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The Vision and Challenges of the Clinical Portal

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To my loving husband and son

Abstract

The task of integrating a complete EPR in large, complex divisionalized organizations that rely on highly professional works such as doctors and nurses presents a particularly difficult challenge. Much more is needed to be known, particularly in terms of organizational factors. My theoretical motivation in conducting this research evolves upon the interests of studying perspectives on organizational change and the role of human agency in determining the performance of an in-house developed portal system during its gradual integration in a large and complex hospital in Norway. Boudreau and Robey (2005) discusses that "a human agency position suggests that human are relatively free to enact technologies on different ways". In this thesis, the transformation from why the participants choose not to use the system (inertia) develops a new practice that leads into an unofficial division of labour (reinvention). It is called improvised learning when the users have acquired knowledge of the clinical portal in ways that were neither planned nor anticipated (Orlikowski 2000). It is the transition between the enactment of inertia and reinvention. Engeström's (1999) basic structural model of activity represents the mutual relationship between the subject, its community and the object. These three given entities are mediated by several factors that will influence the development of an outcome. Based on this model, I was motivated to illustrate the when, why and how of the clinical portal's usage. To generate a deeper understanding of the activities evolving around the work practices of the clinical portals' users, I chose structural model of activity to analyze and define the processes which surround the clinical portal.

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Maricel Delos Santos Espeleta
Blindern, May 2006

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Chapter 1

Introduction

Information technology provides a vital element in the administration of clinical records today. Most healthcare institutions are adopting information system that provides more accurate and timely information regarding patient care. Health providers encounter the problem of making rigorous and fast decisions in situations where there is lack of information and also where there is an overload of information. The increasing demand for well-structured and accessible patient data, in combination with developments in computer science, sparked the interest in the development of a complete electronic record.

The complexity behind the development, implementation and integration of information technology in hospital industry has been an interesting scope in the field of information systems. This complexity also includes the analysis of different perspectives with regards to organizational behaviour on change.

At Rikshospitalet, the integration of the clinical portal is an example where people, their environment, work practices and habits, and organizational culture in relation with their use of integrated system create a new and unexpected organizational behaviour. This is the present case scenario of the hospital where old (practices, habits, culture) unites with new (advanced systems) creating an anticipated working environment and division of labour. The gradual implementation of the portal system also created tremendous impacts with its users. In this thesis, I will try to illustrate, define and discuss how the users engaged with the clinical portal and how they managed to cope up with the new system.

1.1 Area of Research

I have followed the gradual implementation of the clinical portal, the so called "complete Electronic Patient Record (EPR)", at Rikshospitalet. The portal is an "in-house" developed system inside the hospital and works as a part of the whole Clinical Systems All Managed (CSAM) project. The functionalities of the portal are delivered based on a process-oriented design. The functionality which is most frequently used by the medical staff is the first to be developed and distributed. The implementation of the clinical portal is a long-term evolving process. Different versions and new functionalities are delivered in a very short period of time. This means additional information to remember, latest functionalities to learn and particularly new work routines will be altered.

The Clinical Portal is not built from scratch. It is built based upon the complex, large and powerful installed base that already exists at Rikshospitalet. The installed base includes all different kinds of systems and their subsystems that the different actors were using before the Clinical Portal was born. It also includes work practices, different artefacts, communication between systems, and both formal and informal communication between people. One of the most important things about the Clinical Portal is that the users should be able to continue doing things the way it was done before, only easier and in detail. We can simply say that the portal is an improved, open and sophisticated version of the existing systems that comprises a new way of presenting thing that is different from before. This means that the Clinical Portal gives the user the same type of information that the user gets from all the different systems they used earlier but with enhanced functionality. By this it is easy to understand that the Clinical Portal has to be based on how the old systems and work practices worked and vice versa.

1.2 Motivation of the Study

The task of integrating a complete EPR in large, complex divisionalized organizations that rely on highly professional works such as doctors and nurses presents a particularly difficult challenge. Much more is needed to be known, particularly in terms of organizational factors. My theoretical motivation in conducting this research evolves upon the interests of studying perspectives on organizational change and the role of human agency in determining the performance of an in-house developed portal system during its gradual integration in a large and complex hospital in Norway. Boudreau and Robey (2005) discusses that "a human

agency position suggests that human are relatively free to enact technologies on different ways". In this thesis, the transformation from why the participants choose not to use the system (inertia) develops a new practice that leads into an unofficial division of labour (reinvention). It is called improvised learning when the users have acquired knowledge of the clinical portal in ways that were neither planned nor anticipated (Orlikowski 2000). It is the transition between the enactment of inertia and reinvention.

Engeström's (1999) basic structural model of activity represents the mutual relationship between the subject, its community and the object. These three given entities are mediated by several factors that will influence the development of an outcome. Based on this model, I was motivated to illustrate the when, why and how of the clinical portal's usage. To generate a deeper understanding of the activities evolving around the work practices of the clinical portals' users, I chose structural model of activity to analyze and define the processes which surround the clinical portal.

1.3 Problem Statement

The primary objectives of this thesis are to study the uptake, use and impact of the clinical portal. During my fieldwork I have studied how the users engaged with the Clinical Portal during the initial phases of its usage. By using the mixed-method approach, I have tried to answer the following research questions:

- What are the factors that make the participants choose to use or not use the clinical portal?

- How did the users manage to cope up with the clinical portal?

- What new work routines and practices evolved after the implementation of the clinical portal?

1.4 Limitations of the Study

The ongoing integration and implementation of the clinical portal produces several versions.

This thesis focuses only on Clinical Portal Version 1.4 because it was the edition in use when I did my data gathering. More about the functionalities of the clinical portal that I have studied can be found in chapter 3.

My focus group at the beginning of the research includes primarily of doctors, nurses and secretaries in the three wards at the Children's Clinic. After a series of interviews and observations, however, secretaries were excluded because they were not using the clinical portal during the course of my study.

1.5 Thesis Structure

The roadmap for this thesis is as follows: in the theoretical section of chapter two, I will enumerate and discuss three different leading theories that are used in Information Systems. These theories deal with human perspective and IT-usage. It also involves their relationship and humans and information technology affect one another. This discussion will first introduce the Technological Acceptance Model (TAM) of Davis and Venkatesh (2000). It will then be followed by the historical background of the Temporal Theory of Human Agency by Emirbayer and Mische (1998). The discussion of human agency perspective according to Robey and Boudreau (2005), and Cousins (2004) will follow. Lastly, I will discuss the Activity Theory by Engeström (1999), Bannon (1997) and Kuuti (1991).

Thereafter in chapter three, I will present the background and motivation behind the clinical portal. It will be followed by a discussion about the development of the portal. Technical architecture and structure of the system will also be a part of this chapter. Research methodologies will be provided in chapter four. This chapter is concerned with the elements of inquiry, approaches to research and design processes of research. I will begin my discussion by presenting my case setting on where I did my fieldwork research. It will then be followed by enumeration and discussion of the three alternative strategies of inquiry; the quantitative, qualitative and mixed-methods.

Chapter five will cover my empirical findings. I will thoroughly present the information that I have gathered from both quantitative and qualitative methods that I have used. I will also make use of a chart as a graphical representation of my quantitative data. Subsequently in

chapter six, I will provide an analysis between my empirical findings and theoretical lens that I have chosen. This chapter will present the linkage between the gathered information from the area of my research and the theories that I have discussed. Finally, the last chapter will provide my concluding remarks.

Chapter 2 Theoretical Framework

Introduction

For the past decades, there has been an argument about prior views on technology. There are two important aspects of technology concept according to Orlikowski (1992), the scope and the role. The former deals with the question "what is defined as comprising technology", while the latter deals with "how is the interaction between technology and organization defined." She also introduced two premises of a structurational model of technology by using Gidden's framework of structures[1]. She enumerated them as duality of technology and concept of interpretive flexibility. Duality of technology means that technology is created and changed by human action yet also used by humans to accomplish some action. The concept of interpretive flexibility can be defined as the degree to which users of technology are engaged on its constitution during development or use. It is a feature of the relationship between humans and technology and consequently is influenced by characteristics of the material artefact, characteristics of the human agents, and characteristics of the context.

The focus of my thesis is based on the role aspect of technology, the interaction between technology and organization which is characterized by the role of human agency. I will use a human agency perspective in finding out how the users of the clinical portal enact on

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[1] Structuration Theory recognizes that human actions are enabled and constrained by structures, yet that the structures are the result of previous actions. It is proposed by Anthony Giddens (1984) in *The Constitution of Societ* which attempts to reconcile theoretical dichotomies of social systems such as agency/structure, subjective/objective, and micro/macro perspectives and consider individuals as either acted upon (as elements within a structural context) or as autonomous agents.

information technology as a part of their work situation. I will also use the Activity Theory to analyze the relationship between the human agent (users of the portal) and its community (organization), and object with its mediating factors to produce an outcome. The two theories are very relevant to my thesis because both of them focuses and deals with users as a human agent in the human agency perspective and as a subject in the activity theory.

In this chapter, I will present the human agency perspective and activity theory as my theoretical lens. This perspective will guide me with the analysis of my empirical material. I will first introduce the Technological Acceptance Model (TAM) of Davis and Venkatesh (2000) and explain why this model is not suitable for my thesis on section 2.1. It will be followed by the historical background of the temporal theory human agency by Emirbayer and Mische (1998) on section 2.2.The discussion of human agency perspective (Robey and Boudreau 2005, Cousins 2004) on section 2.3. In section 2.4, I will discuss the activity theory (Engeström 1999, Bannon 1997 and Kuuti 1991. Lastly, I will provide an explanation on my choice of theory in section 2.5.

2.1 Technology Acceptance Model

Technology Acceptance Model, or the co-called TAM, is one of the several theoretical models that are employed to study user acceptance and usage behaviour of emerging information technologies (Venkatesh 2000, Davis 1989[2]). Several researchers have replicated Davis's' study to provide empirical evidence on the relationships that exist between usefulness, ease of use and system use. The origin of TAM was based on the model of the Theory of Reasoned Action (TRA). This model (see Figure 1)was proposed by Fishbein and Ajzen[3] to explain and predict the behaviours of people in a specific situation.

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[2] Davis, Fred D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." MIS Quarterly **13**(3) 319-339.

[3] Fishbein, M. & Ajzen, I. (1980). "Understanding attitudes and predicting social behaviour". Prentice-Hall, Englewood Cliffs, NJ.
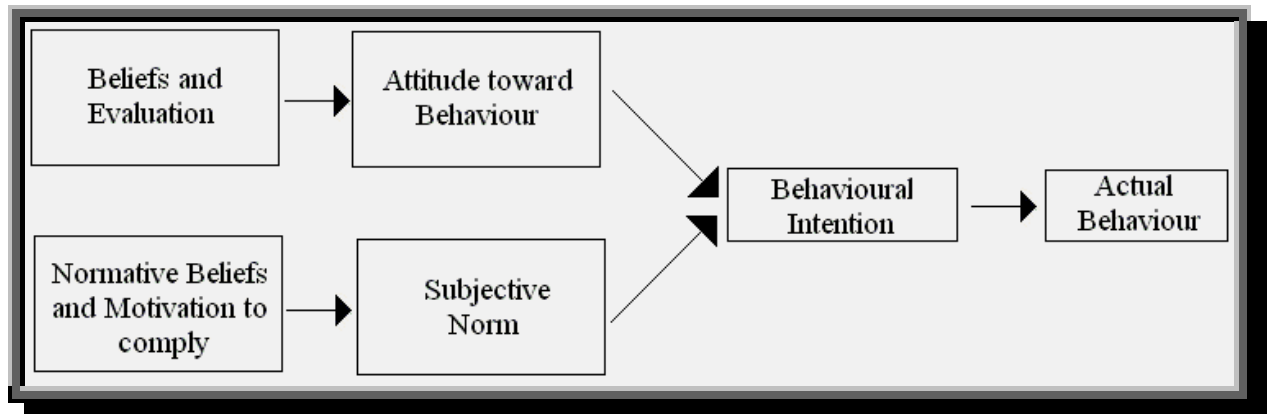
Figure 1: Theory of Reasoned Action

The *Theory of Reasoned Action* (TRA) was developed in 1967. The theory was revised and expanded by Ajzen and Fishbein (1980) during the early 1970's. By 1980 the theory was used to study human behaviour and develop appropriate interventions. Problems arose with the TRA when the theory was applied to behaviours that were not fully under volitional control. The theory took into account that all behaviour was not under volitional control. Therefore in 1985, the *Theory of Planned Behaviour* (TPB) (see Figure 2) was added to the existing model of reasoned action to address the inadequacies that Ajzen[4] (1985) had identified through his research using the TRA. The main difference between TRA and TPB is the addition of a third determinant of behavioural intention, known as the *perceived behavioural control* (PBC). The PBC implies that a person's motivation is influenced by how complex the behaviours are perceived to be, as well as the perception of how successfully the individual can, or cannot, perform the activity. Actual behavioural control refers to the extent to which a person has the skills, resources, and other prerequisites needed to perform a given behaviour. Successful performance of the behaviour depends not only on a favourable intention but also on a sufficient level of behavioural control.

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[4] Ajzen, I. (1985). "From intentions to actions: A theory of planned behaviour." J.Kuhl, J.Beckmann, eds. Action Control: From Cognition to Behaviour. Springer Verlag, NewYork, 11-39
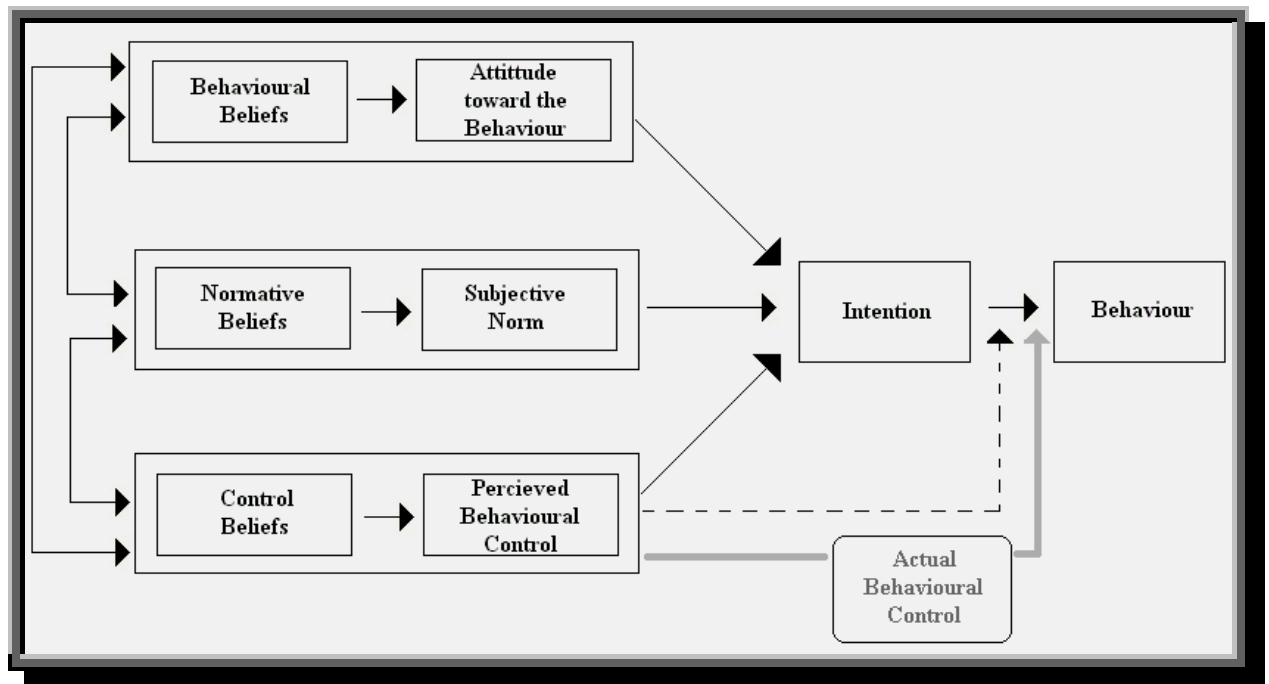
Figure 2: Theory of Planned Behaviour

