environment and help the health care organisation to get the most of the potential benefits from the EPR system. During the project we have realised that the EPR system needs some improvements in order to fully support the users. In the beginning of the project we believed that it would be possible to improve the EPR system, but conditions within the organisation have shifted our focus toward what the organisation can do and not about improve the EPR systems functionality. We still believe that many of the user’s problems should be solved if

- 1.) changes were made in the IT system
- 2.) the company that develops the system would use a user-centred system development approach
- 3.) the system developers used usability and HCI knowledge and research in the development process.

The difficulties in improving the functionality of the EPR systems have made it hard for us to complete the action research cycle, because we consider it important that the user’s suggestions for improvement will be considered and solved. The conflict about what is causing the problems – usability problems and/or wrong EPR usage is not one or the other, it is both. The different stakeholder groups are all responsible for different parts of the solutions. In order to improve EPR usage the clinical managers need help to take their responsibility for the clinical practice.

Future Work

In my future studies I will continue with the grounded theory process and refine the recommendations to health care organisations. In order to do that I will conduct some complementary empirical studies at the same health care

organisation where most of my research has been performed. I would also like to validate my conclusions by comparing them with other health care organisations experiences in Sweden or in another comparable country. It would increase the potential to generalise the results.

I would also like (if it is possible) to complete the action research by testing some of our recommendations. During the research project we have started to develop a model that will make combine EPR working routines and the deployment process with the clinical organisations on going organisational changes. This method will help the users and clinical managers to plan for wanted changes when using the EPR system instead of unplanned changes with unwanted consequences.

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Paper I

Three Key Concerns for a Successful EPR Deployment and Usage

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Abstract. The healthcare environment is unique because of the large and complex organisation with a traditional hierarchic structure that is governed by laws and regulations. This paper examines how a large Swedish healthcare organisation work with usability issues regarding Electronic Patient Record (EPR) deployment and usage. EPR systems have great impact on work environment and clinical work routines will not be performed in the same way as before. This paper analyse how the EPR management and core business understand their EPR responsibilities and work with usability aspects at different levels in the organisations. The paper reveals that there is a conflict about responsibility between EPR management and core business management. The reasons for the confusion are contradictive understanding of what an EPR system is, an IT system or a tool for the core business to perform better health care work. This leads to that care staff's experience regarding the EPR system's usability, is not being listened to within the organisation. Three key concerns for a successful EPR deployment and usage are identified and further analysed; *education, evaluation and support & improvement ideas.*

Keywords. usability, organisational change, health care, electronic patient record system

Introduction

Today many healthcare organisations are deploying computer-based systems such as the Electronic Patient Record (EPR). The rationale behind EPR is to save money and achieve an effective support for the care staff. According to Ann-Britt Krog [1] there are three common assumptions about the EPR systems; 1) better overview, 2) less hazard and 3) less time consumption. Krog's thesis is based on a qualitative study at a Danish hospital and comes to the conclusion that the system gives the care staff a better insight in other care professions' work, by increased accessibility and communication. Krog's study and the result in our study shows that the three mentioned assumptions about the EPR systems benefits have not been met in practice. The care staff had strong opinions about the lack of usability, poor efficiency and that the systems were not able to fully support their specific organisational needs. Almost all care staff appreciated the accessibility and the reliability with an EPR and understood that it is impossible to go back to paper-based patient records [2, 3], but they thought that they spend more time than before with the computers and had less time for patients [4]. These kinds of usability problems are common in both Swedish and international health care organisations. In this paper we examine how a Swedish health care organisation with 10,000 employees work with usability issues in the often neglected perspective the deployment phase[5]. The studied health care organisation, with a university hospital, a

smaller hospital and several primary care centres has since 2004 deployed the same module-based EPR system. In the paper we use a broader definition of usability [6] and focus on the organisational perspective, not the more traditional usability problems concerned with the software, user interface and system usage. Nancy Lorenzi [6] argues that the challenge with introducing IT in complex organisations, such as health care organisations, is mainly behavioural rather than technical. This paper focuses on two stakeholder groups, EPR management and core business. The EPR management were responsible for manage, deploy and support the EPR system and the core business is divided into two sub groups, managers and care staff. Three key concerns that are crucial for successful deployment and user acceptance have been identified and further analysed; *education, evaluation and support & improvement ideas*.

1. Methods

The data gathering has been conducted together with EPR managers responsible for deployment and support, core business management and care staff during a 2.5 years research project. During this period three modules, patient administration (PAS), referrals and drugs has been deployed. The data gathering during the project focused on both the deployment processes and on the everyday working situation. Several research methods were used including field studies, validated questionnaires [8], interviews and observations. During the deployments we interviewed educators and participants and participated in organised activities such as education sessions and meetings. We also conducted semi-structured interviews with physicians, nurses, enrolled nurses and staff at the EPR management organisation. The questions focused on their responsibility, experience and attitude towards deployment processes and EPR systems. All interviews were recorded and partly transcribed.

2. Result and Discussion

2.1. Who is Responsible for the EPR System's Usability?

The health care organisations were separated into two parts, the core business, with clinical managers and care staff, as well as an EPR management organisation. The EPR management's responsibilities were to support the care staff, be responsible for the EPR deployment and have a close relationship to the company that developed and supplied the EPR system. The EPR management was aware of that an EPR deployment affects the organisations core business and working routines, but they considered it to be the clinical managers' responsibility to handle these aspects. The clinical managers consider the EPR system to be a technical tool and not an integral part of the health care process and therefore the EPR management's responsibility to deploy and support. This uncertainty, about responsibilities has also been seen in other organisations. Cajander et al [7] have analysed how managers at a Swedish public authority work with usability issues. They conclude, *"the manager in the organisation did not have a common view about who is responsible for usability issue and how this responsibility works in their organisation"* [7]. This uncertainty and confusion over responsibilities had a major effect for the care staff. A common opinion among the care staff was that the EPR system needed major improvements in order to fully support them. The care

staff had told both EPR management and the clinical managers for several years, but nothing had happened. They experienced that the EPR management and clinical managers mainly considered usability problems to be caused by the care staff and not the system. Both management organisations argued that some of the major problems would be solved if the care staff participated in deployment activities, used the system in the right way [4] and that time would heal some of the usability problems. The care staff's reacted to that by not participating in deployment activities and not deliver improvement suggestions, but the usability issues did not disappear. Kjeldskow et al. [9] have examined if the usability problems that the nurses' experience changed when they transform from novice to expert users. They have identified three different usability problems experienced by nurses 1) complexity of information, 2) poor relation to work activities and 3) lack of support for mobility. They conclude that time does not heal the usability problems, the usability problems must be addressed in some other way. Kjeldskow's study indicates that the usability problems in our study most likely would not disappear with time. EPR management and clinical managers need to address the problems in different areas. Below we will discuss three key concerns that are crucial for decreasing usability problems and increasing user acceptance when deploying an EPR system: *education, evaluation and support & improvement ideas*. The responsibilities for these concerns are highly important to solve in order to succeed with the deployment.

2.2. EPR Education

The EPR management, that were responsible for the EPR deployment, consider it to be important that deployment activities should be close to the core business. Therefore they educated "normal" care staff within the organisation. Their task was to plan education sessions that fit their unit's needs and instruct and support colleagues at the own unit. The EPR management organisation prepared the educators with an extensive introduction to the system so that the educators could customise it to their core business' needs. Some of the educators had earlier experience of EPR deployments and others had no earlier experience. The educators said that they were unsecure with this responsibility and found it hard to customise the education and therefore they gave the colleagues the same extensive education that they got themselves. The educators experienced that during education sessions everything worked well but after the education, in the clinical work a lot of problems regarding working routines and new unknown terminology occurred. One care staff said: "*it's not computer nor health care words, I don't recognise the meaning of the words*" To handle the care staff's uncertainty they made custom manuals that described the workflow in the system. In the questionnaires we asked the care staff if they asked ore used colleagues, support services or manuals when they needed assistance. The result indicated that the care staff did not use the manuals as much as the EPR management thought and that they rather (80%) asked a colleague and/or called the support service. A key concern is to have educators that have the knowledge and support necessary to customise the education sessions so that it supports the core business needs. A care staff expressed that EPR systems should be tailored to the users' needs, not the other way around. Therefore the education should focus on performing clinical work routines and how the systems can be supportive.

2.3. Evaluation

The different health care units within the organisation deployed the EPR modules either one by one or the whole system at once. These deployments were rarely formally evaluated even though they often started with a smaller pilot deployment at one or several units to see how the system worked in the new context. Evaluating deployments from a user perspective would highlight problems and provide recommendations for improving the different steps in the deployment process. In the studied organisation, EPR and the clinical managers said that lack of time and resources were the reasons for not evaluating the deployments and EPR usage. During our study two types of evaluations with different focus were made. One focused on the care staff's work environment. That evaluation excluded questions about the IT and EPR systems, which indicated that the core business did not consider IT and EPR system as a parameter that influence the care staff's work environment. This is surprising because our interviews and observations showed that the EPR system and other IT systems had a huge impact on the care staff work environment. EPR management made the second evaluation, an extensive questionnaire about the care staff's experience of the different modules and what kind of problems they experienced. The evaluation indicated that the care staff thought that the system was non-intuitive, and had low usability. This is important knowledge for the EPR management but it did not give them any deeper understanding about the reason for the problems or how to solve them. A key concern is not just to perform evaluations, it is also to ask the right questions so that the result can be useful and a solid ground for improvements in both the EPR management and clinical managers' deployment routines. A clarification of what the problems really are about can help the health care organisation establish whose responsibility it really is.

2.4. Support and Ideas for Improvement

During the deployment it is crucial that the care staff gets the support they need to feel safe and secure about the new system. The studied organisation had an EPR support organisation that operates at three different levels; local, department and central. All EPR support persons had a clinical background, mainly nurses or medical secretaries, with special interest in IT. The local support person was responsible for supporting colleagues and forward ideas for improvements. The local support called the department service or the central support if further support were needed. The interviewed care staff had many ideas about how to change the EPR so that it would support the clinical routines better. The interviews and questionnaires revealed that the care staff rarely informed the local support person about their problems and ideas for improvement. In the questionnaires 50 % did not know who to contact if they had ideas and wishes about how to improve the system. 60% answered that they very rarely contacted the local support and 12.5% answered that they do not know whom to contact when they have problems. The interviews and observations confirmed that the care staff was not aware of the existence of the local support and their responsibility. There was also confusion among the local support about their responsibilities. In the interviews the care staff said that they asked a trusted colleagues if they needed help or support. In some cases it was the same person as the formal local support but often it was "their own" informal local support person. We believe it is a good idea with a support at all units, but our questionnaires and interviews show that the care staff did not know what to do or who to contact when they had problems. Some had made

complaints and offered improvement ideas but nothing had changed for years so they did not think that it mattered if they reported problems or not. A key concern is to have a transparent support and improvement chain.