Technology Acceptance Model (TAM) incorporates perceived ease of use acceptance and usage. According to Venkatesh (2000), TAM (see Figure 3) also assumes that perceived usefulness will be influenced by perceived ease of use because, other things being equal, the easier a technology is to use, the more useful it can be. The model suggests that when users are presented with a new information system like the clinical portal, numerous factors influence their decision about how and when they will use it.
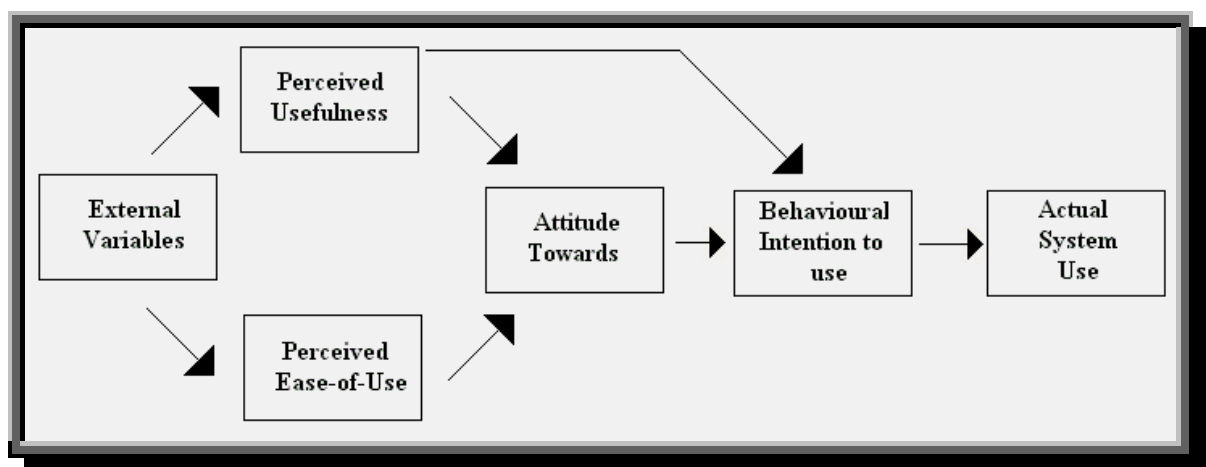
Figure 3: Technology Acceptance Model (1)

The original version of TAM is composed of five components. It can be enumerated as Perceived Usefulness (PU), Perceived Ease-Of-Use (PEOU), Attitude Towards (AT), Behavioural Intention to use (BI) and actual use (U). As a result, ten potential relations are built for examination. This relation includes PEOU-PU, PU-AT, PEOU-AT, OU-BI, PEOU-AT, PU-BI, PEOU-BI, AT-BI, AT-U, BI-U, PEOU-U and PU-U.

TAM postulates that external variables intervene indirectly by influencing PEOU and PU. External variables offers a better understanding of what influences PU and PEOU and their presence guide the actions required to influence a greater use. Examples of these external varibales are:

- Situational involvement
- Prior use/prior similar experiences/tool experience
- Argument of change
- Participation in training/transitional support
- Job relevance
- Output quality

Perceived usefulness (PU), as defined by Davis (1985), is "the degree to which a person believes that using a particular system would enhance his or her job performance. People tend to use and not to use an application to the extent they believe it will help them perform thei better job." This explains that user's perception that technology will improve their work performance because the technology itself became very useful in performing their job tasks. Six items measurement tool was proposed by Davis in his study of PU. Out of these measurements, only four are commonly used based on the findings of Legris, Ingham and Collerette (2003). Items are enumerated as followed:

- Using (application) increases my productivity
- Using (application) increases my job performance
- Using (application) enhances my productivity
- Using (application) enhances my effectiveness on the job

The *Perceived ease-of-use* (PEOU) according to Davis deals with "the degree to which a person believes that using a particular system would be free from effort. Users believe that a given an application is useful, but they may at the same time, believe that technology is too

hard to use and that the performance benefits of usage are outweighed by the effort of using the application." It elaborates the user's perception of the amount of effort required to utilize the system, to the extent in which a user believes that using a certain technology will be effortless.   Legris and et al. observed that four out of six items are more frequently used based on the tools for measuring PEOU by Davis. These items are notably:

- Learning to operate (the application) is easy to me
- I find it easy to get (the application) to do what I want to do
- The (application) is rigid and inflexible to interact with
- I find the (application) easy to use

Legris and et al. have also testes the extended version of TAM, called TAM2 (see Figure 4), used by Venkatesh and Moris[5]. The TAM2 model includes the notion of time in the analysis of factors that influence use. This model reflects three new interrelated social forces that individuals face in adopting or rejecting a new system. They are identified as subjective norm, voluntariness and image. *Subjective norm* can be defined as the technology user's belief on whether they should or should not perform the behaviour to accept technology. *Voluntariness* is the context in which the users are willing to accept the technology. It is a voluntary act and there are no obligations to the user on using technology. *Image* can be described as the degree to which accepting new technology is perceived to enhance and affect the person's status in one's social system.

Internalization, identification and compliance are three additional theoretical mechanisms by which the subjective norm can influence intention indirectly through perceived usefulness. *Internalization* can be explain when "somebody tells you to do something but you do it because you think this person is like you, or you believe he or she thinks like you." This is usual in peer situations. *Identification* is when "you do something because you are trying to gain favours from someone or trying to build a certain image by doing it." *Compliance* can be described in a situation when "an individual simply yields to some other influence. Your boss says do it and you do it because you have to do it (Taubes 2004[6]).

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[5] Venkatesh, V. and Morris, M. G. (2000) "Why do not men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behaviour. MIS Quarterly **24**(1), 115-139.

[6] Taubes, G. (2004). "An interview with Viswanath Venkatesh, Ph.D." Retrieved April 26, 2006 from http://www.in-cites.com/scientists/ViswanathVenkatesh.html

The limitations of TAM were openly discussed by Legris and et al. on their paper. They underlined three limits of TAM. First they have mentioned the involvement of the students in performing the studies. They suggested that it could be better if it were performed in a business environment. Second was the type of application used. Most of the studies made use of office automation software or systems development applications. Examining the introduction of business process application as an example would gain better results. The limitation regarding self-reported use was mentioned. According to Legris and et al, what TAM actually measures is the variance in self reported use not the systems use. The most important limitation of the TAM is in considering Information Systems to be an independent issue in organizational dynamics. The TAM does not include organizational and social factors that could really affect the usage of technology. Organizational dynamics have a strong impact on the user's behaviour. Hofman and Orlikowski[7] acknowledge that the effectiveness of any change process relies on the interdependence between the technology, the organizational context, and the change model used to manage the change. It will be difficult for the TAM to handle such things because of its limitation to include organizational and social factors in its scope.
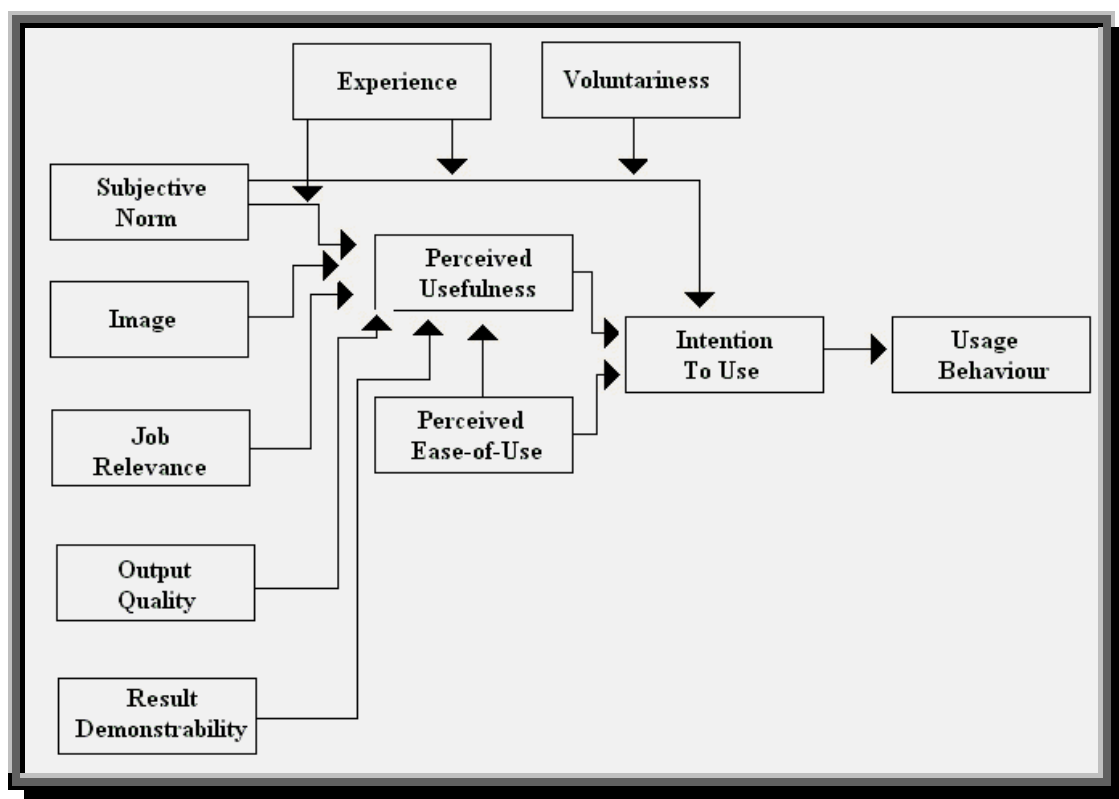
Figure 4: Technology Acceptance Model (2)

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[7] Orlikowski, W. J. and Hofman, J. D. (1997). "An improvisational model for change management: the case of groupware technologies, Sloan Management Review Winter. 11-27.

There are other theories that deal with user's perspective and IT-usage. The next subsections will discuss two leading theories which focus on the relationship between the users and information technology.

2.2 A Temporal Theory of Human Agency

Mustafa Emirbayer and Anne Mische (1998) conceptualize agency as "a temporally embedded process of social engagement, informed by the past, in its *iterational* or habitual aspect but also oriented towards the future, as a *projective* capacity to imagine alternative possibilities, and toward the present, as a *practical-evaluative* capacity to contextualize past habits and future projects within the contingencies of the moment." Thereby defining human agency as " temporally constructed engagement by actors of different structural environments- the temporal relational contexts of action- which through the interplay of habit, imagination and judgement, both reproduces and transforms those structures in interactive response to the problems posed by changing historical situations."

Human agency is multi-dimensional because of its reflexivity and intersubjectivity (Cousins 2004). A human agency occurs in a reflexive process considering the actors encountering problems tend to relate their past, present and future when reflecting on their situation at hand. Intersubjectivity on the other hand, recognizes that actors may also interact with other person, places, meanings and events in their surroundings in context of the past, present and future. Human agency is reproductive and transformative in a given situation as such reflexivity and intersubjectivity may result in repeated actions from the past or the reinvention and creation of new practices (Cousins 2004).

Three analytic dimensions of human agency, based on Emirbayers' and Misches' (1998) conceptualization, are *iterational*, *projective* and *practical-evaluative*. The three enumerated elements are multi-dimensional and one or more of these analytic elements influences the way in which actors relate to the other two elements. **Iterational** as mentioned by Emirbayer and Mische, based on Ortners'[8] (1984) viewpoint can be also be called as "theories of practice". The *schematization* of social experience lies in this dimension. It engages "how actors

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[8] Ortner, Sherry B. (1984). "Theory in Anthropology since the Sixties." <u>Comparative Studies in Society and History</u> **26**(1): 126-166.

selectively recognize, locate and implement schemas[9] in their ongoing and situated transactions" (Emirbayer and Mische 1998, Cousins 2004). It is the restrictive renewal by actors of past patterns of thought and action, which is habitually incorporated in practical activity; thus gives stability and order to social universe and helps sustain identities, interactions, and institutions over time. A summary of conceptual elements within the iterational dimension based on Cousins' work is shown on Table 1.

COMPONENT	DESCRIPTION
Selective Attention	Actors can only focus on small part of reality
Recognition of types	Actors may identify typical patterns of experience and predict their recurrence in the future.
Categorical Location	Actors compose matrices of socially recognized categories of identity and value of past experiences. In doing so, they only identify similarities between past and present types of experiences; they also locate these typifications in relation to other persons, contexts and events.

Table 1: Components of Iterational Dimension

The **projective** dimension relates to the future. According to Emirbayer and Mische (1998), this dimension "encompasses the imaginative generation by actors of possible future trajectories of action, in which received structures of thought and action may be creatively reconfigured in relation to actors' hopes, fears and desires for the future." It simplifies that actors do not simply repeats their past routines but also became inventors. They construct, innovate and invent new possibilities and alternate responses to the problems being confronted. While the focus if iterational dimension is schematization, projective dimension concentrates on *hypothesization* of experiences. A summary of conceptual elements within the projective dimension based on Cousins' work is shown on Table 2.

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[9] Schemas are corporeal, effective and cognitive patterns. They consist in the interpretation of mental categories, embodied practices and social organization.

COMPONENT	DESCRIPTION
Narrative Construction	Based on the assumption that all social groups possess repertoires of stories that provides maps of action and can be used to experimentally posit new resolutions to emerging problems.
Symbolic Recomposition	Actors take elements of meaning apart in order to bring them back together again in new and unexpected combinations.
Hypothetical Resolution	Actors proposed to resolutions to respond to moral, practical and emotional concerns arising from lived conflicts. Proposed resolutions may attempt to resolve several conflicts simultaneously and to incorporate different courses of action.
Anticipatory Identification	Actors draw upon past experience in order to clarify motives, goals and intentions so as to locate possible constraints within the future and to identify appropriate courses of action.
Experimental Enactment	Hypothetical resolutions may be put to the test in tentative or exploratory social interactions. Individuals try out possible identities without committing themselves to full responsibilities involved.

Table 2: Components of Projective Dimension

The primary locus of **practical-evaluative** dimension deals with *contextualization* of the actors' capacity to make practical and normative between different attainable trajectories of action in accordance with emerging demands, difficulties and ambiguities of presently of new and unexpected situations. Unreflective routine dispositions and newly imagined projects must be coordinated to present situation. A summary of conceptual elements within the practical-evaluative dimension based on Cousins' work is shown on Table 3.

The primary limitation of the temporal theory of development can be traced back to its early stage. The theory has not yet been subject to much empirical testing. There is not much empirical work available to test this theory which could supposedly further build the theory. And also an assessment of the practical-evaluative dimension shows the failure of the theory to address sufficiently levels of analysis, particularly macro and micro levels. Although these two levels, as Emirbayer and Mische claimed, can be used in this theory, there is little evidence that can support on how this can be achieved.

COMPONENT	DESCRIPTION
Problematization	Recognizes that the situation at hand is ambiguous, unsettled or unresolved and something must be done to render the given situation unproblematic, settled and resolved.
characterization	Problematic circumstances at hand must be related to principles, schemas or typifications from past experiences.
deliberation	Involves in considering how best to respond to situational contingencies in the light of broader goals and projects.
Decision	The resolution to act here and now in a particular way. A highly discrete and circumscribed choice is made.
Execution	Involves in responding at the right times with reference to the right objects toward the right people with the right aim and in the right way.