3. Conclusion

In this study we have examined how a large Swedish county with several healthcare units works with usability problems in the EPR deployment process. The study shows that there is confusion about the responsibility for usability issues within the organisation. The confusion is because some of the stakeholders consider the EPR system to be an IT system, not an integral part of the healthcare process. Others consider it to be a core business system and therefore the core business responsibility. The confusion and uncertainty about responsibility leads to an unsustainable work situation for the care staff that needs an effective EPR system to perform a high quality work. In order to get a successful deployment and a durable working environment for the care staff it is important that the responsibilities for education, evaluation and support & improvement ideas, are clear. Both EPR management and the core business need to know and understand their mandate and responsibility to achieve an improved work environment. The organisation needs to continuously search and perform improvements in both work routines and the EPR system that aim to support the care staff in their health care activities. The support system also needs to be more transparent in order to give the care staff feedback on the status of their complaints.

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Paper II

Physicians' Concept of Time Usage – A Key Concern in EPR Deployment

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Abstract. This paper is based on an interview study with 19 resident, specialist and senior physicians. The study was initiated by a Swedish Hospital management to investigate physicians' attitude towards their EPR (Electronic Patient Records) and give recommendations for improvement in organization, development, deployment and training. The management had experienced that the physicians were unwilling to take part in the EPR deployment process and simultaneously complained about the low usability and potential safety risks of the systems. The study shows that the EPR must be considered a shared responsibility within the whole organization and not just a property of the IT department. The physicians must consider, and really experience, EPR as efficient support in their daily work rather than something they are forced to use. This includes considering work with the EPR as an important part of their work with patients.

Keywords: EPR, Physicians, Usability, Hospital Information Systems, Organizational Change, Deployment, Qualitative research, Management, Education.

1 Introduction

When implementing IT in health care it is important to have all potential users and management onboard. A large Swedish university hospital started to replace a paper-based record system with an EPR (Electronic Patient Record) system seven years ago. The system covers the whole care process, from primary care to specialized care at the hospital with totally 10 000 employees. The EPR system makes it possible for all care professionals in the county, to track the patients through all health care activities, regardless of treatment unit. The system is modular and the deployment process has been step wise, with modules implemented successively.

In 2001, the county council started a process of investigating the needs of an EPR system for all their care units. One of the visions was to have *one* medical record per patient. This would enable shared care, meaning that all health care providers can access and register information related to a specific patient in the same record. In the process of choosing an EPR system, technical issues, safety and users' requirements were considered. Physicians, nurses, medical secretaries and other care professionals took part in the process as representatives from their professions. They had the opportunity to communicate their needs and requirements and evaluate the different

systems. In 2003 the county council decided on a relatively new system from a Swedish company. They assumed that the system easily could be changed upon request and modified according to new needs and practices. Now, seven years after the first pilot deployment, the list of desired modifications has grown. Some of the users' requests have been implemented but there are still a lot to modify until the care professionals are satisfied with the system. Several other Swedish counties use the same EPR system and they all want their say in the development of the system. Therefore the process of modifying it is long and cumbersome. The systems customers are working together in a user group that negotiate with the company about future features and modifications to the system.

2 Research Background

Our research group conducts research in cooperation with several health care units of a Swedish University hospital since a couple of years. The overall method of the research project is action research, which means that we as researchers have dual aim with the research: *“practical problem solving and generation of new knowledge”* [1]. This paper describes a study where the purpose was to analyze the physician's attitudes toward EPR systems and the deployment process. It is the first interview study in a series with different care professions. The next study will be with nurses that work at the same units as the physicians. The result from these studies will later on be used as a basis for changes in the deployment activities.

3 Purpose and Justification

The hospital's EPR deployment group, the EPR support organization, the organizational system owner and other professions have expressed concerns with physicians not participating in the deployment process. Common remarks were that the physicians were not willing to participate in deployment activities, they were often complaining about the quality of the EPR systems and they seldom attended training sessions. The management described the physicians as a dominant profession and explained that the physicians' attitude was one of the reasons for the deployment process being cumbersome and the use of the EPR being inefficient. They tried to solve the problem by forcing them to take part in education sessions and other deployment activities. In order to investigate the reasons behind the experienced problems, we decided to make an interview study with physicians. The main purpose with the study was to clarify the physicians' attitude towards the EPR system, the deployment of the EPR and IT usage in general. Factors as the usability of the EPR were not in focus, although it is important that the EPR is intuitive, effective and supporting their needs.

4 Related Research on Deployment of EPR and Physicians' Use of EPR

A few studies have been made about physicians' use of and attitudes towards electronic medical records [2-7]. We have found some of them particularly relevant for our study.

Marc Berg has done several studies on implementing information systems in health care organizations, e.g. [8].

Nancy Lorenzi et al. have studied organizational changes in health care organizations. Introducing systems in complex organizations requires more than technical skills. The challenges are often more behavioral than technical [9]

Robert H Miller and Ida Sims paper *Physicians' use of electronic medical records: Barriers and solutions* [4] is based on a qualitative study with physicians. They identify barriers such as high initial physician time costs, technology, difficult complementary changes, inadequate support, inadequate electronic data exchange and attitudes.

M.J. Van der Meijden et al. [7] have studied the users' role in design and implementation of an EPR system. Their methods were questionnaires and interviews. They came to the conclusion that both experienced and inexperienced users have little definite expectations regarding the effects of computers in health care. The only important aspects that the users mentioned were accessibility and reliability. Their conclusion is that *"future users had no clear view of what could be expected after introducing computers into their daily work"*.

Ann-Britt Krog [10] has written a thesis on how care professionals negotiate with each other about how to use EPR systems. The thesis is based on qualitative studies at a Danish hospital. Krog mentions three common assumptions about EPR; better overview, less hazard and less time consumption. The studied users think that the EPR system gives them increased accessibility, increased communication and a better insight into each other's work between the professions. Her conclusion in the thesis is that the three mentioned visions have not been met in practice. As in the case above, we found these results interesting. The Danish and Swedish healthcare environment is comparable and the EPR used in Krog's study is actually the same that is used at the hospital we have studied.

5 Method

The main purpose of the study was to clarify the physicians' attitudes towards the EPR system, the deployment of the system and IT usage in general. To reach that purpose we decided to perform 19 semi-structured interviews with physicians with different level of expertise, age, and gender. The interviews were organized into the following six themes:

- *Background information*
- *How EPR and other IT systems are being used*
- *Experience of the education and training process*
- *Participation in IT-development*
- *Experience of the IT-support in general*
- *The relationship between the physicians and the management*

For each theme, the researchers started with a question and then continued with follow-up questions, more in a conversational style than as a formal interview.

The University hospital is divided into seven divisions with different specialties. The physicians were chosen from two of the divisions: Children and Women care and

Emergency and Rehabilitation care. The selected physicians represented different levels of expertise, age and gender.

Two researchers performed the interviews during one month. The physicians were told that the purpose of the study was for the management to learn about the physicians' attitudes and experiences with regard to EPR and IT systems. The researchers explained that the interview was based on different themes and that the interview was going to last for 20-30 minutes. 12 of these were in this time slot, 3 become shorter and 4 became longer. The interviews were audio recorded and the researchers took notes in parallel.

5.1 Analysis Method

The interviews were planned and performed by the two researchers. All interviews were transcribed by one of the interviewing researchers. In the analysis phase a third researcher was introduced into the project. The researcher transcribing the interviews conducted the analysis together with this third researcher. The analysis method was affinity diagramming [11] with three iterations. The total amount of transcribed material was 160 pages. Each transcribed interview was marked with level of expertise, department, age and gender to enable deeper analysis. In the first iteration one third of the interviews were analyzed on paper. Interesting quotes were cut out of the paper, put on a wall and sorted into different categories without any predefined themes. (Figure 1)



Fig. 1. The findings put on a wall in an affinity diagram

The quotes were then rearranged into named categories. In the second iteration the next third of the interviews were placed into the categories and then rearranged into new headlines. After that the last third of the interviews were analyzed and sorted into the named categories.

At this point we wanted to go deeper into the material. As the different groups of physicians have different responsibilities and work tasks, they also seemed to use the EPR system in slightly different ways and had mixed opinions about the usage of the system. The notes in each category were then rearranged according to three distinct groups, *senior physicians*, *specialist physicians* and *resident physicians*. We also

gender marked physicians *within* the groups. But in our analysis, the expertise was far more significant than gender, so we decided not to go deeper into that analysis, although an interesting analysis might have been to look at *all* the material also with gender glasses.

5.2 The Three Physician Groups

The physician community is divided into different groups based on education level, research degree and expertise areas. There is a hierarchical difference between the groups that influence their status among physicians and other professions. (Table 1)

Table 1. The physicians divided into the groups with number of respondents, age and gender

Group	Number of resp.	Age	Gender
Resident	5	27-34	2 men 3 women
Specialist	8	34-55	5 men 3 women
Senior	6	46-64	5 men 1 woman

After basic education, the physicians do their residency at a hospital. They are called *resident physicians* and have been working at the hospital for 0-5 years. They work in one care unit for a longer time and they use the EPR for searching different kind of patient data that they use later on in the medical rounds. Their usage pattern is longer sessions with the EPR.

The second group is the *specialists*. They are specialists in different areas e.g. infection diseases, internal medicine or neonatology. They function as experts within their specialty and are doing a lot of different work tasks. They are moving between different care units within their medical specialty and are also working as consultant in different parts of the hospital. They are using the EPR for searching, writing, ordering tests and referrals and answering referrals. Their usage pattern is many short sessions with the EPR. Some of them are doing PhD research and others are doing their second specialty education.

The third group is *senior physician*. They all have a specialty and often a PhD degree. Most of the senior physicians in this group have management responsibilities, for a medical area or for other physicians. The seniors use the EPR system mainly for searching and not very frequently. They are concerned about that the EPR contains too much information, and consider it hard to find the important information.

6 Findings and Analysis

6.1 Attitudes Toward IT and EPR

Among the physicians there is a positive attitude towards IT and EPR systems in general. They are all quite used to computers and use them both at work and privately.

The physicians have huge expectations on how the EPR should help them and believe that the EPR systems give them benefits that the paper records could not give.