Table 3: Components of Practical-evaluative Element

A temporal theory of human agency is summarized on Table 4.

DIMENSION	FOCUS	COMPONENTS
Iterational	Schematization	Selective Attention Recognition of types Categorical Location
Projective	Hypothesization	Narrative Construction Symbolic Recomposition Hypothetical Resolution Anticipatory Identification Experimental Enactment

Practical-evaluative	Contextualization	Problematization
		    characterization
		    deliberation
		Decision
		Execution

Table 4: Summary of a Theory of Temporal Human Agency

2.3 Human Agency Perspective

A human agency position suggests that humans are relatively free to enact technologies in multiple ways. The choice is up to them on how they are going to use the technology. It can

either be individually or collectively in a group. While the users are enacting upon the technology, their performance produce novel and unanticipated consequences, and sometimes resulting into users' improvisational behaviour. As users enact on technologies in correspondence to their knowledge, obligation and needs, significant organizational changes may result over time. Recently, studies involving human agency and use of technology in organizations tend to drift away from technological determinism towards a more balance arguments on both agency and technological constraints.

An agency perspective on information technology brings up significant issues regarding technologically-enabled organizational change. The paper of Boudreau and Robey in their study of the implementation of an Enterprise Resource Planning (ERP) in a government institution focuses on two important issues that arise when applying an agency perspective to the study of information technologies in organizations. First and foremost, they discussed how different technologies constrain user enactments. They argued that as technological artefacts become more integrated into larger systems, a narrower range of enactment may be expected from users. The second issue is focused on how and why enactments of information technologies change over time. Different issues and possibilities cause this transformation. Some have used change and stability paradoxically, others have argued that agency and structure simultaneously influence work role transitions. As a result of Boudreau and Robey's study, the authors have enumerated different kinds of enactments materialized in the implementation of the system to the users.

They called the two kinds of enactments as inertia and reinvention. The transition between enactments of inertia and reinvention is called improvised learning. *Inertia* can be called as the initial stage in the process of implementation. It represents the user's ability to avoid direct interaction with the newly implemented technology. The users' expectation about the new system was very high and when they began to use it, their expectations were replaced by frustrations. At first, the users expected that the system would lead their way in leaving the "pre-computer-age process" behind. Simultaneously, they were also worried to leave their legacy system. The system which they have been familiar with gave them comfort and satisfaction. Frustrations arose when they attempted t use the new system. They were very shocked about the complexity of the new system. There have been series of difficulties over the users work practices. Almost everything in their work space was altered. They avoided

using the system as much and as possible. The situation of one user can instantly affect the situations of the others.

Improvised learning is the transitional phase between the inertia and reinvention. The outcome of the situation has never been planned. It emerges out of the different circumstances depending on what the users have been doing in the present situation. Improvised learning is very different from formal training. To prepare the organizational members for the new system, formal training sessions were conducted prior to the rollout date. There has been a sequence of trainings of different forms such as hands-on tutorial and CD-ROM demonstration. The courses were optional and voluntary. The users were not forced to attend the training because the management feared that forcing the users might only cause resistance. That was the thing that they didn't want to happen. Their primary goal was to make the users embrace the system not because they were told to do so, but because the users wanted to. Unexpectedly, only a few attended the training and much to the disappointment of the management. The worse for them was yet to come. Due to lack of training for the users, those who were responsible for maintaining the use of the system had to improvise learning in order for the users to leave the legacy system. New rules, regulations, policies and work practices arose influencing the users to gain their confidence in using the system. Improvised learning according to Boudreau and Robey, is an important process which facilitates the transition from one enactment of technology to another. Learning was achieved through the improvised contributions of multiple actors in the organization's social networks.

Reinvention reflects on the new experiences of the users as they begin to use the system. It represents a response in which users worked around the technology's limitations and their own limited knowledge, thereby producing unintended patterns of technology use. During the initial state of the implementation, the user's expectation was focused on work efficiency. As I have mentioned in discussion about inertia, those expectations were tempered by the realization that much additional work would be required which was the opposite of what they were expecting. Users begun to "tweaked the system" to make it respond to their needs. Through tweakening, also called as "workarounds", the users made the system work in favour for them, so that they could understand and control the system better. They have also used "workarounds" in order to compensate for what they considered as deficiencies within the system. Tweakening was also devised to correspond for user's ignorance of the system's

features. These reinventions allowed the users to triumph over their ignorance of the system and to compensate for its perceived limitations.

The authors have successfully discussed the use of human agency perspective to explain the use and consequences of information technologies in organizations. They used Orlikowsli's arguments on technology and Emirbayer and Mische's temporal view on the analysis of their study. They concluded improvised learning as one explanation for changes in technology enactments over time.

2.4 Activity Theory

The roots of activity theory can be traced back in the 19th century. It was mainly a result of a larger effort to develop a new psychology based on Marxist philosophy, an effort which started soon after the Russian Revolution of 1917 (Bannon 1997). It originated in the former Soviet Union as a part of cultural historical school of psychology founded by group revolutionary Russian psychologists in 1920's and 1930's. It was initiated by Lev Semyonovich Vygotsky[10] and his student Alexei Nikolaevich Leont'ev[11]. According to Vygotsky, a human individual reacts merely directly to the environment. The relation between the human agent and the object is mediated by cultural means or artefacts such as signs and tools. Further development of Leont'ev stressed that activity is socially mediated. Its consciousness and meaning are always formed in joint collective activity. Out of those meanings and understandings, Engeström (1999) has established a basic structural model of activity.

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[10] Lev Semyonovich Vygotsky (1896-1934) was a Soviet developmental psychologist whose work received widespread recognition in the Western world around the 1960s. According to Vygotsky, the intellectual development of children is a function of human communities, rather than of individuals. His contributions are widely respected and influential within the fields of developmental psychology, education, and child development.

[11] Alexei Nikolaevich Leont'ev (1903-1979) collaborated on the development of a Marxist psychology as a response to behaviourism and the focus on the stimulus-response mechanism as explanation for human behaviour. For Leont'ev, "activity" consisted of those processes "that realise a person's actual life in the objective world by which he is surrounded, his social being in all the richness and variety of its forms." He developed the activity theory on its fullest form.
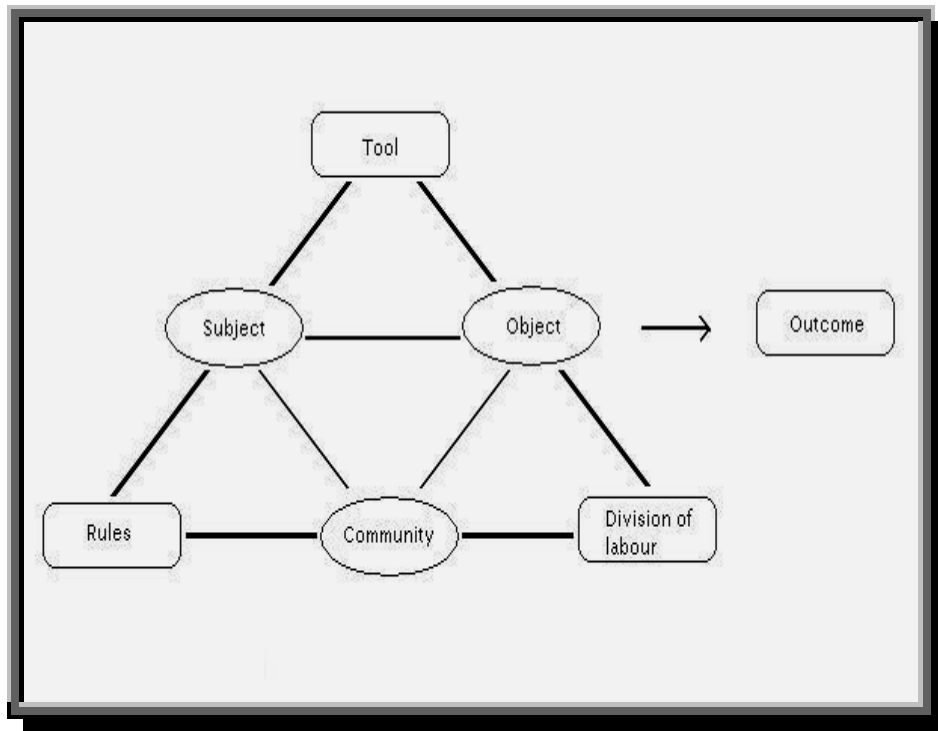
Figure 5: Basic Structure of an Activity

As Bannon added, the schematic graphic triangle is a tool for creating a dynamic picture of an activity system while exploring specific activities, mediating artefacts, rules, the division of labour and other dimensions that constitute the system as a whole. There are three mutual relationships that can be found in this model. The relationship between the subject and the object is mediated by artefacts or tools. The subject and its community is mediated by rules and lastly, between the object and its community is being mediated by the division of labour.

Activity theory according to Kuuti (1991) considered the concept of activity as a basic unit of analysis. It is a philosophical framework of human praxis as developmental process with both individual and social levels interlinked (Kuuti 1991).Its a very general framework for the conceptualization of the human activities that provides a different formulation to the human information processing as to how people learn and society evolves from a materialistic standpoint, based on the concept of human activity as the fundamental unit of analysis, added Bannon. But how could we define an activity?

An activity is a concept of connoting the function of the individual in his interaction with the surroundings. The activity of man has a social complexion and is determined by social conditions of life. Division of labour causes a differentiation between theoretical and practical forms of activity of man (Dictionary of Philosophy). A much shorter version of the meaning of activity derived from Webster's dictionary indicates that activity is the quality or state of being active. Being active means producing or involving action or movement. An action denotes the manner or method of performing. An activity is not seen as an action without someone performing it. I therefore constructed this equation:

Action + Performance = Activity.

Activity theory has five principles and can be enumerated as follows:

- *Object-oriented*

    Human activities are always directed towards a material or ideal object satisfying a need. An activity can be distinguished according to their objects. The existence of these activities is motivated by transformation of the objects towards a desired outcome (Kuutti 1991). Actions are goal directed process that must be undertaken to fulfil the object.

- *Hierarchical structure of activity*

    This structure is based on the Leont'ev's version of Activity Theory. It is often associated with a three-level hierarchical scheme.
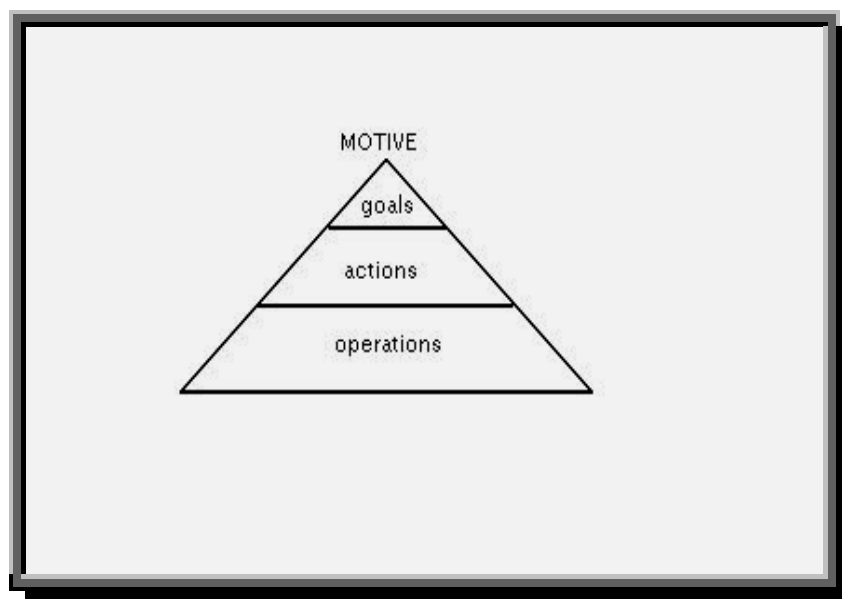
Figure 6: Three-level Hierarchical Scheme

Bannon explains that motives, which are activity-driven, are performed through certain actions which are directed towards a certain goal or goals and are implemented through an operation or series of operations. Let us go back to the equation that I suggested, *action + performance = activity*. I am going to rearrange my equation such as

$$\textbf{\textit{Goal (activity + performance) = motive}}$$

Actions, which are performed during such operations, are oriented towards goals which are usually functionally subordinated by other goals which may be subordinated by still other goals and so forth, until we reach the top-level goal which is not subordinated by any other goal. This top-level goal is the object of a whole activity which is designated as "motive".

- *Internalization/Externalization*

Activities are double-sided in nature. There are both an external and an internal side to every activity. There is a reciprocal relationship between the subject and the object of an activity. On one hand, the subject is transforming the object while on the other hand; the properties of the object penetrate in the subject and transform him/her (Kuuti 1991). There are mutual transformation between internalization and externalization. It is the general context of activity that determines when and why external activities become internal and vice versa.

- *Mediation*

According to Kuuti, mediation of work by artefacts is a fundamental feature of work activities, The mediating characteristics of an activity is therefore crystallized (or objectified) in to these artefacts and through use, the artefacts are continuously modified and shard to meet the evolving human needs (Bardam 1998). Artefacts both include cognitive (ideal) and materials. There is no differentiation between them. Orientation report, verbally or written, is considered to be a tool that mediate between subject and object.

- *Development*

The activities and its elements are always on the move. There is a continuous development evolving around the activities which is not to be considered as linear or straight forwarded but uneven and discontinuous. The analysis of its development, guided by the knowledge on forces and contradictions that occur during the progress, can serve as guidance throughout the evolutionary process.

2.5 The Choice of Theory

I mentioned the limitations of using TAM as a theoretical lens in sub-section 2.1. TAM does not include organizational and social factors in IT-usage. Since the focus of my thesis is based on organizational structure and social dynamics, it is irrelevant to use this theory. Even though there is not much empirical work available to test the theory on human agency, I therefore chose the Human Agency perspective over TAM. I know that the human agency perspective will provide a deeper understanding in terms of organizational change. I also chose to use the well-known and well-used activity theory together with the human agency. I will use the activity theory to focus at the relationships between the users and IT. The theory also allows a narrowed perspective by focusing at a single relation within a collective action.

Chapter 3 Clinical Portal

Introduction

Health providers face the problem of trying to make decisions in situations where there is insufficient information and also where there is too much of information found from different sources. The perfect solution to this problem is the realization of the so-called complete EPR, the clinical portal. The IT-department of Rikshospitalet is continuously developing a portal solution to sum up all the information needed by the medical personnel in one user-interface. The portal will provide the users a complete overview of the patients' history. It will include functionalities such as patient planning, electronic patient journal, ordering laboratory tests and receiving of the laboratory results. The development of such solution will try to solve the increasing problem in the archive which targets a visible objective of becoming a paperless hospital in the year 2007.

First and foremost I will present the background and motivation behind the creation of the clinical portal in section 3.1. Then in section3.2, the portals uses and functionalities will be discussed. The technical architecture and channels of the system will be enumerated and explained on subsection 3.2.1 and 3.2.2. Finally, the clinical portal version 1.4 will be discussed on subsection 3.2.3.

3.1 Background and Motivation

The hospital turned to the help of automating its medical information in 1996. A collaborative project was established between 5 regional hospitals in Norway. The Medakis project aimed to develop an interdisciplinary Electronic Patient Record (EPR) in order to cut costs, improve efficiency and enhance the continuity of healthcare. Rikshospitalet was included as one of the

five regional university hospital in Norway that tried to implement the EPR. By the year 1997, the first deliverable version of the EPR system was delivered and tested. Although with all uncertainties and compromises, the DocuLive EPR[12] serves as a tool to easily help medical employees with the patient flow of information. The popularity of its usage has increased after the Health Personnel Act in July 2, 1999 (Ministry of Health) was imposed in Norway. It was stated that all related patient information must be recorded. The documentation became a duty, which obliged all medical health personnel to maintain a recorded copy of the patients' information (Hellesø and Rulland 2001).

Rikshospitalet have 16 medical departments and 11 administrative departments (Rikshospitalet). All these departments are autonomous and make use of IT to support their work practices. Some of the departments have their own vendors for their own system. They have contacted these vendors on their own to make their system developed for their specific needs. This is a common scenario that one could view from the hospital due to a high level of research and specialization from one department to the other (Berge 2004).

The hospital has a total of 164 systems which runs independently and composes of 1 167 applications (Lærum 2005; Storjord 2005). It cannot be solved by putting everything into a single system. It is complex and requires too many compromises, and no single vendor can offer everything that the hospital needs.

Problems in the archive are also increasing. Paper-based journal records could be found anywhere, even in the hallways and chairs of the archive department (Boulus 2004). They are spending millions of Norwegian Crowns renting warehouses to use as storage places for the records (Lærum 2005). This is the point where the administration decided to put an end to the problems. They have to find out a solution in order to hinder the growing crisis that the hospital is experiencing. Then, they came up with a mission[j]:

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[12] DocuLive EPR: It is a text-editor based Electronic Patient Record which supports diverse types of notes and different modules such as ordering of laboratory tests, writing prescriptions and nurses' documentation. It was integrated at Rikshospitalet in 1996 in collaboration with the Medakis Project.

"Rikshospitalet shall by 2007 have a complete electronic record, the paper record is history, and we are at the cutting edge nationally and internationally when it comes to the use of IT in hospitals"

How this would happen was a challenge to the IT department. They have to take into considerations some of the important aspects of the present situation in the hospital. Some of them are isolation, fragmentation, redundancy, unstable environment, information overload, and lack of cooperation. Besides that many have developed their own initiative with little or no assistance from the IT department, and without considering any strategy.

To fully digitalize the record, which includes patient-related documents, Rikshospitalet started scanning the documents from the paper based journal to be included in the DocuLive EPR. This kind of strategy covers 4 faces of scanning concept. Face 1 is related to external referral letters, face 2 with internal documentations, face 3 with documents during patient's stay at the hospital and the 4th face include old documents on the paper-based journal. This scanning strategy was formed in collaboration between the IT-department and the patient journal archive to help the problem of lessening paper documents on the hospital. On March 15, 2005, the DocuLive EPR at Rikshospitalet was pronounced as a legal and judicial patient record by the state of Norway (Hansen and Larsen 2005).

3.2 Clinical Portal

The IT department came up with a latest strategy to build a new infrastructure integrated from their very powerful installed base. They have found an infrastructure, a framework, and a methodology decided and introduced "top down", which among other features enables their users to specify and get the functionality and services they need to do an optional job, while at the same time catering for important common needs as security, management support, research and education as well. It will be an advanced "toolbox" enabling an evolutionary approach, focusing on clinical practice, workflows, quality and efficiency by bringing the users *what* they need, *when* they need it and *where* they need it presented on their terms, may they be doctors, nurses, managers, patients, microbiologists etc (Berge 2004).

Rikshospitalet has developed a framework. CSAM emerged as a strategy to put things in their proper places. CSAM, widely known as Clinical Systems All Managed, is developed at

Rikshospitalet, owned by CSAM AS which is 100% owned by Medinnova by which is entirely owned by Rikshospitalet (Berge 2005). It is an in-house development.

There are five existing components of the CSAM and these are the following:

- Clinical Portal
- Enterprise Management Methodology
- Integration and communication tools and methodology
- Security and Assurance Framework
- Methodology for Benefit Realization

The **clinical portal** is a web portal solution that sums up all the information of the patient in one window. It gathers and compresses information from different patient related systems in one simple interface with the help of an Internet solution. **Tools for control and management** include establishing and operating a reliable and secure infrastructure, building a modern operating centre and scalable model to fit local, regional and national needs. **Integration and communication tools and methodology** encompasses the use of portal to access clinical systems, tools for integrating and certifying clinical systems in a pre-defined architecture, and tools for securing communication of sensitive health information. Tools for authenticating and authorizing user based on role and context is covered by **security and assurance framework**. It also deals with scalability to apply to different organizational levels locally and nationally. Tools for analyzing clinical processes and establishing a program for reaping benefits through process development based on more efficient information handling is taken by **methodology for benefit realization.**

3.2.1 Technical Architecture
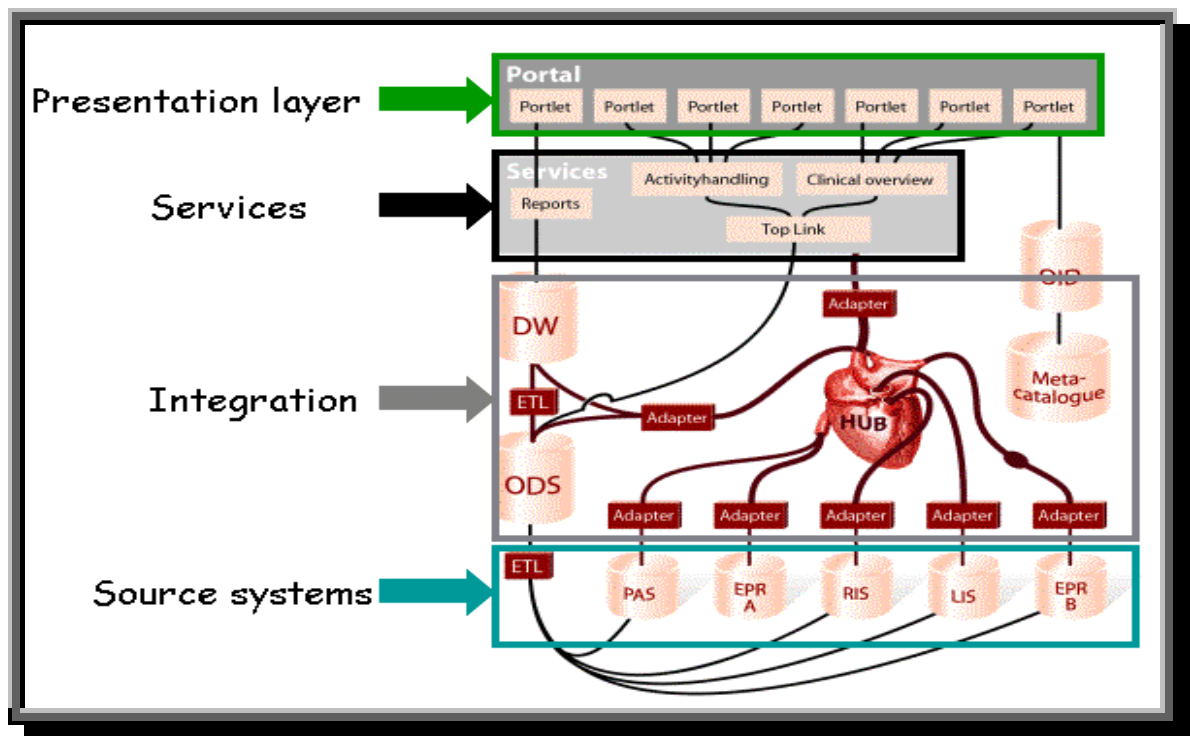
Figure 7: Technical Architecture of the Clinical Portal

Figure 7 illustrates the technical architecture of the clinical portal. The upper level consists of different portlets. Here, the users can access different types of information system and views the information on a single interface called as the **presentation layer**. These channels have different access to the system. Although the Clinical Portal produces a standard interface, it handles the users differently based on their respective positions or professions, and what kind of information they want from the system. The interface that a doctor will see when using the Clinical portal, and the way the system is getting the requested information, may be different from what a secretary gets when using the system.

Service layer is on the next lever. It contains all diverse services the system has to offer. Examples of services can be different kinds of reports, patient information or different kinds of activity information at the hospital.

Between the service and source system layer is the **integration layer**. This is known as the heart of the clinical portal. The hub gathers all the information needed from highly dissimilar

information systems and temporarily stores this information at the Operational Data Storage. The adaptors make it possible to communicate with the subsystems through a hub. The

At the bottom of the figure is the **source systems layer**. We can find all the existing information systems that are presently included on the Clinical Portal. An example of such system is the Patient Administrative System (PAS), which was implemented in 1975 (Berge 2004; Rygh 2005).

The introduction of the portal could save the hospital up to 400 million NOK every year in costs (Brunn 2005). Once all the records are digitised, the hospital will be able to compare productivity in different departments and examine workflows to streamline operations.
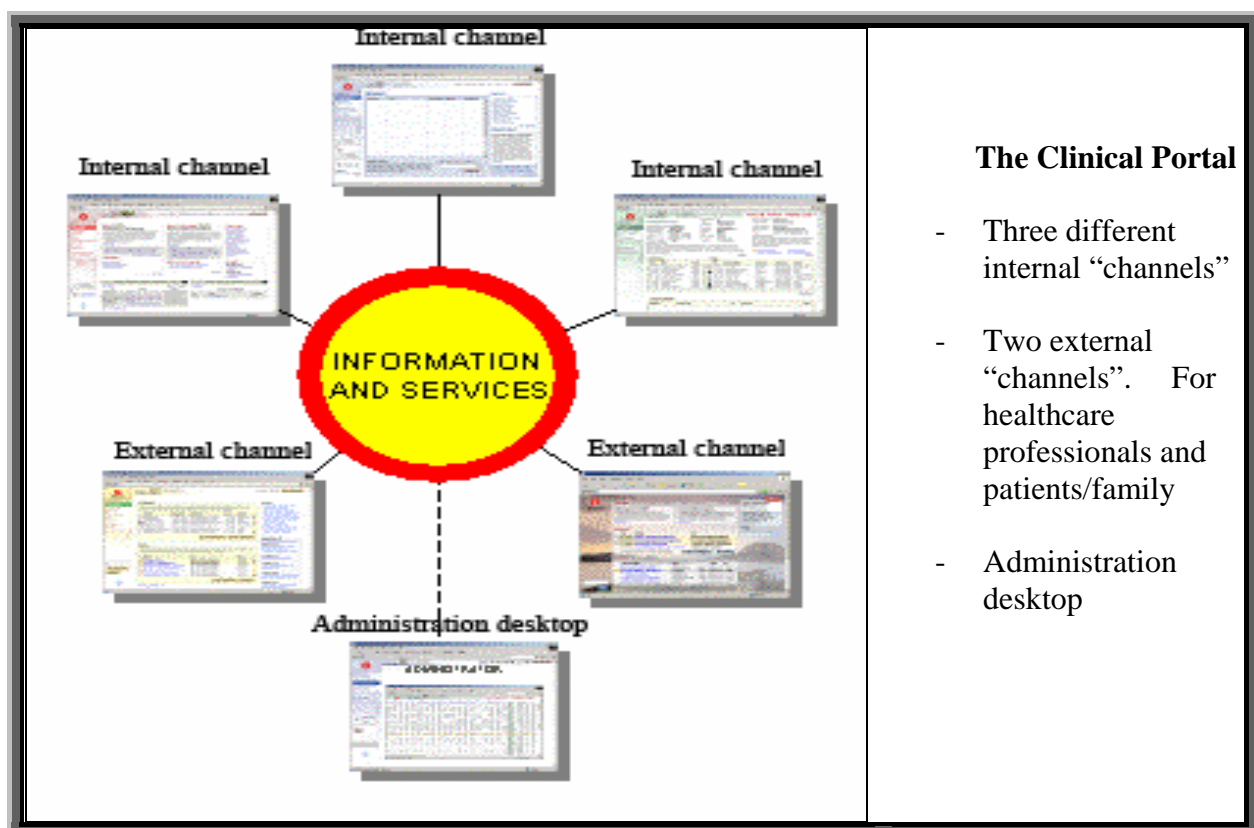
3.2.2 Channels

Figure 8: Channels within the Clinical Portal

The clinical portal has three different internal channels, two external and an administrative desktop (see figure 8). Versions that can be developed are tailored based on role event, problem, diagnosis and specialty. Users, organizational and patient are three fundamental focus of the portal. The user focus of the system contains no sensitive information. It is user definable and works much like a traditional intranet. The organizational focus includes tasks and roles. Sensitive information could be found on groups of patients. There is an access to clinical systems where you can select a certain patient. The patient focus represents one patient at a time. There is a complete overview of information on a single patient that is accessed from different clinical systems.

3.2.3 Clinical Portal Version 1.4

For the first time in Norway, clinical information within eight fields from six different system sources is available at one place at the same time. The eights fields include six laboratory disciplines, clinical document and patient administrative information. The six independent systems which are included in this version can be enumerated as follows:

- NetLab – provides laboratory results from Medisinsk biokjemi (MBK), Immunologisk Institutt (IMM), Pasientnære analyser (PNA) and Koagulasjonslab (KOAG).
- Miclis – provides results from Mikrobiologists Institutt.
- iLab (Sympathy) – provides results from Avdeling for Patologi.
- RISweb – provides results from Radiologisk avdeling.
- Doculive EPR– provides electronic clinical patient information.
- PiMS[13] – provides patients administrative information.

The clinical portal is divided into three main divisions. The first division is the "clinical desk" (Klinisk Skrivebord, see Figure 9). This division includes:

- List of Patient – provides an overview of the patients with their contacts attached to the clinical portals' users department.
- Find a Patient – gives the opportunity to search patients either to their person number, date of birth or name.

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[13] PiMS is an abbreviation for Patient Management Information System which contains basic patient information like name, date of birth, address, contacts and more. It also used in support for budgeting, accounting and for planning waiting and visiting lists.

- Requisition per Patient – gives an overview of the requisition status for a chosen patient. The table is sorted after date and the newest order can be found on top. The result from a request whenever it is ready can be seen by clicking a particular requisition.

- Examinations – shows the same elements as listed on the requisition per patient. In addition, it includes the patients name and their birthdays. The list of examination shows when the laboratory result is last changed instead of when it was taken.

- Patient Calendar – shows all the patients and their contact at the chosen date in a particular department. It can either provide all patients, waiting patients, patients who are confined for the day, patients who are confined, patients who are discharged, patients who are in the polyclinic, patients who are out of the polyclinic or cancelled patients.

- Weekly Planning – provides information over the patients' confinement and consultations (polyclinic) for a week in a particular department. It will be very useful or the patient coordinator and others because the weekly planning gives a complete overview over the scheduled patients within a week.