For example, access to more patient information than before, quicker response on referral, possibility to have one complete record for a patient instead of several separate paper records. Despite the possibilities, the physicians are frustrated about the usability of the systems. The users feel that they are not in control because the system does not give a good overview, is not intuitive, requires a lot of “clicks” and involves many steps to perform the work tasks.

A senior physician expressed a view on the usability of the EPR that well shows the common attitude towards the EPR:

Interviewer:

“Would it be meaningful to modify the education sessions to be more tailored to your needs?”

Senior physician:

“No, the meaningful thing would be to make the EPR tailored to the users...”

Most of the physicians compare the electronic records with paper records but come to different conclusions. The senior physicians express that the EPR is much easier to use and talk about the differences between paper-based records and computer-based records. The paper records used to “disappear” and were not always readily available when needed. They believe that all systems have positive and negative aspects. They think that they are more positive towards EPR than other, younger physicians because they remember and compare it to the paper based systems.

A general attitude among the specialists is that the EPR system gives them some positive effects but it is not time efficient because of bad usability. They express their frustration, and some of them even claim that it is better to have some information on paper until they have an EPR that is fully supporting them in their work. The resident physicians come to the conclusion that computer records are safer than paper records. They too are frustrated with the system, but even if the systems are not fully usable they prefer the computer records over of a mix of paper and computer records, as it is today.

6.2 Use of Time

In general, the physicians seem to be continuously short of time. When they refer to time they use different conceptions of time e.g. *patient time* and *administration time*. The interviewed physicians argue that their time is more precious than other care professionals’. Medical knowledge, longer education and higher costs are arguments used. They argue that it is important that physicians not do tasks that other professions can do, otherwise it is a waste of time and money.

The physicians consider their time as split into two parts: patient time and administrative time. A general opinion is that their main work is done when they have direct patient contact. Other tasks, such as documenting, reading, ordering referrals and tests, are tasks that they consider to be done in administrative time. One specialist said:

“The drug module takes a lot of time from the patient time”

The main problem with this separation is that what they refer to as real “physician work” is only the tasks done during patient time. The tasks done in administrative time they refer to as tasks that they want to spend less time on.

“A lot of time [with the EPR] compared to the time I spend with the patients”

The physicians on an average estimated their time in front of computers as 50% of their total time. According to their opinions they spend half of their time with tasks that they do not see as part of their “real work”. If they would think of documenting, writing and reading referrals as a part of their “real physician work”, it would probably affect their attitude towards EPR.

6.3 Participation in Deployment Activities

As mentioned above, the physicians refer to EPR and IT as something that is not a part of their “real work”. Even though they are positive to IT in general, they are not motivated enough to participate in the deployment activities. A consequence of this is that other professions and the management experience that the physicians are unwilling to participate in optimizing EPR work. The senior physicians have all participated in different EPR development, requirement analyses, and taken part in formal groups or smaller informal groups, where they have discussed EPR and other IT questions. A common opinion is that they do not have the power to change anything in the systems. Some senior and specialists try to communicate their requests and thoughts but they express that the hospital management have created a structure that puts a distance between the care professionals and the IT organization. The specialists use lack of time/interests as well as lack of computer knowledge, as arguments for not participating. Some of them have taken part in EPR development activities, but they think that their participation was not valued highly enough. One specialist commented on her lack of participation:

“Yes, if you get time for it. I often think that they ask if you want to participate, but you need to participate instead of taking care of your patients or you have to postpone your consultations. And I don't think that is ok...”

On the other hand, some of the specialists say that when they express complaints about the systems, they are being listened to. But, changes to the systems take a long time to implement, and decreases their willingness to participate. When it comes to resident physicians they are not in such a position that they talk about participating in different EPR activities. They are often moving around between different departments and feel like they cannot educate older, more experienced colleagues. On the other hand, they think that they would have a lot to contribute because they are more used to computers.

To get improved participation, we think that the physicians need to find the EPR as “their” system, not as the IT organizations property.

Lorenzi [9] argue that it is a difference between implementing smaller systems and more complex systems into the organization. *“It has become apparent in recent years that successfully introducing major information systems into complex health care organizations requires an effective blend of good technical and good organizational skills”*. Today the care staff and management in the health care organization consider the EPR as a technical system that is the IT organizations responsibility. We argue that the organization needs to change their attitude toward EPR, and look at EPR as the health care organization responsibility. This is of course not true for the technical

infrastructure, but the implementation into the organization and how the system is used as a part of the care process. The IT organization shall be a support and IT expertise organization. If the EPR is the care organizations property, not the IT organizations, participation will be more appreciated and seen as more important.

6.4 About the Education and Training Process

When introducing new IT systems or EPR modules, the hospital uses an education model where representatives from each health care unit educate and teach their colleagues. A common opinion is that this education method is good because it gives an introduction to the systems.

“It is absolutely good that you have the possibility to go to education. But it is hard because the education-hour must be squeezed into the normal physician work. I know a lot of colleagues that missed the education because of lack of time, so they have had to learn the systems by themselves and in real- life situations.”

The quote points out some main thoughts that are generally expressed by the physicians. The opinion is that the introduction is not supposed to be longer than 2 hours. Some even express that a 20 minutes briefing is enough. Longer education is considered a waste of time. The rationales for short intensive introduction differ between the groups. Here is a quote from a senior physician that is representative for their opinion:

“I always go to education sessions. But it cost too much to have one whole day for all physicians. I think that the system should be so good that you don’t need any education at all, because everybody is using so many other IT systems. I had 20 minutes education at a physician meeting, you don’t need any more. You need to know the system’s possibilities and then learn to use it by yourself”

The quote indicates that the senior physicians prefer shorter education sessions because otherwise it would take up much too of a physician’s time. It also illustrate that they think of education as an introduction to the system, not a session where they learn to use the system. The specialists think it will take too much of their own time. They will not be able to use that time for the usual patient and administrative work. Instead they have to deal with that later. The resident physicians’ opinions can be summarized by this quote;

“Sometimes I think that the education sessions can be too basic and simple. They teach you things that you already know.”

None of the physicians see any consequences from missing an education session. They all learn to use the system by using it in real-life situations, not at the education session.

Today the management handles the physicians’ “negative attitude” by forcing them to go to education sessions and try to teach them how to use the EPR in the “right way”. We think that today’s point-and-click education session or viewing-the-system

education is not the right way to achieve an attitude change toward the EPR. According to Berg, *“In health care, however, the ‘core business process’ consists of highly knowledge-intensive, professional work, typified by a complexity that defies the predictability and standardization required for simple reengineering. Moreover, the professionals ultimately responsible for this process are powerful actors in the organization, and cannot be simply told to change their work patterns by senior management.”* [8] Therefore we considered the education ought to be role-based according to the different physicians work environment, needs and knowledge. The education should focus on how the EPR will support them in their work and not everything that is technically possible to do in the system. It is important that the education gives a critical perspective towards what the EPR can do for them [12], otherwise they get false expectations of what the EPR can support them in.

7 Discussion

The starting point for the study was to find out why physicians do not want to participate in the education sessions and other deployment activities. We conclude that this problem is more like the symptom than the diagnosis of the problem. The real problem is why the care professionals, physicians in this case, do not look at IT as a possibility to perform a better work. Why don't the physicians love their EPR system? The answer is complex. The separation between the EPR and the health care organization confirms the physicians' attitude that using the EPR is an administrative task, not something they want to spend time with. This attitude towards use of IT, which is one of their most important work tools, is not something we have seen in other professional areas. The EPR system is also something that the health care organization does not own and has the power and mandate to change to fit its needs.

Among the physicians, there is a mixed opinion about to which extent the EPR support their work, but the physicians agree on that accessibility is the best feature of an EPR. Beyond that the picture is unclear. We found some similarities with the Miller & Sims study [4], for example difficulties with complementary changes, inadequate support and attitude. Differences between the studies are that Miller & Sims focus on solo/small groups, while we focus on resident, specialists and senior physicians.

7.1 The Differences between the Groups

Residents have often worked with other EPR systems and are used to learn new IT systems. Their opinion is that the EPR has more advantages than disadvantages, but they are not expressing that the EPR is supporting them as much as it could. A general opinion among both specialists and senior physicians is that the system can be much more intuitive, usable and better in supporting them in their patient work. The difference between their opinions is that specialists are more disappointed and frustrated with the EPR, while the seniors understand that the EPR cannot be perfect in the beginning but have high hopes that the system will be better in the future. According to M.J. Van der Meijden et al. both experienced and inexperienced users have little defined expectations regarding the effects of computers in health care. The

only important aspects that the users mention are accessibility and reliability. Meijdens' conclusion is that *“future users had no clear view of what could be expected after introducing computers into their daily work”* [7]. Our study indicates that the different physicians have different expectations concerning the benefits of an EPR. We believe that age, education, work tasks, work environment and responsibility are important aspects that explain the differences between the groups' attitudes. None of the physicians express that the EPR support them fully, but the specialists are most expressive and skeptical, because of their dependency of the EPR. The respondents in Meijdens' study expect that *“an EPR should give them more overview than paper records and should release them from copying data from one sheet to the other”* [7]. The respondents in our study do not think that the EPR gives better overview. In fact the specialists point out that using only paper records instead of a mix of papers and computers is better. Using mixed systems means lack of control, which makes them insecure about their ability to perform a great work, and that the EPR is too immature to be used without any complementary papers.

7.2 Conception of Time Usage

The groups have different work tasks and use their time differently. The residents are still learning to become physicians and are not conceptually separating EPR time and patient time as much as the specialists. The senior physicians have much more administrative tasks and are not using the EPR as much as the specialists. The conclusion is that the specialists are more protective about the patient time and hesitant to regard the EPR as a part of that time. We believe that the physicians, especially the specialists, ought to change their attitude toward EPR and should consider EPR usage as an integrated part of the total care work. Changing both the physicians and the health care organizations way of looking at EPR will support this.

8 Summary

The result of the analysis of the interviews, and our preliminary suggestions for improvements of organization and processes, can be summarized as follows.

The physicians have huge expectations on how the EPR should help them and believe that the EPR systems give them benefits that the paper records could not give. Despite the possibilities, the physicians are frustrated about the systems usability. The physicians consider their time as split into two parts: patient time and administrative time. A general opinion is that their main work is done when they have direct patient contact, they consider working in the EPR and other IT systems as administrative tasks. Their own estimation is that they spend 50% of their time in front of the computers.