- Overview of Beds Filled – shows planned hospitalization or scheduled confinement and stipulate bed overview within a particular department.
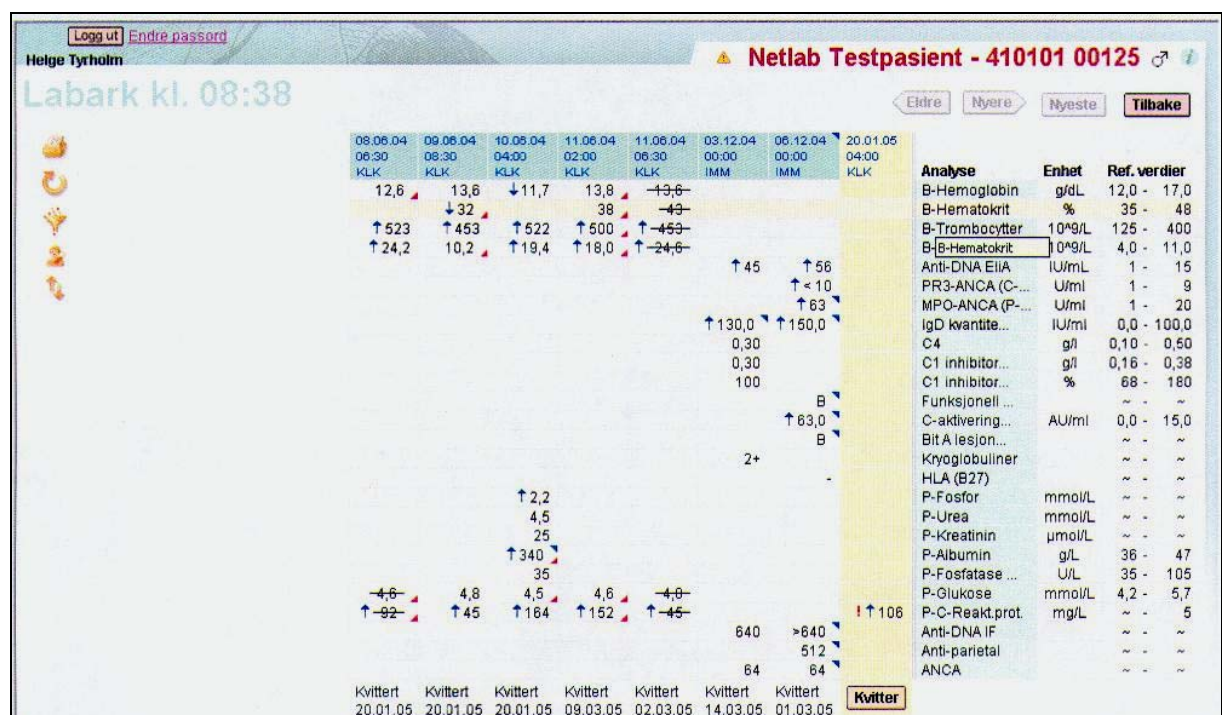
Figure 9: Laboratory Results

The second division is the "patient desk" (Pasientskrivebord, see Figure 10). This division provides:

- An overview picture of the patients' active contacts, personal information, documents in DocuLive, requisitions and activities.
- Patients contact information from PiMS.
- An overview of remedial action for the patients (tiltaksoversikt).

Figure 10: Patient Desk (Patientskrivebord)

The last division of the clinical portal is called "my desk" (Mitt Skrivebord, see Figure 11). It provides the same information which can be seen at the Riksnett[14]. It includes the following:

- Front page shows the equivalent information in today's Riksnett.
- Information about the hospitals employees.
- Email.
- Overview of research, inventions and more.
- Overview of the activities at Rikshospitalet.
- Shows the news for the whole hospital and department basis news.

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[14] Riksnett is the hospitals intranet.
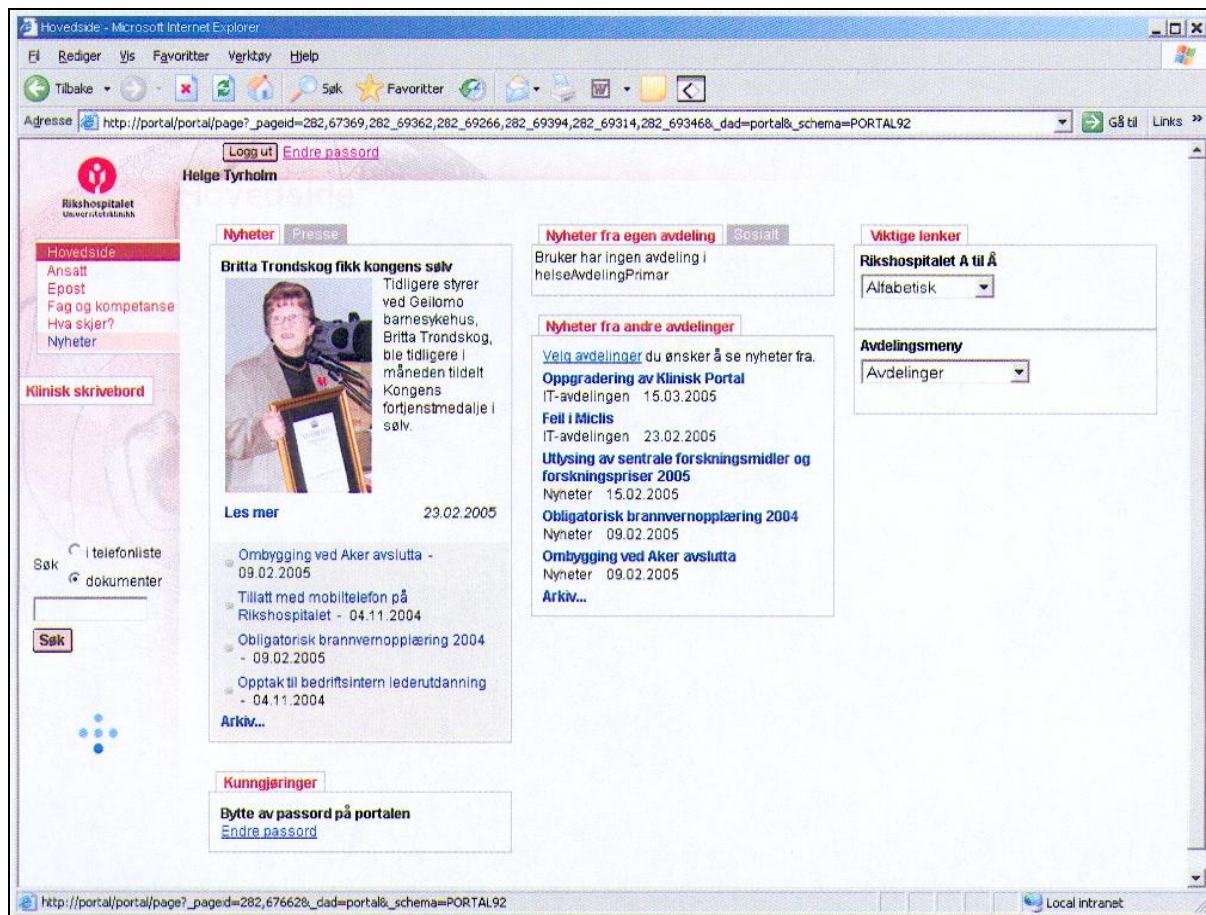
Figure 11: My Desk (Mitt Skrivebord)

Chapter 4 Research Methodology

Introduction

This chapter is concerned with the elements of inquiry, approaches to research and design processes of research. The preliminary step in making a research is to first consider the strategies of inquiry to be used. This should be followed by identifying what research method that suite this inquiry. After deciding the research methodology, the choice among different techniques and procedures should be considered. Cresswell (2003) conceptualizes three central questions of research based on Crotty's (1998) model as follows:

1. *What knowledge claims are being made by the researcher (including a theoretical perspective)?*
2. *What strategies of inquiry will inform the procedures?*
3. *What methods of data collection and analysis will be used?*

I have divided this chapter into three subsections. I will begin my discussion by presenting my case setting on where I did my fieldwork research in subsection 4.1. These include the background and specialization of the hospital and one of its clinics in which I devoted my research involving three of its sub-departments. I have focused my data gathering on these sub-departments. The strategy of inquiry, the research approaches and process of research will be discussed in the next subsection 4.2. I will enumerate and discuss three alternatives strategies of inquiry. These are strategies are the quantitative, qualitative and mixed methods strategy. Thereafter, I will specify which procedures are associated with those methods. Finally on subsection 4.3, I will describe on how I did my research, what research methodology I used and why I used this type have methods and procedures.

4.1 Rikshospitalet

The fieldwork has been conducted at the National Hospital of Norway, usually known as Rikshospitalet (RH). The main task of Rikshospitalet is to perform advanced treatment of patients, research, teaching, and to give advice on a highly international level for the benefit of both present and future patients and society in general. The hospital has 585 beds. The surgical patients use half of it and every fourth bed is reserved for children. Forty-four beds are designated for postoperative or intensive care. There are twenty-seven operating theatres in the hospital. Many of Rikshospitalets' patients need complex and expensive care. The hospital admits 28 000 patients as inpatients annually, 17 000 patients are given day-treatment, and there are 130 000 outpatient consultations. About 60 % of the patients admitted to the hospital are referred from other hospitals for more specialized investigations and treatment.

In Norway, Rikshospitalet plays an important part as a highly specialized hospital with advance and expert knowledge of the treatment of unusual and complicated disorders and diseases. With the help of more than 4 000 personnel that works in the hospital which consist mostly of 500 doctors and at least 1 500 nurses, the hospital continues to render their medical services with information technology as their tool in their everyday working situation. In addition to medical professionals, the hospital is also a challenging workplace for other professional groups as well. It includes engineers, IT-personnel, economists, statisticians, lawyers and service personnel.

4.1.1 Children's Clinic

The clinics' vision is to work with its attachment and continuity of developing its position as one of the Northern's leading children's clinic. They wish to accomplish their vision in a constructive interplay between patient treatment, research and education. More than 10 000 children visit them every year. There are approximately 500 workers at the clinic in different active group professions. Children and their families' needs shall be met by an environment characterize by cooperation, safety and respect is the primary goal of the clinic.

The profession-and drift division and drift divisions are the two main sections at the children's clinic. A complete overview of the entire division can be seen at Figure 12.
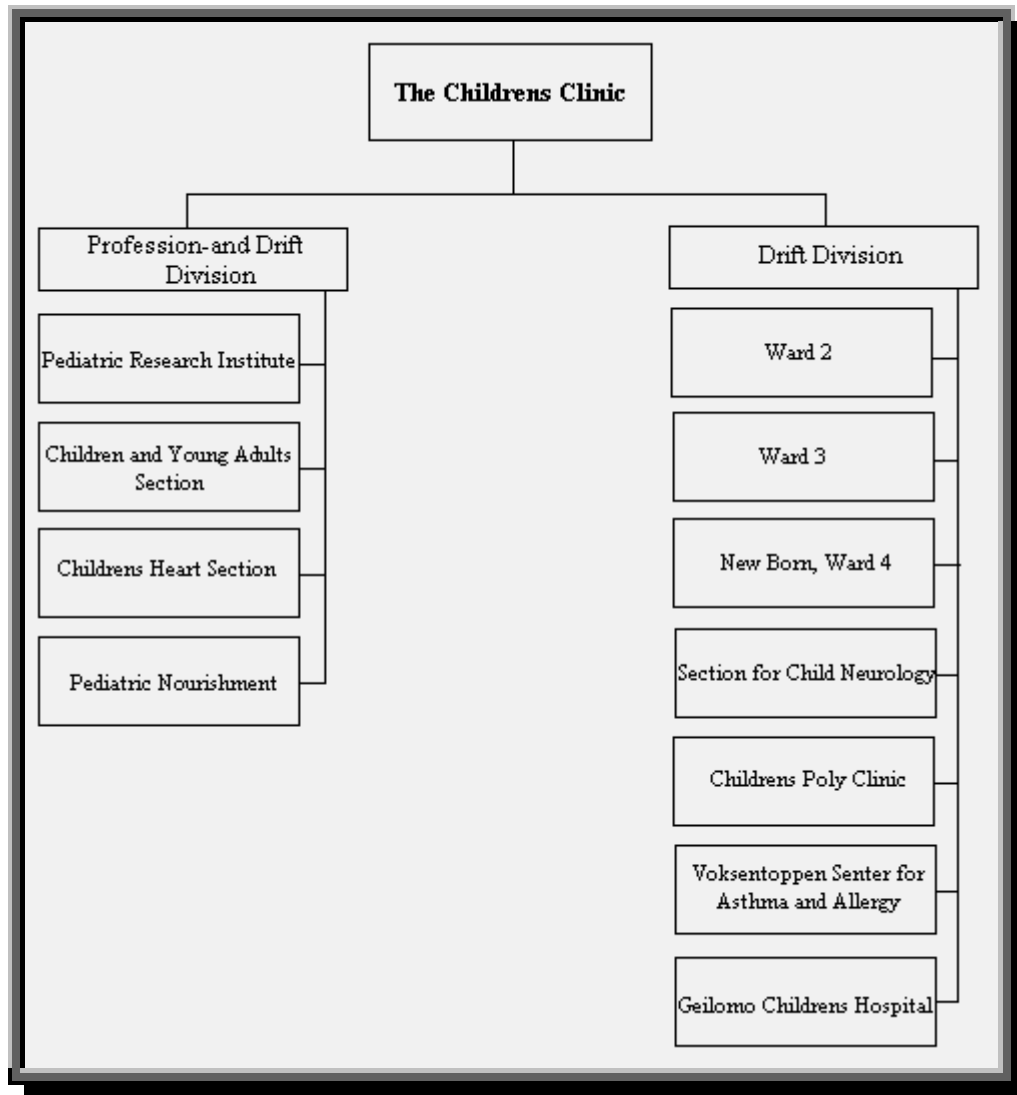
Figure 12: Division at the Children's Clinic

4.1.1.1 Ward 2

Ward 2 is a bed ward section, which can be occupied by 14 children from 0 and 15 years of age. The post has a land function responsibility for children who have Hypoplastic Left Heart Syndrome (HLHS), kidney transplants and those children who are suffering from acquired heart diseases that involve heart transplant operations. They also serve as a multi-regional function responsibility for children with serious inborn heart disease and arrhythmia.

There is a wide range of involvement within different type of specialists and group of medical professions during the treatment of patients. The children have their own preparatory teacher, which is responsible for their playroom. It is a little sanctuary place where most of

the children enjoy staying. Those children who have been studying receive teaching offers within the hospital's school premises.

To accomplish the continuity of service, every patient has a primary nurse in every shift, which is in charge for the patient and their family. The staffs want the children and their family to experience a safe and positive stay on their post. Their duty is to give the necessary and intended care that is needed in order to achieve their goal. One of the parents can be with the child the whole day and night during confinement because of the free visiting policy at the post. They have a recreation room where coffee and tea is available at any time.

4.1.1.2 Ward 3

Ward 3 is a bed ward section for children between 0 and 15 years old. This section can admit thirteen children. Most of the children have different cancer illnesses (leukaemia, solid cysts) or liver diseases and children suffering from neurological problems. They also have additional services, which includes liver and bone marrow transplant. They have their own children oncologist polyclinic.

There are 3 doctors who specialise in children's cancer and 2 specialists in liver diseases and neurology in addition to a permanent resident doctor and assistant doctor. The Norwegian Cancer Organization (Den Norsk Kreftforeing) has a nurse consultant working in the department. Specialists in children's cancer have a regular working day in the policlinic. The healthcare personnel are divided into 2 groups (red and green). Every child is placed in one of the group and given a primary attending nurse. The primary objective is to give just one attending nurse for each child and family in order to give the patient the total health care that is needed. Most of the nurses are educated as children nurses and cancer nurses. The post has its own teacher who is responsible for the playroom. The students get study offers from the hospitals' study lecture.

Their services include preparing the children about their illnesses and what is going to happen. In addition, to help them understand what they are encountering through games and activities that are suited for them. They must also prepare the family, close friends and relatives on diseases stages and challenges in everyday life. Information is given through

orientation, lectures, advice and support, both individually and in-groups. It is also given through written materials and other form of visualization.

4.1.1.3 Section for Child Neurology (SCN), Berg Gård

The section has a day unit, which has a capacity of 10 beds and can also accept children for both day and overnight stays. Those patients who are admitted at Berg Gård include children requiring hospitalization for a functional assessment or for various specific disorders and treatment procedures. Specialized habilitation, cross-disciplinary function diagnostics and medical assessment also take place at this section. The section functions as a centre of expertise with respect to specialized habilitation, with particular emphasis on movement disorders and eating and nutritional problems. Children who are admitted in this section are at all times accompanied by one or both of their parents but occasionally also by their sibling(s).

The department's target patients consist of children and young people between 0 and 18 years of age with congenital or acquired neurological diseases or functional disabilities. The sections major patients are children with cerebral palsy, spinal bifida, neuromuscular diseases, epilepsy, rare syndromes, neurodegenerative conditions, children with multiple functional disabilities, mentally retarded children and children who were born extremely prematurely. They were usually referred to this section by the county habilitation service and children's departments. The section also receives referrals from other departments at Rikshospitalet.

SCN has a broad, cross-disciplinary personnel team of doctors, nurses, psychologists, physiotherapists, ergo therapists, uro-therapists, educationalists, sociologists and nutritionists who have specialist expertise on children with neurological diseases, injuries and functional disabilities. Clinical activities are organized through cross-disciplinary teams whose composition depends on the problem and reason for the referral.

4.2 Strategies of Inquiry

This research is mainly focused on issues relating into improvement of very powerful installed based information systems within large and complex organization, thereby

producing new work practices, routines and responsibilities. Methodological framework and theoretical perspectives depends basically on the researchers' worldview and area of study. On two opposite point of view are the positivistic and interpretative approaches.

The issue of choosing which suitable research method appropriate in IS research has been a centre of attention for quite a period of time. Orlikowski and Baroudi (1991) examined 155 research articles notably from Communications of the ACM, MIS Quarterly, and Proceedings of the International Conference in Information Systems and Management Science from January 1983 and May 1988. They found out that 96.8% of IS research used a positivist framework while the remaining fraction of 3.2% used an interpretive structure. Much of the IS research being conducted today is concerned with the ongoing relations among information technology, individuals and organizations using an interpretive approach. This is an evident shift proven by a study made by Nandhakumar and Jones (1991) which gave an increase of almost 13%, from 3.2% taken from Orlikowski's and Baroudi's (1991) study to approximately 16%.

Klein and Myers (1999) and Walsham (1993) describes different sets of principles for conducting field studies in IS research. The former have suggested interpretive field research, which is carried out in a hermeneutic perspective, while the latter have also advocated an interpretive approach but by using longitudinal in depth case studies. Mingers (2001) on the other hand considers the newest mixed method approach in IS research. He has argued that every research method focus on different aspects of reality, and therefore a combination of several methods will gain a richer understanding of the research. Numerous authors, such as Landry and Banville (1992), Gallliers (1993), Lyytinen and Klein (1985), have also argued that hermeneutic and empirical analytic traditions should be combined.

It is important to remember that in choosing a methodological approach, the possibility of knowing the right method to use in advance is not always predictable. Method choice will depend upon the measurement of problem area and specification of problem statement. Nevertheless, my thesis requires both quantitative and qualitative approach in order to achieve the best results that I need with the purpose of answering my problem questions. The quantitative approach, such as interviews and observations, provides detailed information on how the users are engaged in the clinical. It also shows when and where the medical staffs use the system. The quantitative approach provides a clear overview on what particular part

of the clinical portal is used by the users. It will be difficult for the researcher to monitor each user while using the system. Therefore, the researcher chose to use a sequential exploratory strategy of the mixed-methods approach by means of both qualitative and quantitative techniques of data collection to provide complete information needed in the analysis of the research.

4.2.1 Quantitative Research

Quantitative research method is defined as "numerical representation and manipulation of observation for the purpose of describing and explaining the phenomena that those observations reflect (Babbie 1992)." It is generally linked to the notion of science as objective truth or fact wherein it can be readily describe and represented by measurable properties through scientific method. These methods can be enumerated as:

1. *The generation of models, theories and hypotheses*
2. *The development of instruments and methods for measurements*
3. *Experimental control manipulation of variables*
4. *Collection of empirical data*
5. *Modelling and analysis of data*
6. *Evaluation of results*

Measurement of quantitative research often excludes meanings and interpretations or subjective part from the data, which are collected. It requires statistical samples, which often do not represent social groups and which do not allow generalization to or understanding of individual cases. It rather takes a sample of a population, use and assigned them as a group or more and thereafter derives a generalization from the sample population.

Although quantitative investigation of the world existed since people first began to record events or objects that had been counted, the modern idea of quantitative processes have their roots in Auguste Comte's[15] positivist framework. Strategies of inquiry associated to quantitative research include different kinds of experiments such as true, quasi and specific-

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[15] Auguste Comte (1798-1857) was a French philosopher who founded the school of philosophy known as positivism. He sees the intellectual development of man covered by what is called the Law of the Three Stages - theological, in which events largely attributed to supernatural forces; metaphysical, in which natural phenomena are thought to result from fundamental energies or ideas; and positive, in which phenomena are explained by observation, hypothesis, and experimentation.

single-subject during the late 19th century and all through the 20th. Recently, complex experiments with multifaceted equations, variables and treatments are involved in this type of research method (Creswell 2003). The use of surveys as strategy of inquiry has gained its popularity nowadays.

A **survey design** uses questionnaires or structured interviews for data collection by studying a sample of a population. While **experimentation** on the other hand, tests the impact of a treatment on an outcome, then controlling all the other factors that could manipulate that outcome. Both of the design generalizes about the population from the sample result (Creswell 2003).

In a survey research, the researcher administers a standardized questionnaire to the selected sample of respondents from a population. The questionnaire can either be in form of a written document on paper or online using the internet. The survey can also make of a face-to-face interview or telephone interview using the standardized questions. Choosing what type of survey to use depends upon the target population.

Mail survey is one of the three types of written survey. This is a low cost survey in terms of time management. The expenses in using this kind of survey are less than the other type of written surveys. The participant can also answer the survey during their spare time since it was administered through mails and there is no direct personal contact between the researcher and the respondent. Even though that the respondents have the freedom to answer the survey anytime they want to, this kind of survey has the lowest response rate. Since it uses random sampling, one cause could be language barriers or physical impairment. **Group administered questionnaires** guarantees a high response rate but can be problematic when to administer the questionnaires. Since it requires the entire group to answer the survey together, it will be difficult to find an allotted time slot that is convenient for every respondent. A **drop-off survey** allows the researchers to present themselves and their study to the respondents thereby leaving the questionnaires behind. The researcher will then go back to pick-up the answered questionnaires at the negotiated time. Although this kind of survey is better than the mail survey, still the response rate is considerably lower than the oral survey.

Oral survey is considered to be the most personal form of survey than the written and electronic. It is conducted face-to-face or by the use of the telephone. The response rate of this kind of survey depends upon the willingness of the respondents to answer the survey. It is very difficult to find the right time for the impulsive interview especially on the phone, since the respondents have no control over the questionnaires. The **electronic survey** is the cheapest of all the other types of surveys. It is also the fastest way to deliver the survey and get the results instantaneously. The researcher can also go global when using this type of survey. Due to the openness in nature of the internet, it is very difficult to guarantee and preserve the anonymity and confidentially of the respondent. And also, not all users of the computer can perfectly navigate the internet. There are also time consuming instructions and orientation before the respondents could answer the survey.

4.2.2 Qualitative Research

Qualitative research means, "Any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification (Strauss and Corbin 1990)." It involves the systemic collection, organization, and interpretation of textual material. Knowledge claim on this approach is based on a constructivist (Creswell 2003) often combined with interpretative perspectives.

Constructivism has its roots in Emmanuel Kant's[16] synthesis of rationalism and empiricism, where it is noted that the subject has no direct access to external reality, and can only develop knowledge by using fundamental in-built cognitive principles to organize experience. He also proposed that the theoretic or pure capacity of judgement be based on *a priori* synthetic judgements of space and time.

To understand the historical and cultural settings of the participants, the researcher focuses on the precise contexts in where people live or work. They have to process an interaction among individuals by positioning themselves in the research and interpreting different

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[16] Emmanuel Kant ((1724-1804) was a German philosopher from Königsberg (now Kaliningrad) in East Prussia. Kant is often considered one of the greatest, and is one of the most influential thinkers of modern Europe and the last major philosopher of the Age of the Enlightenment. Kant proposed that objective reality is known only insofar as it conforms to the essential structure of the knowing mind. He maintained that objects of experience or phenomena might be known, but that things lying beyond the realm of possible experience or things-in-themselves are unknowable, although their existence is a necessary presupposition.

settings based on their own personal, cultural and historical experiences (Creswell 2003). The intention of the constructivist approach id to interpret others meaning about the world. The characteristics of qualitative research as recommended by Creswell (2003) are the following:

1. *Qualitative research takes place in the natural setting.*
2. *It uses multiple methods of data collection that are interactive.*
3. *It is emergent rather than tightly prefigured.*
4. *It is fundamentally interpretive.*
5. *The researcher views social phenomena holistically.*
6. *The researcher systematically reflects on who he or she is in inquiry and is sensitive to his or her personal biography and how it shapes the study.*
7. *The researcher uses complex reasoning that is multi-faceted, iterative and simultaneous.*
8. *The researcher adopts and uses one or more strategies of inquiry as a guide for the procedures in the study.*

One of the strategies, which are associated with the qualitative approach, is **ethnography**. Typically, the ethnographer focuses on a community selecting informants who are known to have an overview of the activities of the community. Then the researcher became intact to the community over a prolonged period and uses this time to collect data by primarily doing observations and interviews. **Grounded theory** is also one of qualitative strategy. It involves a multiple stages of data collection to guarantee a good theory as the outcome. In **case studies**, an in-depth, longitudinal examination of a single instance or event, known as case, is involved. **Phenomenological research**, on the other hand, is an extensive and prolonged research where the researcher identifies the essence of human experiences concerning a phenomenon, as described by the participants in the study (Creswell 2003). And last but not the least strategy associated with the qualitative approach is the **narrative research**. The researcher retells the stories, about the lives of the individuals who have provided their life stories, into a narrative chronology.

Qualitative data collection types involve observations, interviews, documents and audiovisual materials. An important source of qualitative evaluation of data is direct, first hand observation of the program into the field. It is where we gather impressions of the subjects and their surroundings occurring naturally. **Observations** take place on the case

setting wherein the researcher takes notes on the behaviour and activities of the individuals being observed. In **interviews**, the researcher can choose either from face-to-face interview, by telephone or a group interview. These kinds of interviews were unstructured and basically open-ended questions. The interview can also be **audio recorded** with consent from the interviewee. Gathering **relevant documents** on the research is also a mean of data collection. It can either be reports, forms, documents, emails, letters or newspapers.

4.2.3 Mixed-Method Research

Mixed-methods research combines theoretical and/or technical aspects of qualitative and quantitative on a particular study. Many different terms are used for this approach, such as **triangulation** and **multi-method research**. A mixed-method researcher commonly builds on their knowledge claims on pragmatic grounds. Cherryholmes (1992) enumerated works of Peirce[17], James[18], Mead[19] and Dewey[20] as derived from pragmatism.

Pragmatism maintains that the value of ideas is determined by their consequences. It is more concerned with what "works" than with what's true. The problem is most important and the researchers use all approaches to understand the problem instead of methods being important. According to Creswell (2003) based on his interpretations of Cherryholmes (1992) and Murphy's (1990) work, pragmatism provides a basis for the following knowledge claims:

1. *Pragmatism is not committed to any one system of philosophy and reality.*
2. *Individual researchers have freedom of choice.*
3. *Pragmatists do not see the world as an absolute to unity.*
4. *Truth is what works at the time; it is not based in a strict dualism between mind and a reality completely independent of the mind.*

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[17] Charles S. Peirce (1839-1914) was the founder of American pragmatism. He was, for a few examples, the first modern experimental psychologist in the Americas, the first to use a wavelength of light as a unit of measure, the inventor of the quincuncial projection of the sphere, the first known conceiver of the design and theory of an electric switching-circuit computer, and the founder of "the economy of research." He is the only system-building philosopher in the Americas who has been both competent and productive in logic, in mathematics, and in a wide range of sciences.

[18] William James (1842 –1910) was a pioneering American psychologist and philosopher. He wrote influential books on the young science of psychology, psychology of religious experience and mysticism, and the philosophy of pragmatism.

[19] George Herbert Mead (1863 - 1931) was an American philosopher, sociologist and psychologist, primarily affiliated with the University of Chicago, where he was one of several distinguished pragmatists. He is regarded as one of the founders of social psychology.

[20] John Dewey (1859 – 1952) was an American philosopher, psychologist, and educational reformer, whose thought, has been greatly influential in the United States and around the world. He is recognized as one of the founders of the philosophical school of Pragmatism, a pioneer in functional psychology, and a leading representative of the progressive movement in U.S. education during the first half of the 20th century.

5. *Pragmatist researchers look to the "what" and "how" to research based on its intended consequences – where they want to go with.*

6. *Pragmatists agree that research always occur in social, historical, political and other contexts.*

7. *Pragmatists believe that we need to stop asking questions about reality and the laws of nature.*

Mixed-method approach involves collecting and analyzing both forms of data, either qualitative or quantitative strategies of inquiry, in a single study. Campbell[21] and Fiske[22] used this method to study validity of psychological traits in 1959. That was probably where the mixing of different method originated. Both have encouraged others to use a "multi-method" approaches such as observations and interview (qualitative) were combined with the traditional surveys (quantitative). From the time of Jick[23] in 1979, "triangulation" of data sources was born. Triangulation tests the consistency of findings obtained through different strategies of inquiry.

There are six types of mixed-method strategy grouped into two categories. They are the sequential explanatory, sequential exploratory, sequential transformative, concurrent triangulation, concurrent nested and concurrent transformative strategies. **Sequential explanatory strategy** is the most straightforward strategy among the six. Its priority is more on the quantitative data. It means that this strategy uses qualitative results in order to assist in explaining and interpreting the findings of a primarily quantitative data. The collection and analysis of data is first done in quantitative data, and then followed by collection and analysis on qualitative data (see Figure 13). The **sequential exploratory strategy** is the exact opposite of the sequential explanatory strategy. Instead of doing qualitative methods at the beginning, it is the other ways around (see Figure 13). The priority is given more on the qualitative findings. The word "exploratory" is used because its primary focus is to "explore" a phenomenon. The **sequential transformative strategy** has two distinct data collection phases, one following the other. Nevertheless, either method may be used first or even both methods if sufficient resources are available. The data collection and analysis can

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[21] Donald T. Campbell (1916-1996) was one of the truly important thinkers in evolutionary philosophy and social science methodology, and one of the most cited authors in the social sciences. He coined the term "evolutionary epistemology" and developed a selectionist theory of human creativity.

[22] Donald W. Fiske (1916-2003) was a University of Chicago psychologist whose research taught scholars how to measure a person's abilities and personality. He promoted rigorous methods to make psychology a true science and accordingly influenced generations of researchers.