The physician groups have different work tasks and different experiences with the system. They all have the possibility to participate in education sessions and find it useful as an introduction to the system. The residents think the systems are easy to use and think that the education sessions are too simple and basic. The specialists, on the other hand think that the systems have bad usability and find it better to keep some paper records until the EPR is safer and more intuitive. The seniors do not use the EPR as frequently as the other physicians. They are concerned that the EPR contains too much information, and consider it hard to find the important information.

The seniors, and some of the specialists have participated in different development project but do not think that the hospital management listens to their opinions. We argue that it is important that the physicians participate in education sessions and deployment activities. *If* they do not participate in the education and training they will not learn to use their computer systems in an appropriate way and *if* they are not engaged in the development and deployment process they do not see the full potential of using EPR and other IT-systems to improve organization and work processes.

To solve this problematic situation, several changes must be made. Physicians' participation in development and deployment must be prioritized, given enough resources and be rewarded. They must see EPR and other IT-systems as the responsibility of the care organization and not of the IT department. Education and training procedures must be tailored to each target group and must be focused on learning the new way of working, not on how to handle the new technological artifact.

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Paper III

The New Clinical Practice: How Nurses and Physicians Experience Electronic Patient Record Systems

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Abstract. Deployments of electronic patient record systems (EPR) in healthcare organisations are major change that affects the entire organisation. This paper is based on a 2.5 year research project that was conducted in collaboration with a Swedish university hospital. In this research project two groups of clinicians, nurses and physicians, were interviewed regarding their experiences of EPR supported clinical practice. The interviewed clinicians experienced changes in their clinical practice regarding how to *read*, *write* and *use* the patient records. They all considered the use of an EPR system necessary, but experienced that the EPR system used did not fully supported them in their clinical practice. The interviewed clinicians that had participated in deployment and support activities were frustrated about how hard it was to change and improve the EPR system. Instead they experienced that they needed to change their clinical practice to less efficient work routines in order for the EPR system to support them. The main result of the paper is that even though both nurses and physicians experienced the same problems with the EPR system it affected them differently. The physicians were more frustrated and expressed the problems more strongly than the nurses. The physicians were more frustrated because they experienced that the EPR system gave them a worse clinical practice and a decreased status among the other clinical professions. The nurses on the other hand experienced that their documentation became more visible than before and found it easier to claim the importance of their work towards the physicians.

Author Keywords: usability, sociotechnical system, studies of organisations, technology and work, healthcare, electronic patient records, group processes

Introduction

Today many healthcare organisations deploy different types of health information systems such as the electronic patient record (EPR). The rationale behind EPR is to save money and achieve an effective support for the clinicians in the clinical practice. According to Krog [1] there are three common assumptions about the EPR systems: 1) better overview, 2) less hazard and 3) less time consumption. In our study we can see that the EPR system affects the clinicians' clinical practice, work routines, relationship and communication with other clinical

professions. According to Berg [2] “*shifting from paper-based recording practices to electronic record keeping often makes work practices more visible, inspectable and manageable*” [2], which are also a consequence that can be seen in the studied organisation. Almost all clinicians appreciate the increased accessibility and reliability. They believe that the EPR system improves their clinical practice by giving them access to other clinicians’ documentation and work. Both Krog’s study and ours indicate that the three previously mentioned assumptions about the benefits of EPR systems have not been fulfilled in practice. The reasons for the lost benefits are that the EPR system are considered to be time-consuming, have low usability, poor efficiency, and finally not supportive in the clinician’s clinical practice. Despite these lost benefits, both physicians and nurses are positive toward the concept of a common EPR system and understand that it is impossible to go back to paper-based records [3, 4].

In this paper I use a sociotechnical approach [2, 5], and theories about group processes [7] to analyze how two clinician groups, nurses and physicians are influenced by the EPR system in their clinical practice. The experiences of the nurses and physicians in relation to the adoption of an EPR system have also been analysed by Jensen [6-8]. She has come to the conclusion that physicians and nurses invest different amount of time in the EPR adoption. The physicians are also more frustrated by the new administrative tasks that the EPR system forces them to do than the nurses are.

Theoretical framework

Healthcare organisations are complex organisations that consist of heterogeneous groups of people (clinical professions, patients, managers), technology (tools, patient record systems) and both organisational and clinical routines. [5] Using a sociotechnical approach means that all these factors are considered when deploying an IT/EPR system. [2] According to Aarts “*Clinical work changes as ICT [Information communication technology] are implemented as much as these technologies change as a result of local clinical practices*” [6]. This quote illustrates that the EPR deployment and usage influence the clinicians’ practice and their conception of what an EPR system is and what it is suppose to support. What an EPR is and what it is supposed

to support is not determined. It is affected by the clinicians' needs and how they use the EPR system in the clinical practice.

Theories about group processes: within and between groups

In this paper I use a group perspective when analysing the clinicians use of EPR systems. All individuals are members in several groups or communities. These can be groups that we are born into (gender, class and ethnicity), groups at work and leisure time [7]. In this paper members from two groups/professions are examined, the physician profession (subgroups: resident, specialist and senior) and the nurse profession (subgroups: 'ordinary nurse' and nurse with management responsibility). The reasons for not focusing on groups based on gender are because their clinical profession have a huge impact on their clinical task, practice and affect their position among other clinical professions. The traditionally gender codes (physicians - 90% men and nurses - 90% women) are changing rapidly. Today, newly educated physicians are equally divided between men and women; but unfortunately a similar change is not seen for the nurses. Our interviews show that the interviewed nurses and physicians identify themselves more with their profession than their gender.

According to Brown, *"a group exists when two or more people define themselves as members of it and when its existence is recognized by at least one other"* [7] (p 3) Being a member in a group influence your behaviour, self-esteem, understanding of right and wrong behaviour, attitude toward others and much more. [7] The groups create their own values and norms that are crucial for the group's existence because it decides what is accepted and not accepted behaviour within the group. In group theory terms as *in-groups* and *out-groups* are used. In-group is the group that you are a member in, and the out-groups are the other groups. The group's norms decide how the out-groups experience your group, and how your group experience others. The members in the group have different roles and status that are formally and informally decided within the group. The roles of the members decide who they are in the group and status shows how respectable they are in relation to the other members. The existence of clear roles and status within groups gives a structure to the group that helps the members to better define themselves.

Conflicts between groups can be explained by “*Relative deprivation theory*” that suggest that “*people become discontented and rebellious when they perceive a discrepancy between the standard of living they are currently enjoying and the standard they believe they should be enjoying*” [7] (p 233). This theory about group processes within groups and between groups will be used in the discussion to explain behaviour and attitudes that appear when an EPR system is being deployed and used.

Method

This paper is based on a 2.5 year research project in a Swedish county that contains several healthcare units: a university hospital, a smaller hospital and several primary care centres and a habilitation unit. The county has since 2004 deployed the same module-based EPR system. During the project a grounded theory [8, 9] approach, inspired by Charmaz, has been outlined. During the empirical data collection several methods have been used:

- Interviews with clinicians, managers and EPR managements
- Observation of the clinical practice
- Participation in different deployment activities
- Notes in a research diary and continues analyses during the project.

The paper is mainly based on two interview studies with 17 nurses and 19 physicians that worked at the university hospital. The interviewed nurses and physicians worked in the same four units within two departments, children and women care and emergency and rehabilitation care. The purpose with the interviews was to clarify the physicians and nurses’ attitudes towards the EPR system, the deployment of the system and IT usage in general. The respondents had different level of expertise, age, and gender. During the interviews a semi-structured interview guide was used with question themes about:

- How they use EPR and other IT systems
- Experience of EPR deployment and deployment education
- Experience of participation in IT-development activities
- Experience of the IT and EPR support in general

- Relationship to other care professionals

The interviews lasted for 20-30 minutes and the themes were used as a flexible guide during the interviews. All themes were discussed during the interviews, but the experiences of the respondents and their interest influenced how deeply they were discussed. All interviews were audio-recorded, transcribed word-by-word, coded and analyzed. The physician study was performed 2009, and the nurses study 2010. Both were separately coded into different categories that have been further analyzed and compared. The result from the physician study is presented in *Physicians' Concept of Time Usage A Key Concern in EPR Deployment* [10].

Result

From Paper-based records to Computer-based records

At the wards nurses and physicians had different tasks. The physicians were responsible for the treatments and diagnosis and the nurses were responsible for nursing. Because of their different tasks and clinical practice they had earlier used separate paper-based record systems with different structure and terminology that supported their specific needs. The paper-based record were different kinds of paper lists and cardex. Cardex contained information about the patient's status, prescribed drugs, blood pressure and fever and together with the lists they had all support they needed to treat and care patients. All wards and units had their own paper-based record, with the results that one patient often had several records. The main problems with the paper-based records were that 1) it was hard for the clinicians to get a good clinical picture of the patients and 2) a lot of time was spent on searching for the actual record. Despite these problems a great advantage was that the paper-based record were developed based on the basic needs of the clinical practice.

In 2002 the studied university hospital began deployment and use of their first EPR system. The EPR system is module-based and soon (in 2011) all units have deployed the main modules. The main advantages with the EPR system is considered to be that it has made all

documentation accessible and the possibility to get a good clinical picture of the patient's needs has increased. Here are some examples of how the clinicians are affected by the EPR system:

How to document: Using an EPR system instead of a paper-based record changed how the clinicians document. With an EPR system they used a computer instead of pen, paper and dictaphone. When documenting in the EPR system you needed to learn how to navigate in the system and where to document different type of information. The EPR system also used the same terminology for all clinicians, which had the consequence that some words were unknown and sometimes used in a new unknown setting.

How to read documentation: With the paper-based record system the documentation was a pile of papers and while with the EPR it is uncountable pages on a computer. The piles of paper were a system that they were used to and had trained to be fast to read. In the EPR system, that contained all information from all clinical professions, they had access to everything. However, the system lacked good and useful overviews so it was impossible to get the expected benefits. This resulted in that many clinicians thought that the EPR system contained too much unnecessary information. Therefore physicians and nurses believed that the other professions needed to start documenting just the "necessary" information.

How to use the documentation: with the paper-based records they could take the paper with them when they meet patients. Unfortunately only one person could access the record at the same time. With the EPR system everybody could access the same information at the same time. The problem with the EPR is that they needed a computer to access the documentation. The studied clinicians did not have access to computers whenever they needed it (at the patients' room or enough for all), so they wrote information on papers so they could remember what to do, and what drugs to deliver.

EPR usage and attitude

Both the nurses and physicians used the EPR system every day and were depended on the EPR system in their daily clinical practice. In the

interviews the physicians estimated that they used the EPR system 50% of the day and the nurses 25-30% of the day. All physicians and the younger nurses said that they were “experienced” EPR users. The older nurses and the nurses with management responsibility were less secure of their EPR knowledge and they said that they could use the system adequately, but they needed more education in order to be advanced and confident users.

The nurses and physicians used the EPR system for slightly different tasks. The physicians used it to read and write documentation, managing referrals, lab tests, x-ray and drugs. The nurses used it to read and write documentation, administrate drugs, read lab tests and some patient administrative tasks. Both physicians and nurses said that EPR systems were part of the future and that it was not possible to go back to paper-based records. The benefits that almost all clinicians experienced were increased accessibility and reliability. Despite that both nurses and physicians experienced that the EPR system did not fully support them in the clinical practice and that the systems needed major improvements in order to do so. The main problems were considered to be low usability, non-intuitive interaction, lack of overview and too many ‘clicks’.

There were some differences between the nurses’ and the physicians’ attitudes toward the EPR system. Both said that it was an important tool, but the physicians experienced that their workload had increased and they now performed much more administrative tasks than before. The increased time in front of the computer was a great issue for them [10], one physician said that “*we work more with the computers than with the patients*”. Specialist physicians that were more dependent on the EPR functionality even said that it was better to use some paper-based routines, which they know work effectively, than to deploy a bad EPR module. Other physicians generally thought it was better to use an insufficient EPR system than a mix of paper-records and EPR. While the physicians’ complained about the increased time in front of the computers the nurses experienced that their work tasks and documentation were more visible to others than before. They thought that it was good that the physicians and other clinicians could see their documentation and use it in their work tasks. Unfortunately the physicians experienced that the nurses documented unnecessary information, which resulted in that the physicians did not usually read

or incorporate the nurses' documentation in their decisions regarding the patients' treatment.

Participation in EPR deployment activities

Some of the interviewed nurses and physicians had participated in different deployment activities and suggested how to improve the EPR system. These activities included

- Educator when a new EPR module was deployed
- Educator at local education sessions
- Local EPR support
- Member of the local documentation group
- Advisor in the EPR requirement work in the procurement phase

Physicians and nurses that had participated in different deployment activities had a higher awareness of what the system could support. They were also more disappointed about the EPR system's lack of crucial functionality than the others that had been less involved in the deployment. Participating nurses had a better understanding than the participating physicians about EPR learning. One nurse who had participated as educator when a new EPR module was being deployed said: *"[learning the EPR system] has different parts, partly computer usage, and partly to learn the terminology"* and *"it's a lot about how to document, how you should think, maybe as much as it's to learn how to use the system"*. Therefore some of the nurses tried to teach their colleagues (other nurses and assistant nurses) a deeper EPR knowledge about how to manage the documentation process, which the EPR system is based on. This was unique for the nurses. The physicians did not organize education sessions on their own. They used email to deliver information to the other physicians when there was news about the EPR system.

EPR learning

When a new EPR module was deployed the EPR management organized education sessions. At these sessions clinicians were super-users that educated the other clinicians. Nurses or medical secretaries

educated nurses and assistant nurses and medical secretaries and physicians educated physicians. All interviewed physicians and the younger nurses said education sessions were a good opportunity to get an introduction to the EPR system. They also said that the education sessions should be an introduction and that the main learning should occur when they used the system. All physicians thought that the education sessions should be between 20-120 minutes, not longer. The different physician groups used different reasons for having a short education.

- **The senior physicians** that had a manager responsibility thought that it took too much time if all physicians should attend longer educations.
- **The specialist physicians** thought that the EPR system should be designed so that you could use it without education.
- **The resident physicians** thought that the EPR system was easy to use and that the education sessions tended to be too simple and basal.

If we compare the nurses with the different physician groups, we can see that the younger nurses shared the residents' ideas and the nurses with management responsibility shared the senior physicians' worries about longer education. The specialists and the older nurses had slightly differing opinions about the education sessions. The older nurses thought that they needed more frequent education opportunities so they could become more secure and confident in their EPR usage.

Attempts to improve the EPR system

Both physicians and nurses experienced a lot of problems regarding the EPR system's functionality. Most of the interviewed physicians and some of the nurses had tried to suggest ideas for improvements in the system that they knew would increase the usability and make the system more supporting in clinical practice. Those who had tried (usually the same ones that had participated in deployment activities) quickly realized that changes took at least several years and after seven years the list of wanted changes were still growing and many improvements remained unsolved. A nurse that had participated in deployment activities said:

“In the beginning you did that [suggest ideas for improvements], we put a lot of time and effort into that...//... but you got tired of it because not much have been listen to. They have not listened to that [our ideas for improvements] and it has been hard to make changes and improvements. So that energy, I saved it, and did other things instead of try to change the EPR system”

There were two main reasons why the system was difficult to change. The company that delivered the system was the only ones that could change the systems functionality and changes would only be made if all customers wanted the same changes and were prepared to pay for them. The other reason were that when the clinicians complained about usability problems, EPR management responded by telling the clinicians (mostly the physicians) to participate in education sessions and learn to use the system in the right way, as it is suppose to. Managers and EPR management were convinced that many problems would disappear if they used the system in the right way, but the clinicians said that it was almost impossible to use the system in a different way if it were to fit with their clinical practice. The clinicians that did not suggest ideas for improvements thought that they had no power to change the EPR system. So the clinicians that tried to improve the system and the clinicians that did not try came to the same conclusion: that it is nearly impossible to change the system’s functionality.

EPR support

All interviewed clinicians had experienced problems that they needed help to solve. However, their problem solving strategies varied and the most common strategy was to ask a colleague for help. Another strategy was to look in an EPR manual or try to solve it by using trial-and-error. The least common strategy was to call the central EPR support. Physicians and nurses used these strategies to different degrees. The nurses that worked at the ward had a close group of colleagues that they knew and trusted. Therefore they usually asked a colleague for help. The physicians moved around more than the nurses and did not have the same collegial support as the nurses had. They functioned more as individuals in their practice and tried to solve the problems that occurred by using “trial and error”.

Changed relationship between physicians and nurses

The nurses and physicians had different education and there was a hierarchic difference between them. Simplified, the traditional roles were for the physicians to make diagnoses and treatment plans and the nurses' job were to be responsible for the nursing. The fact that they experienced the same usability problems and tried to improve the EPR system so it could support them lead to that the some of the hierarchic differences between them had decreased. This was seen especially in relation to the EPR management and managers where they were a more united group of clinicians than before. In the interviews we could also see that their work tasks had changed. The physicians did more administrative tasks and they were forced to do tasks that they earlier delegated to the nurses and the medical secretaries. This had changed the nurses' behaviour towards the physicians. One nurse described a dialogue with a physician that had not been possible when they used paper-based records:

“[The physician asked] ‘How much does the patient weight?’ and then I can say: ‘I have no idea, but you can find it in the EPR system’, you are welcome to search for it yourself. Some day they might learn to search for it”

This quote shows that the nurses are more aware of their own tasks and are more self-reliant when the physicians ask them about information that they can access themselves in the EPR system.

The nurses said that the younger and older physicians used the EPR systems differently. They experienced that the younger physicians manage all tasks themselves and the older physicians needed help to manage the EPR system.

Discussion

The clinicians interviewed in this study experienced that the EPR deployment had affected their clinical practice and that the EPR system both supported them and hindered them. It supported them by increased accessibility and hindered them by not supporting their clinical practice. This ambivalent experience by the same individuals can also

be seen in Jensen and Aanestad study about how Danish surgeons adopt an EPR system [11]. They explain the physicians' opinions as a consequence of how the EPR system was deployed and accommodated. The physicians in our study [10] and the surgeons in Jensen and Aanestad's study [11] focused mainly on how badly the system supported them in their clinical practice, that their work tasks had increased and how the professional roles among the clinicians have changed.

The physicians have tried to influence the EPR system's functionality, but consider it to be futile. The nurses on the other side experience the same problem but are more willing to accept and not fight the problems. Those nurses that tried to change the system came to the same conclusion as the physicians.

Relative deprivation theory can be helpful to understand why the physicians are frustrated by their situation. Relative deprivation occurs when you think that you are in a worse situation than you think that you deserve. [7] The EPR system has led to changes for the physicians, both improvements and disadvantages.

- Increased access to patient records
- Decreased time with the patients, something that the physicians consider to be the real physician work
- Increased time in front of the computers – something that the physicians consider to be administrative tasks
- More administrative tasks
- The system controls what the different clinicians are responsible for. They cannot act according to what they consider to be their usual working routines.

The physician's frustration could be explained by these (for them) uninformed and unplanned changes of the physician profession. So why are not the nurses as frustrated as the physicians are? Social comparison is a great source for relative deprivation. It means that if a group is unsatisfied it depends on who they compare themselves with. For example, the physicians have always been on the hierarchic top and have no other clinicians to compare with. Therefore they compare themselves with the physician roles before the EPR deployment. This comparison leads to that with EPR, they have less control over their main working tool (the patient record), more "non-patient" work

responsibilities and less respect among other clinicians than when they used the paper-based records.

The nurses on the other side are more likely to compare themselves with assistant nurses. The assistant nurses are not legally required to document and not frequent EPR users. The introduction of EPR system have increased the differences between the assistant nurses and nurses and decreased the differences with physicians. The EPR system have made their documentation more visible and the fact that the EPR system controls who are responsible for the different working tasks means that they cannot do tasks that are someone else's responsibility.

Conclusion

The healthcare organisations' EPR deployment has lead to a new clinical practice for both nurses and physicians. In this study 19 physicians and 17 nurses that work at the same units have been interviewed about their experience of EPR deployment and usage. Both nurses and physicians believe that the system has both benefits and problems. They think that it is not supporting them in their clinical practice, but this seems to affect physicians and nurses in different ways. The interviewed physicians feel frustration and resignation against the EPR system and they try to influence their situation, but nothing happens. Before, the nurses used to help the physicians with tasks that were the physicians' responsibility. This is no longer possible because the system controls who is allowed to do different tasks. That increases the physicians' workload, and gives the nurses increased power over their own work tasks. Nurses also experience that their work is made more visible for other clinicians when using the EPR system.

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Paper IV

Obstacles to the Establishment of A User-Centred Perspective in Two Organisations

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Abstract. This paper examines the problems of establishing the basic values and fundamental principles of a User-Centred (UC) framework. This is done from an organisational perspective in the light of the theory of Communities of Practice (CoP). The different CoPs examined are: users, managers, IT coordinators/user representatives and system developers. Data has been gathered in case studies and interview studies in two separate organisations. The studies show that the identities of the different main communities within the organisations are closely connected to their core business and not to IT, usability or computer systems. The studies also reveal that there is an illusion of communication and contact between the IT departments and the core business. The boundaries between the different CoP are hence partly rigid in these organisations. Finally, some implications on the establishment of a user-centred framework in organisations are presented.