[23] Todd D. Jick is a former Harvard Business School professor who engages himself on writing about managing change and the challenges of organizational change.

either first begins with quantitative and then followed by qualitative or it can be the other way around (see Figure 13). The purpose of the strategy is to employ the methods that will best serve the theoretical perspective of the researcher.
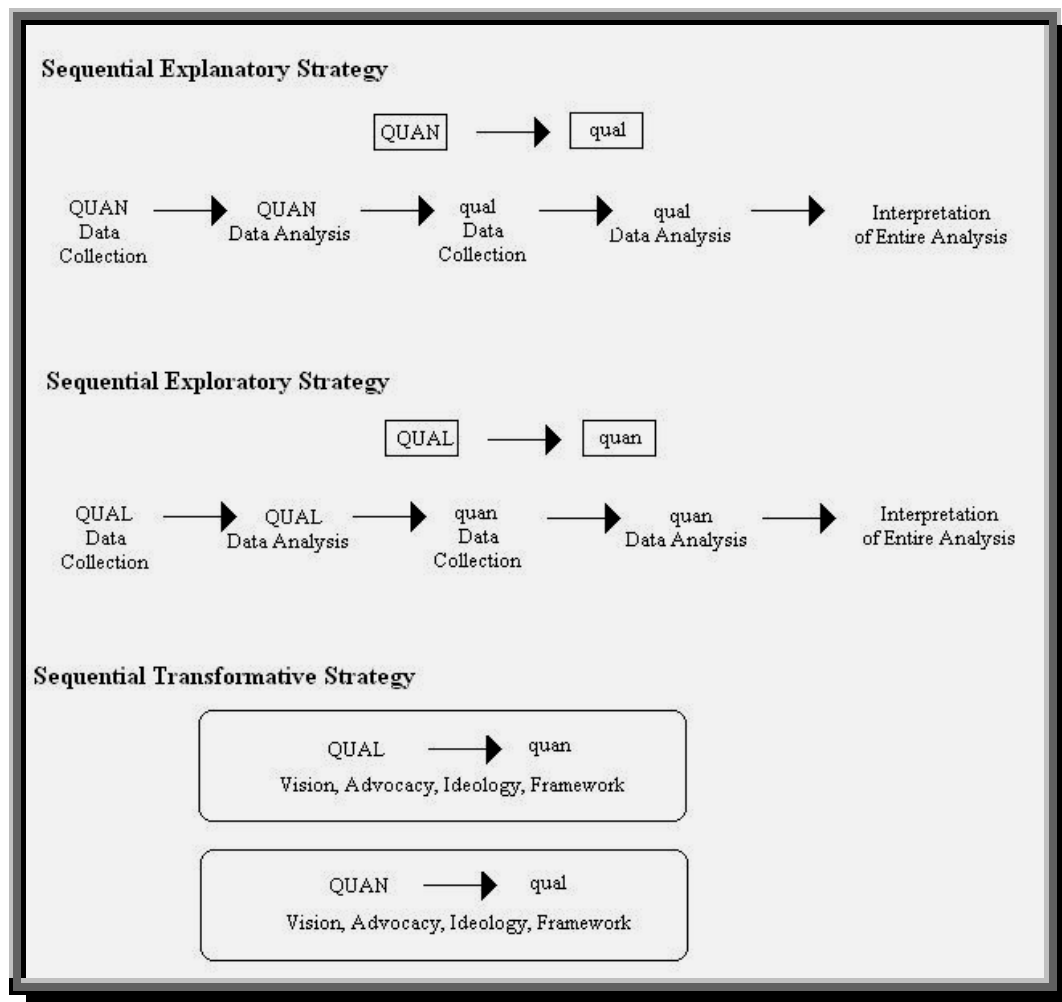
Figure 13: Sequential Strategy Category

The **concurrent triangulation strategy** is utilized when a researcher uses two different methods in an attempt to confirm, cross-validate, or corroborate findings within a single study (Creswell 2003). In this method, the quantitative and the qualitative data collection is concurrent (see Figure 14), happening in one phase of the research study but the priority may be given to either the quantitative or the qualitative approach. This strategy integrates the results of two methods during the interpretation phase that can either note the convergence of the findings as a way to strengthen the knowledge claims of the study or explain lack of convergence that may result. The **concurrent nested strategy** can be identified by its use of one data collection phase, during which both quantitative and qualitative data are collected

simultaneously (see Figure 14). It has a predominant method that guides the project. The method (quantitative or qualitative) is embedded or nested within the predominant method (quantitative or qualitative). The researcher can use this method if they utilize different methods to stuffy different groups or levels. The **concurrent transformative strategy** has almost the same approach as of sequential transformative model. Both of them are guided by the researcher's use of a specific theoretical perspective. This perspective can be based on ideologies such as critical theory, advocacy, participatory research, or a conceptual or theoretical framework. This strategy may either take the design features of triangulation or a nested approach. It means that during data collection phase, two types of data are collected at the same time and may have equal or unequal priority (see Figure14).
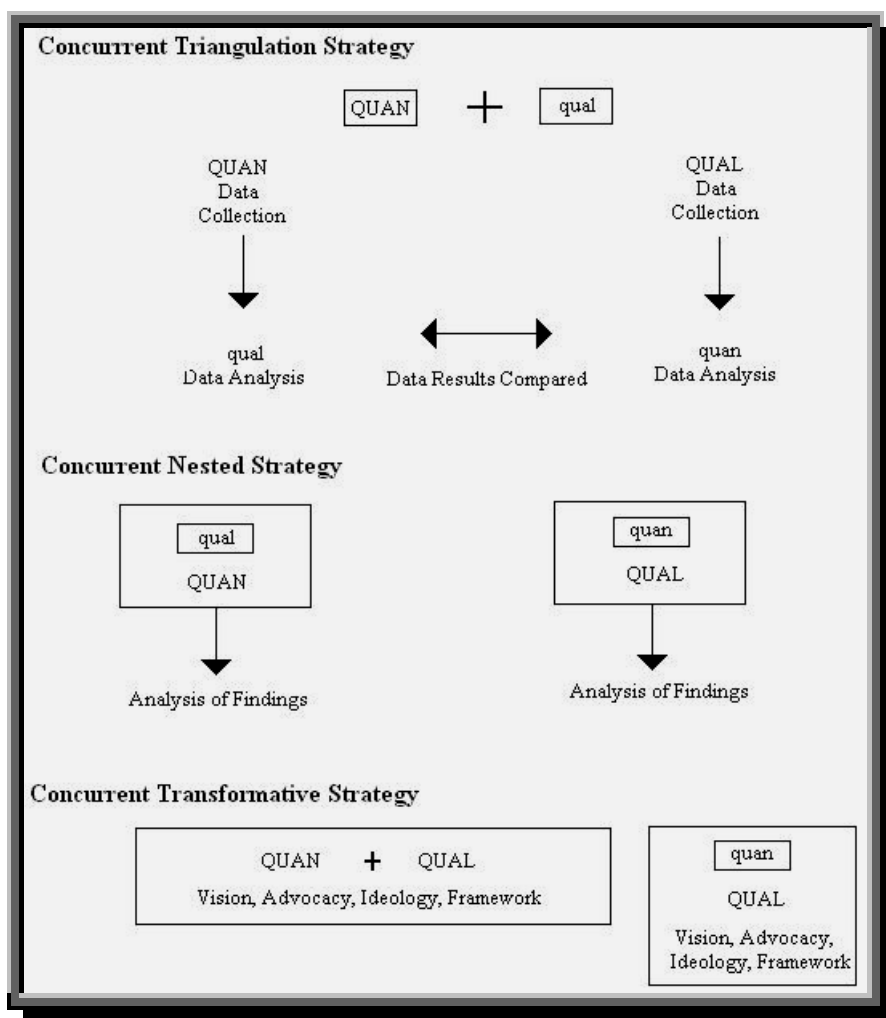
Figure 14: Concurrent Strategy Category

4.3 Experiences

Every researcher within a particular study has their unique experiences. Acquiring different methods of inquiry, techniques and strategies makes a research different from one another. Although several researchers have studied the same problem at the same setting, the outcome of the analysis based on the methods that are used and how it is used will have different results. On the following subsections, I will discuss my experiences and accomplishments that I have encountered during my data gathering on the field site.

4.3.1 The Choice of Method

Considering the problem area and statement of my thesis, the researcher has used both quantitative and qualitative methods of inquiry. I have decided to use the mixed-method approach because I wanted to balance the strengths, weaknesses and limitations of each approach. Multiple methods provided me additional insight of the study because the problem was approached from different perspectives. As I mentioned at the introduction of this chapter, the qualitative approach provides an overview of when, where and how between the users and the clinical portal, while the quantitative approach shows what part of the system is used by the respondents. Moreover, I was benefited to cross-validate my findings on qualitative versus quantitative method at the end of my analysis.

4.3.2 Access to the Field

Before finalizing what, who, when and how you will use the techniques, gaining access to the field must be first considered. A very busy hospital like Rikshospitalet was hard to reach at the beginning because of the fully scheduled activities of the contact persons. It took a while just to get in touch with them and to be rescheduled for the orientation or an interview. There were also factors to be taken seriously. It is common among organizations where data about individuals are considered as treasures and should be treated with confidentiality. In the 4th century B.C., the Oath of Hippocrates states "*Whatsoever things I see or hear concerning the life of men, in my attendance on the sick or even apart there from, which ought not to be noised abroad, I will keep silence thereon, counting such things to be as sacred secrets*". This oath survived and is still in practice by medical practitioners.

Ethical issues and considerations are the main concern when choosing a hospital to be the field of the research. Since delicate and important information about the patients were to be

explicitly seen, I must first and foremost sign on the secrecy form in order to pursue my study. One of the employees at the IT-department has the responsibility to guide and help the students at Informatics Institute to be able to perform their research on the hospital. He gave me the form of secrecy and I signed it immediately. The only mistake that I did was that I was not able to photocopy the form. I have totally forgotten it. I talked to the responsible employee and asked him if I need a copy of this form. He told me that after the form was signed and recorded at the hospitals administration, he archived it at his office together with the forms from other students. He additionally said that there would be no problem at all. During that time, I was also busy doing my research on one of my subjects at the University. I have made use of this secrecy form in order to accomplish my first and only fieldwork exercise on my qualitative research method subject. My topic was on the nursing documentation. By signing the secrecy form, I am entitled to be punished by the law if any rules and regulations were broken during my study.

But of course it was not as simple as it was. Signing the form was only my first step on how I can do my thesis at Rikshospitalet. Since I have previously done an observation with one the wards at the Children's clinic, I though that I have already gained access to the field. I was totally wrong. A one-time observation was entirely different from a half year of observations and interviews. Now I needed an approval from the head of the Children's clinic to do my thesis on their department. I wrote a fieldwork application (see Appendix 3) stating my working problem statement and targeted flow of my data gathering. The former nursing coordinators at the clinic endorsed me. They told me the name of the person that I have to contact. It was a huge help for me to get the name of the contact person and to be supported by the former nursing coordinators. The current nursing coordinator has just started working at the hospital and knew nothing about the policy regarding informatics students whose thesis will be accomplished at Rikshospitalet. During my first meeting with her, she was accompanied by another nurse with training responsibilities. The meeting was held on her room and lasted for an hour. We have discussed my topics and what the plans in their clinic. We agreed on the number of interviews and observation that I must do based on what was stated on my fieldwork application. The nursing coordinator also introduced me to one of the chief section doctors at the clinic. A week before the meeting, I sent her my fieldwork application and the English version of the interview agreement. The nursing coordinator submitted the forms herself to the head of the Children's Clinic and it was immediately

approved. It was my duty after that to ask the permission of the head nurses, secretaries and doctors in the clinic.

4.3.2 Fieldwork Techniques

I have made use of the following qualitative techniques: observations, interviews and reviews of relevant documents. After the data gathering on the qualitative perspective, I have utilized the quantitative method by using the survey design technique. A complete overview over my fieldwork can be seen Appendix 4.

I used the sequential exploratory strategy of data collection. This model is characterized by an initial phase of qualitative data collection and analysis followed by quantitative method. The findings of these two methods were then integrated during the interpretation phase, which will be discussed at my discussion and analysis chapter. The purpose of this kind of strategy is to basically support and assist in the interpretation of qualitative findings.

4.3.2.1 Observations

The researchers take field notes on the behaviour and activities of the individuals being observed at the filed site during the researcher's observations. The researcher can record information as the individuals reveal it. Seeing and at the same time experiencing what was really happening on the field site makes it easier for the researcher to understand and analyze the situation. Any unusual aspects for the researcher can also be noticed during the time of observations. Those characteristics can be considered as the advantages of observation. But not every body wants to be observed. The researcher may be seen as an intruder because the researcher may also observe private information.

I did my first observation at ward 3. I considered this observation as a trial and error experience because this will serve as a basis for my other observations to come. Although I did a one-day observation with the nurses at the same post in December 2004, it was entirely different from my present study. Unlike before, my area of focus was only on the registration of the nurses on the electronic nursing documentation. My present case covers the main users of the clinical portal; the doctors and nurses.

I had to change from my civilian clothes to the official white uniform that the hospital staffs were wearing. I had to wear an ID in addition (see Appendix 1) to let the hospital employees know that I was part of the group. The purpose of wearing the white uniform was to not attract the attention of the patients at their ward. Together with the student ID, I felt like that I do belonged in the clinic. I made my observations as I followed the doctors around in the wards. During the pre-visit meeting, I felt that all the attention was focused on me. Almost all of the medical staffs at ward 3 that day were very curious to know my background and my reasons for being there. I had to repeat my case and my status many times. Due to sensitive patient information according to one of the chief doctors, I was not allowed to go along with them during their morning rounds with the patients. Things were not that complicated during the 2nd and 3rd observations at ward 3. Although they were still inquisitive about my case, my status could be compared to a regular employee at the hospital. I went along with three nurses during my last observation. It was a little bit difficult to be with them all the time because they had different patients and obligations. At the end, I decided to follow just one of the nurses whom I think was more active with the discussion than the others. I did my observations as a participant observer. The medical staffs at ward 3 were well informed of my role as a researcher.

My observation at ward 2 was different than that of ward 3. I didn't wear any uniform during my 2 observations at their ward. Only my ID could distinguish me for my purpose. It was their first time to be observed by an informatics student. I arrived after the nurses' endorsement meeting during my first observation, and I was not introduced to the staff. Therefore the nurses had no idea of what was going on and what was my purpose. They were very reluctant with my presence. They kept on asking me why I was always writing while observing them. They thought that every single detail, including their personal conversation, was also recorded. I guaranteed them that I signed the secrecy form and whatever delicate or personal information will be discarded. My second observation was better than the first because the head nurse to her staff appropriately introduced me. I attended the nurses' endorsement meeting this time. Even though I was properly introduced, no one was willing to be my nurse (shadowing). Therefore, the head nurse assigned one to be my guide. I have not entirely gained the confidence of the nurses on ward 2, but they were more open during my second observation. They started talking to me and begun to tell their experiences with the clinical portal.

I only used 4.5 hours of observation at Berg Gård (SCN). It was also their first time to have a visitor like me at their ward. They were curious about my study. It didn't felt awkward to be in civilian clothes because almost all the medical staffs were not wearing their uniforms. I saw few employees wearing their white blouse and pants. I only spent a small amount of time in the observation because there was nothing to observe. Only one of nurses uses the clinical portal once or twice a week. My observation at this ward is written in complete details in the empirical chapter.

4.3.2.2 Interviews

According to Fontana and Frey (1994), interviewing is a universal and dominant tool we use to try to understand others. It allows the researcher to go through another person's mind and to understand the perspective of that person. Interviews support in adding an inner perspective to outward behaviours. In this manner, the interviews help the researchers to find the source of meaning and explanation of observations. Interview is also used in order to learn about things that the researcher cannot observe (Patton 1987). Not all things during the observation can be observed. A pre-interview or a follow up interview is needed to elaborate the missing details in an observation. It has a multiple of uses and wide variety of forms. There are three approaches to qualitative interviewing and it is through informal conversational interview, general interview guide approach and the standardized open-ended interview.

Informal conversational interview happens naturally. There are no predeterminations of questions topics. Questions are built circumstantially from the observations collected from different people with different points of view, resulting into different questions. The interview becomes less systematic and comprehensive making it difficult for data organization and analysis. **Interview with guide approach** happens when the questions or areas of topics are made in advance, in an outline form. This outlined form makes the data collection easier for the interviewer because of its' increasing comprehensiveness. When the researcher asked the same basic questions at the same order, he uses the **standardized open-ended interview**. The exact questions and sequence are determined at the beginning. The questions that are used to the respondents are the all same, thus increasing comparability of responses. The situation on the interview becomes less flexible because similar yet identical questions are used. When responses are fixed and already predicted, the researcher uses a **closed quantitative interview**. The simplicity of the responses makes the data analysis easier. Responses can be

immediately compared and combined. This kind of interview may be perceived as impersonal, irrelevant and mechanistic (Patton 1987). The response is limited and can affect what the respondents really experienced.