Keywords: User-centred systems development, managers, system developers, users, IT coordinators, user representatives, work environment, communities of practice, IT coordinators, change, public authority, health care.

Introduction

There are no well-established principles for how to incorporate the basic values and fundamental principles of a User-Centred (UC) perspective in organisations. Previous research has focused on defining processes and methods for building usable systems [1] as a way to address the problems of poor usability and a poor work environment [2, 3]. The problems of how to successfully establish the fundamental principles and basic values behind UC in organisations as such remains, as discussed by e.g. [2] and [4], even though we today have a better understanding of the underlying problems than we had ten years ago.

In this paper, we use UC as a framework and mainly as a herald for the underlying basic values and fundamental principles. Our UC perspective is profoundly grounded in the Scandinavian tradition of extensive user involvement [5, 6], in some communities known as participatory design. This has influenced us

in e.g. defining a framework for user-centred systems design based on this tradition, including basic values and a set of key principles [7].

Introducing IT in complex organisations are more a behavioural than a technical challenge [8]. People from many different parts of the organisation participate in the systems development we study, and usability is seen in the context of human activity as described by Nørgaard [9]. In this paper the organisational context is conceptualised as several Communities of Practice (CoP) [10]. Our starting point is that a successful establishment of UC requires an understanding of these communities and how they influence the establishment of UC. We need to influence all levels in the organisation to be able to introduce usability work and methods.

Organisational aspects of the establishment of UC has been studied by for example by Iivari and Abrahamsson [11], where they demonstrated that the different organisational cultures have different views of the nature of HCI, in the motives for implementing UC and in the expectations of the experiences gained from the implementation.

In order to understand the difficulties when establish UC, we need to understand the organisational context in which the new methods are introduced. There are many communities within the organisations that are influential for the establishment of a UC perspective. In this paper four communities are identified. They will be analysed with the theory of CoP, in order to understand how they influence the establishment of UC. The identified communities are:

1. Users of the computer systems
2. Managers at different levels in the core business
3. IT/EPR coordinators and user representatives
4. System developers

In this paper we will discuss the identified CoP and their relationship to each other, and how this affects the establishment of a UC perspective.

Theoretical Framework

In defining our research we use the concepts methodology, method and theoretical framework as defined by Crotty [12]. This research adheres to the action research methodology [13-15], which means that it aims both at improvement and change in the organisations studied, as well as knowledge about this change.

Our research has been inspired by the perspective that human action is situated [6]. Consequently, our research must take place in practice. It consists of both *“high, hard ground where practitioners can make effective use of research-based theory and technique”* as well as *“swampy lowland where situations are confusing ‘messes’ incapable of technical solution”* as described by Schön [16].

Our research is based on a constructivist and interpretive perspective [12], where we create and understand our reality by using language through communication. Interpretations are flexible, situated, and socially constructed.

Examining the role and implication of users, managers IT/EPR coordinators/user representatives and system developers as CoPs requires an understanding of human action and competence. In this paper we see knowledge and understanding as a social process, and define learning as a part of a CoP. At the same time we adhere to Schön [16] who defines true competence as reflection on action and reflection in action. In our research we adhere to and work according to the quality criteria and principles established by Klein and Myers [17].

Communities of Practice

Recent research on organisations focus on occupational communities and different Communities of Practice (CoP) within organisations [11]. CoP as described by Wenger [10, 18] is a theory of the social learning where learning is seen as a natural part of social participation. Social learning is seen as something that occurs, emerges, and evolves when people with common goals interact.

The concept CoP denotes a group of human beings sharing a common interest, or a set of problems, in a topic. CoPs exist around us, and often we do not recognize them as such. We can participate in multiple CoPs at once, and have different roles in different communities. Communities, according to Wenger, are where we do things together with other people, in a shared domain of interest and with certain practices.

A CoP is a special case of a community that has, three dimensions and recognises by the presence of all three in combination. The three dimensions are named domain, community, and practice and are described below.

Domain. What it is about – its joint enterprise as understood and continually renegotiated by its members. Often members have a mutually defining identity and common styles. Knowledge and competence in the community differentiates a member of the community from an outsider.

Community. Denotes how the community functions. This includes for example what mutual engagements that tie members together into a social entity. Some examples are feelings of solidarity and construction of boundaries against outsiders. This implies that members of the community share information and assist each other.

Practice. What capability it has produced – the shared repertoire of communal resources (tools, techniques, language, routines, sensibilities, artefacts, vocabulary, styles, etc.) that members have developed over time.

This theory elevates that we participate in social communities and construct our identity through learning in relation to these communities. Such active participation and learning in a community shape not only what we do, but also how interpret what we do and who we are [10]. Moreover, this learning results in practices, which in turn become the practice of the community as such.

The structure of the community is created over time through a process of legitimate peripheral participation and the transition to central participation or the reverse process. This is a description of how members of a community can become socialised, and how new members who enter the community can become more

central members for the community. This transition to more central parts of the community takes place through social interaction and learning. According to Wenger, the concept of legitimate peripheral participation “*provides a way to speak about the relations between the newcomers and the old-timers, and about the activities, identities, artefacts, and communities of knowledge and practice*”[10]. Hence, legitimating and participation together define the characteristic ways of belonging to a community and the process of becoming and continue to be a member of a community.

CoP cannot be considered in isolation from the rest of the world. They create boundaries to the rest of the world, and at the same time, they share history, and repertoire with the rest of the world. Entering a CoP hence does not only include entering an internal configuration, but also its relations with the rest of the world. Boundaries of practices create links to the rest of the world and are bridges between inside and outside. They form a complex social landscape of boundaries that govern how a community open and close various forms of participation. Boundary spanners, and boundary spanning competence are important concept in this context in that they build new connections across CoP, enabling communication, and open up new possibilities for learning in the community [19].

In summary, the theory view learning as an integral part of everyday life and describes participation in a CoP as a learning strategy. Such communities are constantly changing by on-going development of their identity and relevant knowledge. A community can for example evolve due to the members' common interest in a particular domain, phenomenon or area, or it can have emerged due to common goals of gaining knowledge. Through the process of communicating information and sharing experiences within the group, the members learn from each other and develop both personally and professionally. Learning is closely connected to practice and the members' ability to negotiate meaning [10].

This is a theory that has helped us understand the different communities encountered within the organisations studied. The fundamental idea that made us interested in this theory is that all changes of practices involve a process of learning and negotiation of meaning. In this paper, the theory of CoP helped by providing a systematic way to discuss the experience of change in the communities in the organisations.

Methods

This paper investigates the main CoP that influence the establishment of a UC perspective in two different organisations, a public authority referred to as OA and a health care organisation referred to as OB. The research projects were done between 2006-2009 (OA) and 2008-2010 (OB). Both projects focus on computerised work environment [20] through an action research collaboration with the organisations [13-15]. The primary goal were to introduce/establish a UC perspective within the organisation and find methods that will help the organisation to work effective with their core IT systems. The studies and results from case OA are described in numerous studies, as for example [21], and some of the results

from OB are presented in [22]. In both case studies researcher have worked together with people within the organisations, helping them identify actions and measures to address problems identified. Data has been collected primarily by means of participatory observations and interviews with key informants. The researchers have followed the organisations participating in various activities, for instance, project meetings, office meetings, and various work meetings.

In OA a longitudinal four-year action research project was carried through. The data collection was an on-going process that has resulted in large amounts of data such as descriptions of the practical actions of people, photographs, about 100 interview recordings, and transcriptions of interviews. In addition, data was gathered in a research diary with descriptions of situations such as meetings, conversations over lunch and of what people express as well as drawings of ideas and mind maps.

In OB, semi-structured interviews were conducted with 70 informants. These represent the four CoP. The interviews lasted between 30-90 minutes. The interviews were recorded and totally or partly transcribed. The questions were about 1) Their experience and attitude towards the IT systems and IT deployment, 2) Organisational structure and belonging, 3) Contact with others in the organisation.

Analysis of Data

This rich material has been analysed in different ways and we have used a number of analysis techniques in order to provide a better understanding of the complex situation. Analysing this kind of data includes selecting, condensing and transforming data.

The recorded interviews in OB were roughly categorized according to the question themes presented above. After that, all data was analysed in discussions with the researchers in our research group using the three dimensions of CoP as a starting point. During these discussions, we have tried to interpret the things we have seen through a conscious discussion and by being both suspicious and curious. As our research group is truly multidisciplinary, these discussions often result in new and interesting interpretations of phenomena that contribute to new understandings relating to working with the establishment of UC methods in organisations.

In our research group, the writing process is used as an analytical tool used to bring a deeper understanding of what we have seen in the organisations. Hence, we do not consider the reporting of findings as separate from the actual analysis. We often begin writing down results from our studies early, as it has become a way of making ideas clearer. This view of the writing process as a part of the analysis is shared by for example Wolcott [23].

Case Settings

Organisation A

OA is a public authority with 1.000 employees. The organisation is distributed in 15 Swedish cities. In OA, the computer systems are mainly developed in-house, and a majority of these IT projects start because of changing legislations that influence the prevalent work practices.

Figure 1 demonstrates how different CoPs in the organisation are related and how they work together. The communities are further elaborated in the results section. From figure 1, you can see that IT has a large focus in OA, as their IT department comprises a major part of the organisation.

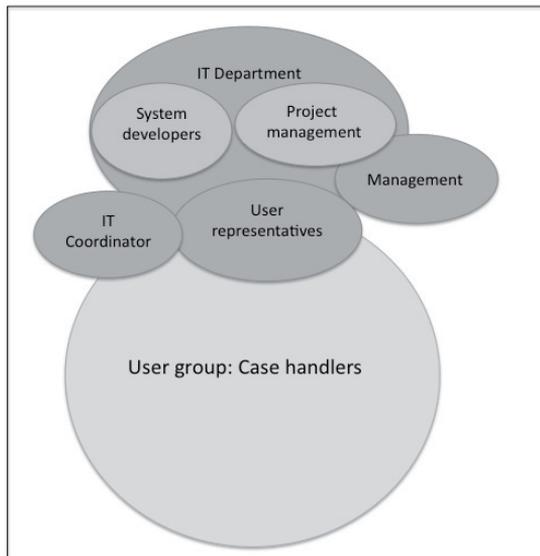


Figure 1. The CoPs in OA. The circles show different CoP within the organisation. The circles that are overlapping describes that the individuals in them belongs to both. The largest CoPs are users and IT department.

Organisation B

OB is a large health care organisation with 10.000 employees. The organisation contains of several health care units, one of Sweden's largest University hospital, 30 primary care units and a smaller local hospital. The organisation has an IT-department that is responsible for the operation of the Electronic Patient Record (EPR) system. The EPR system has a dedicated EPR system owner and an EPR support organisation that is responsible for technical implementation and support of

the system. OB has an assigned role called EPR coordinator. They are supposed to be the contact between the users of the system and the EPR support organisation. The EPR support organisation is aware that implementing an EPR is an organisational project but their prime responsibility and task is to implement the computer solution and answer questions about IT, and not to directly work with organisational changes. Formally organisational changes are the EPR coordinators and managers within the core business responsibility.

Figure 2 demonstrates how different CoP in the organisation is related to each other and how they work together in OB. For example, OB has a much more diverse user group and the IT department is a much smaller part of the organisation compared to OA. The CoPs are further elaborated in the results section.

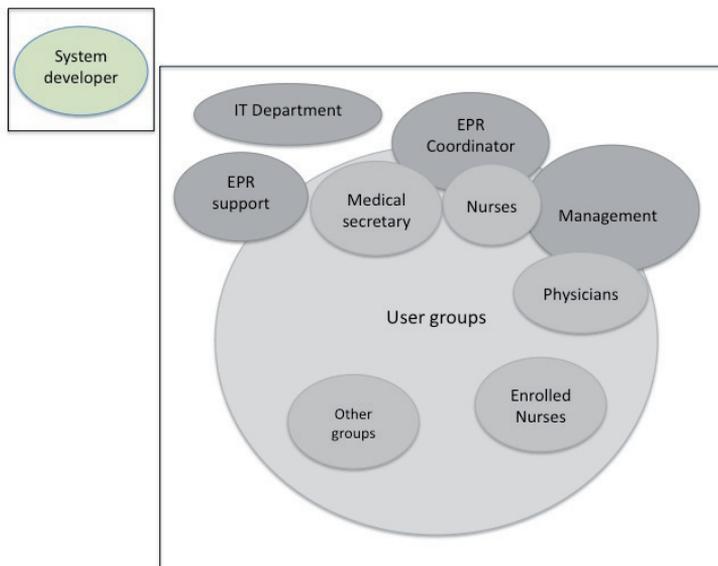


Figure 2. The CoPs in OB. The circles show the different CoP within the organisation. The largest CoP in OB are users. The circles that are overlapping describes that the individuals in them CoP belongs to both. Ex. a nurse can be an EPR coordinator and/or managers. The system development is not in-house in OB.

Even though there are certain roles defined; the system owner, the EPR support organisation and the EPR coordinators, there is an uncertainty about who is responsible for the establishment, acceptance and quality when using the EPR systems. The different actors at different levels in the organisation do not know exactly what their responsibilities are.

Result

The different stakeholder groups in both organisations are conceptualised as different CoP [10] in our study. Our results are changes and reactions to the establishment of a UC perspective in relation to their *domain*, *communities* and *practices*. Concepts from the theory of CoP will be used to illustrate the problems and changes. Figure 3 explains the four CoPs and the three dimensions.

CoP	Domain	Community	Practice
CoP 1: Users OA: Case Handlers OB: Physicians, nurses, enrolled nurses, medical Secretaries.	We are users. OA: we are not aware of the usability problems, but interested of knowing more. OB: we are aware about the problem and tell the other CoP but they are not listening to us.	IT is a tool to perform the main work- the organisations core business.	We work for CoP 2, and rarely with CoP 3 and 4.
CoP 2: Managers	We are managers for the core business, at different levels.	We are not users of the system. However we are responsible for the users. IT is a tool that the IT department are responsible for.	We manage CoP 1 and do managerial work
CoP 3: IT /EPR coordinators and user representatives OA: IT coordinators, user representatives OB: EPR coordinators, local IT support	We are the link between core business and IT organisation. We are from the core business.	We represent the user perspective. We have worked with IT for so long that the other CoP considers us as IT and not users.	We work with CoP 1, 2, 3. Our working tasks depend on what the other wants us to do.
CoP 4: System developers OA: System developers, OB: EPR support, IT department	We develop the system. OA: have in-house development OB: have a EPR support organisation that are doing some of the system development.	The other CoP considers us to be IT. In OA we truly are but in OB some of us consider us to be partly a part of core business.	We want to communicate with CoP 1,2 and "use" CoP 3 to do it.

Figure 3: the table shows the four CoP and the three dimensions.

Users

Users of computer systems are the largest CoP in both organisations. In OA there is one large group of users, case handlers, and in OB there is four different users; physicians, nurses, enrolled nurses and medical secretaries.

The general impression of the computer systems varied between the organisations. In OA the users often were surprised when we gave numerous examples of usability problems in their computer systems. The users in OB were

much more aware of the usability problems encountered. They often talked about the system as being “*non-intuitive and difficult to use*”.

During the usability project in OA, the users were truly enthusiastic towards understanding usability, and the impact of computers on their work environment. They took active notes during seminars, discussed, and were interested in usability and health effects of computer-supported work. Moreover, the users were often very positive, and were optimistic to changes and improvements. They felt that their work was the focus of this project, and that they were seen as important by the organisation.

The users in OB were generally interested in usability, but they often felt that they did not have time to handle questions regarding usability and computers. The users wanted someone else to handle this, they did not think of computers as a part of their core work.

Very few users in both organisations had knowledge of system development processes, or if the software in their computer was a standard system or software produced through in-house systems development.

Before the different usability projects started, the users of the IT systems in both organisations experienced that they had no power or possibility to affect the IT systems used. The users in OB had tried for several years but experienced that the other CoPs; managers, IT/EPR coordinators, user representatives and system developers did not listen to them and their needs.

In both OA and OB the users had a strong identity in their core business work, where the computers are merely tools to use in their work. Hence, they had no feeling of responsibility for the development of usability of the systems, as their responsibility lies in being professional in the service they provide for the customers. However, this view of identity within the CoP has somewhat changed in OA and some, but not all, of the users in OB during the project. At the end of the project, users began to see that describing problems with the computers systems, as well as seeking to provide solutions, were a part of their profession.

In OA there were changes in the organisational structure that affected the user community. A new organisational group formed during the project, the improvement management teams, where user representatives, users and business developers worked actively with the handling of suggestions of improvements from the users. This formed another community within the organisation, with which the users' community interacted and helped. Moreover, the user community started to have some contact and collaboration with the IT department and the community of system developers.

Managers

This CoP contained managers from different levels in the core business. Most managers in the organisations had a vague idea of what usability was. The study of managers in OA [24] focused on managers at all levels, both at the head office and local offices in the country. The study concluded that the interpretations of the word usability varied to a high degree. Many managers interpreted usability and

described it in relation to their own professional responsibility as managers. This was despite the fact that the UC project had run for one year and that all managers had taken part in the discussions and education concerning UC and usability. UC perspective and usability knowledge was hence not a part of the core knowledge of the community.

When this study was reported back to OA, most managers agreed to the results presented in the paper. The results regarding the view of responsibility and understanding of usability was considered disappointing and focused on an issue that the organisation needed to address. However, some managers experienced the paper as well as the presentation of the study as very provocative. One of the citations that upset managers was this one made by a manager at the head office: *“We are the head office – we know best [...] to work at the head office is sort of better and more sophisticated.”*

The managers that found this citation provocative believed that this described an old and dealt with problem in the organisation, which had been addressed [24]. This can be seen as a differentiation within the CoP as the managers at the head office were considered more central in the community, whereas the managers from the local offices were more peripheral in their participation. The managers who disagreed with the citation all worked at the head office, and in their sense making of the organisation, the local offices were considered as equally important in the organisation. However, in our study we understood that there was a feeling among the managers that working at the head office was more sophisticated. This difference between local office managers was also expressed in interviews with both managers from the head office and, managers from the local offices.

In the managers study it was clear the responsibility for usability, and usability related activities was not seen as a part of the practice within the community. After the presentation of the management study described above, there was an extensive discussion about practice among the managers in the authority. This discussion resulted in an ethical seminar series as described in [25], as well as actions to change the attitudes and perspectives presented. There was also a discussion of whether OA could be informed about who had said what in the interview study so that people could be personally responsible for their values and ideas. The research group declined this request.

In OB the managers are often defenders of the computer systems, and claim that they are usable even though the users have complaining to managers at different levels within the organisation about the lack of usability. The users have also made suggestions about improvements that will increase the systems usability. The managers are rarely using the EPR systems and a common thought among the managers is that *“if you use the system as you are suppose to the usability will increase”*. They blame the users, especially the physicians, for using the system wrong. They also say that the physicians are a dominant profession that are unwilling to participate in education and training [22]. The managers have different idea about their responsibility within that subject. Some managers understand that the usability of the systems effect the care professionals and that this is their responsibility. Other think that the IT support organisation is responsible for both technical and usability aspects within the IT systems.

IT/EPR Coordinators and User Representatives

This CoP was constructed as a part of the system development and deployment process. This community had different titles in different organisations, such as IT administration, IT/EPR coordinator, program owner or user representatives. Their role is to represent the users and being the link between the IT organisation and the core business. The members in the CoP are also members of the user CoP; *case handlers, nurses and medical secretaries*. The IT/EPR coordinators and user representatives have seldom an educational background in computer science or similar areas. They have extensive experience from the core business, where they work closely together with the core business.

Clearly the IT/EPR coordinators' CoP has a central position between the users' CoP and the IT department and their CoP. The IT/EPR coordinators in OA and OB described the situation in the same way: *"I feel like a spider in the middle of the net in all aspects when it comes to the systems and the core business"*

However, in both OA and OB parts of the users CoP and managers CoP was unaware of the role of the IT/EPR coordinators, and did not collaborate with them. Consequently there is a false impression, almost like an illusion, in the organisation that the IT/EPR coordinators act as "a bridge" between the IT department and the core business as a *"spider in the net"*.

Some IT/EPR coordinators in OA and OB think of themselves as a user representative and have closed contact with the users and others have a more distanced relationship to the users. Despite their own relationship to the users they all experience that the users look at them as coming from the IT department and not as a representing the users CoP. In OB the EPR coordinators had little cooperation within their community. Now when one of their main tasks, EPR deployment, soon is finished they have started to cooperate with the goal to define their working tasks and to secure their professional role. We believe that a closer cooperation between the coordinators makes their CoP work better as a CoP but increases the distance to the users.

Another role that often work closer to the users than the IT/EPR coordinators are the user representatives and local IT support. Their task is to represent the users perspective in system development and deployment activities. In both OA and OB the same users work as user representatives on a part time or full time basis for several years. Often the user representatives work with process models, or do final tests of the computer system. This work has often-required extensive computer knowledge of for example database techniques and SQL-questions.

Some user representatives in OA found the ideas of a UC perspective to be threatening to their own role in the systems development projects, even though their role and contribution in the systems development projects never were questioned. Some user representatives felt threatened because we stressed the importance of having real users with the same skill and knowledge as an average user in the systems development projects. The user representatives did not understand what they should do in the projects if "real" users would participate in the system development projects. The user representatives saw their identity and practice as representing the user, and did not see it as a possibility to change their

identity to being user experts who contribute with their knowledge from being experts with excellent skills and knowledge. Clearly, there was CoP in the organisations that questioned the role of the user representatives in OA as in this quote from one of the managers:

“In some cases this has led to the fact that we have user representatives that are IT people. They are simply bad at everything. /.../ They are bunglers when it comes to systems development /.../ Honestly, one can discuss if they are contributing at all.”

In OB many of the users questioned the IT/EPR coordinators and user representatives and the EPR support organisations lack of IT knowledge. This quote is from user representative:

“...now there is self-learned, ambiguous, enthusiastic people that have the important roles. I know, I have been there [as user representative], I had no IT education or IT knowledge, you do as well as you can. We need competent people to manage it. In EPR support there are nurses that are interested in IT, they are also not having any solid IT background and IT education”

Most user representatives in OA were, however, enthusiastic about the project of introducing UC, and some were interested in learning more about methods for UC design as they could see the benefit of them as well as an opportunity to become usability professionals instead of user representatives.

In both organisations, being a part of the IT/EPR coordinator and user representative CoP was considered to be a career path for some of the users, but not all. The users in OA and nurses and medical secretaries in OB consider it as a career path but the physicians do not think of IT as a career opportunity and participating in IT deployment is not highly valued.

System Developers

System developers are an important community when establish a UC perspective into organisations. Even though OB does not have any in-house system development, the users, are referring to “*the IT people*” when they talk about the EPR support organisation. According to the users, the EPR support is the CoP that is closest to the company that are producing the system.

In OA all system developments are a part of the organisation. The system developers in OA expressed that they would rather take an active part in the design of the system where they are given the opportunity to understand the business processes and program usable systems.

However, it is clear that the system developers’ identity in relation to the user community affect their understanding of the method field studies, as is illustrated by this quote:

“We are as good as they are at guessing! And I don’t buy all these things about working with the users because they know how things work. Because I have been talking to users and I know the rules better than they do since they are used to doing things in a certain way. I, who don’t work with these things say that I have read the rules and these are the rules. Then I can do it easier somehow. I wouldn’t say that I am better than they are at saying what they want. But still somehow we guess what they need and they are not better than we are at expressing that need. Of course there are some things that they can tell us, but I don’t think it is a good idea.”

The above quoted system developer sees his competence and understanding of the users’ needs as equal to the users’ own understanding. In OA we have seen that this is a value in the community of system developers.

In OB the user CoP are interested to take part of requirement work and to suggest improvement of the systems. One problem is that the managers CoP think that all users have different requirements and it is impossible to listen to all users, therefore the IT/EPR coordinator and user representatives are the one that are representing the users.

The system developers in OA had previously been physically detached from the real end-users, and they had never meet them or seen them work in their work environment. Hence, they had never seen how the system development and the systems affected others. One of the systems developers in it in this way: *“Good to establish some real contact with end-users that we could make use of in the future.”*

Discussion

In the result we have presented four CoPs (*users, managers, IT/EPR coordinators and user representatives and system developers*) that are identified as being important for successfully introducing a UC perspective into an organisation. In the discussion findings and general reactions to UC perspective will be discussed using the three dimensions defining a CoP [10], the notion of group identity (who are we?); to the joint practice (what do we do?); and to the helping and hindering ‘outsider’ groups (who do we work with?) in the organisations. The discussion will focus on the change process that the members go through as UC is introduced and established.

Users Concentrate on Core Business

The user CoP within both organisations had a strong identity in the organisations core business. They helped the clients with their problems, and the computers were merely tools to facilitate their work. This concurs with other research claiming that in general users have the goal to handle task and to work, not to handle devices such as computers [5], and with previous studies illustrating how the users in OB perceive computer supported work as not being a part of their core work [22]

This construct of collective identity gives some explanation to why this group did not suggest improvements to the systems, nor participate in activities related to systems development. In OB, one EPR coordinator describes this in this citation:

“Sometimes when you discover problems and you talk to users, they say that this has been a problem for a long time. But I haven’t gotten any information about that!”

However, in the project there was a shift in this collective identity towards an identity including acquisition of computer systems, as well as the possibility to deliver requirements and suggest improvements. This shift was prominent in OA. This change in the community’s perception of what they do and their identity is a necessary change for a successful establishment of UC.

The users in OA generally did not collaborate with the IT department, or the development department. One reason given for this was that they were physically separated. However, there was a shift in the community dimension as well, and the user community started having some contact with the system development community and the project manager’s community. The group’s change towards working with the IT department, where the system developers work, is a necessary change for a successful establishment of UC.

Lack of Contact Between User and IT/EPR Coordinators/User Representatives

Even though the IT/EPR coordinators describe themselves as the bridge between the core business and the IT department in OB they have little contact with these CoP. One IT/EPR coordinator describes this discrepancy in the following way: *“I know what I do, but I don’t know if anyone else knows what my job actually consists of”*

The collaboration between the CoPs clearly is not working properly and there is a lack of communication and contact between them and the user CoP, as described by a user in the following citation: *“It feels like we bombard them [EPR support] with improvement ideas, but that none of them will be solved anyway”*. This lack of feedback from IT/EPR coordinators and users are a consequence of insufficient contact with system developers.

One interpretation of this result is that this organisational unit merely constitutes an official excuse, but not used in practice by system developers and managers. This excuse is both conscious and unconscious in the CoP of system developers and managers. The excuse is unconscious among some individuals who perceive that the official view of the communication mirrors true communication and contact, but some individuals see the official version of the communication as an illusion. The lack of contact has negative effect on the users work situation and the usability of the systems.

User Representatives as IT Professionals

The user representatives in OA are experts on the computer systems, not representing the “real” end-user. They are often super-users, support person and have a higher understanding of the possibilities and benefits that the system gives. Often they have become skilled IT people who work with testing of databases, UML flow diagrams of work and use cases. They participate in the system development projects at a distance or travel regularly to the main office. From the CoP theory one can call the user representatives boundary spanners, as they relate practice from diverse fields (as in [19]). Some of the user representatives in the studies are gatekeepers, whereas others are advisors or trust brokers [19]. The gatekeepers do not want other CoP to intrude into their CoP.

The user representatives worked together with the people from the IT department, and the development department. This group does not generally work with the user group, and sometimes does not even belong to that group. The work and the identity of this community need to change in the future for a successful establishment of UC. The community needs to have better contact with the user CoP and shift their identity towards collaboration and inclusion of the user community’s interests. However, it should be noted that research in the area of boundary spanners [19] conclude that this role often can be stressful and lead to burnout which might lead to competent people avoiding the uncomfortable feeling the role might imply [26].

Implications of Identity Construct on Preferred Methods

System developers in OA work with building computer systems. Their identity construct includes an interest in computers, and in computer programs. It should be noted that an interest in humans and human work is not central for this community. It is slightly different with the EPR support (OB) because their identity is originally with the core business, not IT. But their identity is slowly changing to be IT because of the users and managers CoP attitude and expectations. The usability project in OA introduced the concept that the system developers create tools for work that constitute the computerised work environment. This resulted in a gradual shift in the identity of practice in the community, and some system developers were enthusiastic at this new perspective on their work.

However, if usability methods are not regarded as useful by the system developers, the prospect for a successful deployment is severely undermined according to Riemenschneider, Hardgrave et al [27]. In this context one might wonder what a useful method is for the system developers. From the identity discussion above one could conclude that methods that contribute directly to computer systems design are perceived to be useful as this is the identity of the community. A shift in the construct of the joint enterprise, what we do, is necessary in this community and this shift has gradually entered the community in some of the organisations.

Managers in Relation to Planning and Executing

One interesting identity construct prevalent in the managers group, and in OA, is the distinction between thinking/analysing/planning/understanding versus doing/executing/producing. This is connected to the discussion above. The responsibility to think/analyse/understand lies with the managers at head office, whereas the local offices have the responsibility to execute and produce. This is described in several interviews and also seen, for example, in the strategic work at the head offices and the use of language, for example when the case handling work is described with the word “production”. Schön [16] discusses and is critical to this distinction, and he argues that it is a worldview prevalent in many parts of society and in the school system.

This distinction between planning and executing also affects the establishment of a UC perspective in several ways. To ask the local managers, and other members of staff in the local offices, to implement a system or an idea that they do not feel that they “own”, or have been involved in choosing or creating, might lead to a slow and possibly unsuccessful implementation, or worse, be met with resistance or ignored. Furthermore, if local managers do not feel that they are involved and thereby support the establishment of the UC perspective and the different methods proposed, then it is unlikely that they will be very eager or convincing when “selling” the idea to the end-users and other members of staff. Part of the path to success when establish UC might therefore be closely linked to identifying and addressing prevalent attitudes within the CoP, and inviting all managers and decision makers to a discussion about existing roles and responsibilities.

Conclusion

Our starting point is that a successful establishment of UC requires an understanding of the involved communities and how they influence the establishment of UC. We need to influence all levels in the organisation to be able to establish a UC perspective and usability work and methods. The implications on the establishment of a UC framework in organisations are that it is a process that effect, and must effect, all CoP within the organisation.

The studies show that it is not enough that the CoPs understand and respect a UC perspective. It is also necessary that they are willing to change their practice in order to gain the benefits that a UC perspective will give. Some necessary changes are: users need perceive IT systems as their responsibility and managers needs to see IT as a part of their core business and merely as a tool.

One problem we can see in OB is that the role that was constructed to be the link between the core business and IT department is not working sufficiently. One conclusion is that it is not enough to just implement this CoP the other CoPs must also trust and use their “services” which requests changes in work practices. This community can be seen as boundary spanners and future research into their role and identity construct would be interesting.

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