I did 11 interviews at the Children's Clinic, 3 at the Skin Clinic and 4 at the IT-department. I have make use of two different types of interviews because of the nature and background of my respondents. In the Children's Clinic, I utilized a standardized open-ended interview. Little revisions have been made for the difference between the doctors and the nurses, but the questions are almost the same. Out of 11 interviews at the clinic, I used audio recording 7 times. Not all of them allowed me to audio record their interview or even sign on the interview agreement. I have prepared open-ended questions, which were chronologically arranged. The respondents were free to answer the question as long as they like. Some of them have already mentioned the answers that I have prepared at the end. I immediately cross the question out of my list to save the burden of asking them again the same question. It would be embarrassing to do so because they might think that I am not paying attention to what they have told me. I scheduled my interviews before hand (expect from one of the nurse ward 2 which was spontaneous), sending it to them through emails. I have asked almost every doctor at ward 2, 3 and at the Section for Child Neurology but unfortunately, only 6 of them responded. The interviews lasted from 7 minutes until 25 minutes.

I used an informal conversational interview with the IT-department. Although I have some phrases or groups of word prepared, it only served as a reminder list. It appeared to be somewhat like an orientation rather than an interview, even if I asked them questions about the clinical portal. The interview lasted from an hour until two hours. Only two of the interviews were audio-recorded.

I used the same interview guideline from the children's clinic and used it at the skin clinic. I interviewed three doctors and none of the nurses. The reasons are stated at the limitations (see Chapter 1.4) section at the Introduction. The three interviews were audio recorded and all of them signed the interview agreement. It is not too hard to schedule an interview with the doctors. I send them requests through emails, present my self and ask them to choose from the dates that I have suggested. If the dates and time doesn't fit their schedules, it was my responsibility to adjust my schedules.

Audio recoding helps the researcher remember things that are seem to be forgotten and difficult to capture during the actual interview. By means of recording, it captures the actual words and the full description of what was said by the person being interviewed. We must also consider that we cannot rely on our recollections of conversations even if we write it down right after the interview (Silvermann 2000). Even though not all of the interviews were fully transcribed, I have captured the essence of the whole interview by only writing valuable sentences and expressions that I needed for my thesis. All the interviews were in Norwegian and some of the audio-recorded interviews gave me problems in understanding what was said. I have to re-run the record many times in order to capture the exact words in Norwegian. After doing that, I translated those sentences into English. It was not translated word per word because the meaning of the sentences will change. I have tried to acquire the thoughts of the respondents without loosing the original meaning of the sentences.

4.3.2.3 Reviews of Different Relevant Documents

I have reviewed different types of documents in different forms. I used the hospital's homepage to be updated on issues regarding the clinical portal. I also have reviewed diverse documents coming from IT-consultants during presentations. Some papers available on the internet also helped me with some details regarding the portal.

4.3.2.4 Survey

I have also used the quantitative survey technique of gathering data in my thesis. As I have said on section 4.3.2 Choice of Method, I needed to know which of the functionalities in the clinical portal was most likely used and rarely used. Based on the information that I have gathered through observations and interviews, I will conclude in the last chapter of my thesis on whether the findings of both the qualitative and quantitative methods contrast or confide with one another.

I used a drop-off survey design (see Appendix 2) after my observations at ward 2, 3 and Section for Child Neurology. I observed the work routines and practices of the nurses on the three wards in particular. With the help of their head nurses and assistant nurses, I have made a decision that only the nurses will be included on the survey. I have asked the head nurses and assistant nurses for the assistance to distribute my questionnaires to their respective nurses. I gave them an allowance of 2 weeks before I came back to collect the answered

questionnaires. The interview with some of the doctors overlaps with the distribution of the survey. It did not affect the survey at all, because there were no questions that were focused outside the functionalities of the clinical portal. The survey must be based on the nurses' own experiences in using the clinical portal.

The questions on the questionnaires were derived from Clinical Portal version 1.4 since it was the current working portal solution that time. I have a complete manual that was given to me by one of the IT-Consultants. It was on hard copy when I received it from him. I have analyzed the functionalities of the clinical portal and divided it into different components.

Chapter 5 Empirical Material

Introduction

This chapter will serve as the foundation of my analysis and discussion. I will divide it into 4 main division, the first three division, wards 2 and 3, and the Section for Child Neurology, consists of the three sections under Children's' Clinic that have observed and the last division will be focused on the use of the clinic portal in each section. Here, I have thoroughly presented the information that I have gathered from both quantitative and qualitative methods that I have used. The representation is based on the review of artefacts and materials connected to the area of topic, interviews from the medical personnel, observation done on their work place and the survey that have been handed out to the medical personnel that have been observed by the researcher. I have made use of a chart as a graphical representation of my quantitative data so that the gathered data will easily be seen and interpreted.

5.1 Ward 2

5.1.1 Nurses Endorsement Rounds Meetings

The turn over between the night shift and the day shift between the nurses happens at 07:30 in the morning and ends at 08:00. This is a thirty-minute period of time where the two shifts overlap. They use this time for orientation. One or two representatives from the night shift inform the nurses from the day shift about the condition of the patients during their entire shift. These include what medications have been given, the patients' sleeping condition, emergency cases and patients who are scheduled to leave or to be transferred. Updates on the patients' present status are also discussed during this session. They are equipped with a piece

of paper called as "reminder note" which serves as a helping aid in their discussion. This paper is updated twice during the night and afternoon shifts. There are two nurses in-charge of updating their list and the magnetic white board on the nurses' working station.

During my observation, there were a total of nine nurses present from the night and day shifts with the exclusion of the head and the assistant nurse. The meeting was held on their break room. There were two nurses from the night shift who were responsible for the orientation of all the patients' information. The presentation includes those patients who were admitted, those who were scheduled to leave and those who will come for check-up or admission. The patients who were admitted don't necessarily means that they will stay on their post the whole night. Oftentimes, there are also patients who were admitted for treatment for the whole day and will be sent home the same day. Those patients usually are resident in Oslo or in the nearest town outside Oslo.   Almost all of the patients have a long history of chronic illnesses. Therefore, they have spent most of their time in the hospital.

Since most of the patients were well known to the nurses, the selection of the patients was done voluntarily. The team was divided into three groups of patients, the red, the green and the middle room team. Aside from patient-nurse responsibility, technical obligations must also be decided. The questioning was led by the head nurse. She mentioned the duties one at a time in order to give room for answers. These obligations include the kitchen, medicine room, fabric room and other technical rooms of their post. This was also voluntarily done. While the meeting was taking place, the assistant nurse had a huge work week planner in front of her and a book where the reminder note from day to day basis was glued. This book will then again serve as a helping aid and guide for the medical staff during their planning.

I was properly introduced by the head nurse to the group. She mentioned the reason for my presence of their meeting, from which school I am from, what I am studying, the area of my research and what will be my duty during my observation. When the head nurse asked the group who wanted to be my guide during my observation, no one volunteered. The head nurse has to choose from one of them. A nurse who was in charge of two patients was my guide for the whole duration of my observation for the day.

5.1.2 Nurses Working Station

This is the room where the nurses record, register, update and have an access to all sorts of patient information both manually and electronically. It is not only the nurses who use this room but also the doctors who are in duty at this post. I observed that the room is equipped with three computers and a printer. The working station looks very overcrowded with the presence of two huge book shelves. During my time of observation, I was sitting in the middle of these shelves. They also have different types of forms and brochures hanging on the wall, a white magnetic board, plenty of chairs and a long rectangular-shaped table which almost occupied the entire working station. They have two television-like monitoring screens, known as the cardiac monitor, hanging on the wall that monitors the heartbeat and pulse of the patient who are attached to the device. The monitor shows information in every room in which a connection was installed. There are two dictation phones beside the computers. A piece of paper hanging at the back of the door states that there should be quiet periods between 13:30-14:30 and 21:00-22:00. The nurses were busy doing their electronic and manual report during those mentioned periods. As I observed during my stay, the day shift usually comprises of nine nurses. By computing the number of available computers on the room, it meant that three nurses must share a computer.

5.1.3 Endorsement Meetings with the Doctors

There were two consecutive meetings constantly held at 08:45 in the morning at the nurse's working station and in the break room. The green group of patients are discussed at the break room. These are two resident doctors, an assistant doctor and an assistant head nurse, while the red and the middle room teams discussion is held on the nurse's working station. The latter also contains two resident doctors, an assistant doctor and a nurse.

Since the meeting of the latter group was held at the nurses working station during my observation, there were also other nurses present in the room. These nurses would occasionally speak up during the discussion. One of the resident doctors sat back and fort from the computer and the table using a rolling chair. She borrowed one of the three computers available on the room. She accesses the CP at the same time looking at the paper-based journals or the temporary patient folders. The owners of these temporary patient folders are those patients who are admitted at their post. It will be too hard for them to carry or to look through the whole patient journal because most of their patients have a long history of

treatment that causes the journal to increase its weight and size. There was only one responsible nurse for the entire patient on post 2. She was jotting down notes while the doctors assessed the conditions of their patients.

The meeting was somewhat chaotic. Since it was held at the working station, a lot of things were happening at the same time in the room. There were nurses talking to each other or at the telephone, sitting and working in front of the two available remaining computers, nurses walking back and forth and inn and out of the room, and those who were looking for their patients' journal on the table in front of the resident doctors. There was always some interruption now and then.

5.2 Ward 3

5.2.1 Nurses Endorsement Rounds Meetings

The orientation between the night shift and the day shift usually begins at 07:30 in the morning. It is usually held in their break room. The patients are divided into two groups and so are the nurses, the red and the green group. The nurses have a white paper containing the lists of patients and their conditions. The discussion is focused mainly on the condition of the admitted patients, the incoming patients and those who have a control visit for the day. The copies of the lists on top of the organizer are available for every staff at the post. These are updated during the night shift.

The division of labour was voluntarily done by the nurses during my observation. Most of the patients on post 3 are children who have illnesses since birth and are usually admitted a lot of times during a pan of time. For this reason, the nurses have thoroughly followed their growth and development. On one of my three observations on this post, a total of twelve nurses were on duty that day. A nurse commented that they were too many on duty and it was more than the usual. They were divided into two groups; the green group which was composed of seven patients, and the red group with eight patients. The head nurse prompted the conversation on who's going to take care of whom. Consecutively, the nurses chose their respective patients in particular with their past involvement with them. The meeting ran smoothly until a problem

was discovered. One of the patients, who had an appointment that day, was missing from their reminder list. The nurse responsible for the reminder list accidentally forgot to include the patient because she oversaw the name on the calendar book. The problem was fixed by writing the name of the patient on the nurses' own reminder list.

After the patient responsibility selection, technical duties were decided led by the head nurse or the assistant nurse. This was done on a volunteer basis. These technical duties included responsibility at the kitchen, infection room, fabric room, equipment room, medicine room and examination room. The medicine room is the most important room to keep an eye on. They have medicine stock good for two-three days of stay for each patient. They must have an inventory of the medicine every night so as to be prepared for unexpected circumstances. Such example of this unavoidable circumstance is when the inventory does not match. There are many reasons for this kind of incident, a probable example could be mistake during the ordering, or it could also be when a nurse have exceeded the quota of use without ordering new ones. The worst case scenario could be when one of the medical personnel steals medicine from that room.

The head nurse always carries a huge blue book which can only be updated by him and the assistant nurse. The book contains a daily list of the patients and their scheduled tests in the past and in the future. This artefact serves as a primary source of information ready at hand. It is also the head or the assistant nurses' duty to update the white magnetic board hanging in the break room.

5.2.1 Nurses Working Station

In this room, the nurses are free to choose what manner of acquiring information about their patient. It can either be done manually with the paper-based patient journal or by means of the computer using the electronic patient journal and other medical systems integrated at the hospital. They didn't have any standing book shelves since most of it were placed in their break room. They do have hanging book shelves which consist of books and binders. There are also forms and brochures in every sight whether hanging or on top of the table. The room

has four computers and a printer. It was spacious and not overcrowded with furniture and chairs. On one of the day during my observation, there were twelve nurses during the day shift. My computation suggested that each computer must serve at least four nurses.

5.2.2 Endorsement Meetings with the Doctors

The morning meetings are always held in a meeting room at the end of the hallway. The room is big enough to occupy up to twelve persons and is equipped with a computer and a telephone. The session is constantly held from 08:45 until 09:45 in the morning. Normally, the meeting is composed of two assistant doctors, a resident doctor, the head nurse or an assistant nurse as well as the nurses at duty. Thursdays are different. During this day, a diverse group of medical personnel such as a nutritionist, sociologist and psychologist are also present during the meeting. An assistant doctor sits in front of the computer while the CP is open, viewing the sorted names of the patients on their particular post. One after the other, the nurses enters the room carrying the patients' temporary folder or sometimes the whole paper based journals. The other nurses are waiting outside for their turn. During my observation on a Thursday, the room was overcrowded with medical personnel from different specializations. A big blue book is used for updates, registration of upcoming consultation and tests of the patients, and schedules of long term medications is being updated by the head nurse or the assistant nurse during the discussion with the doctors and other medical personnel. As they discussed the case of the patient, the assistant doctor who was accessing the CP clicked the name of the patient retrieving the information available for the patient. Even though the resident doctors didn't asked for any electronic information, the assistant doctor must be prepared for any questions by prompting the screen sequentially corresponding to that of the patients being discussed. The presence of the information on the CP was parallel to that of the information given by the patient's journal. The nurses here were too energetic to print out every single updated laboratory result of the patient. It was stored on the patients' temporary map during their admission. One of the assistant doctors was responsible for ordering services or laboratory tests for the patient. She was also in charge of referral letters.

5.3 Section for Child Neurology

5.3.1 Endorsement Meetings with the Doctors

The orientation meeting usually starts at 07:45 in the morning and held at the break room. This session is a merged meeting between the medical staff of the Section for Child Neurology. There are no separate orientation meetings within the nurses. The meeting is normally composed of two-three resident doctors, four-five nurses and the head nurse with its assistant. There are times when the assistant section leader takes over the duty of the head nurse.

During my observation, there were three doctors, the section chief doctor, four nurses, an assistant section leader and a medical assistant. One of the nurses was from the night shift and the other three from the day shift. The nurse from the night shift has the responsibility to inform the others about the patients' conditions during the night. The assistant section leader holds a time plan and jots down notes while the discussion was taking place. This weekly time plan is updated in collaboration with the assistant section leader, the patient coordinator and the secretaries. It includes the patients' condition and their treatment, where they are supposed to stay and the management of their rehabilitation. During their entire meeting, the paper-based journals were the only source of patients' status. These journals could either be the thick and original patient paper-based journals or a temporary admission folder. They were not using a computer to check the history of the patient. Neither did the nurses have a reminder list in front of them. They were discussing patients one after the other who were already confined in their section and those who were scheduled to come that day. As I have observed, it was only the assistant section leader, with the exclusion of the doctors, who was jotting down notes and reminders on the week planning paper. After the discussion of the patients' condition, the nurses chose their patients for the day. The meeting ended approximately after fifteen minutes.

5.2.3 Nurses Working Station

This room serves as an information room for the nurses. This is where they spend their time searching for information, registration and updates regarding the patient's condition. These

tasks can either be done manually with the use of the paper-based journals, brochures and forms, or electronically with the help a computer and its system such as the DocuLive EPR or other programs suitable for their division.

As I have seen, the room was filled with three computers, a printer and three enormous bookshelves. It can only be occupied by four-five persons because of the room's narrowness. The bookshelves are almost half empty but contain binders and organizers marked with the nurses' respective names. During my entire observation, the room was only occupied in three occasions and not all of the nurses used the computers at the same time. Therefore, the scarcity of the computer was never a problem in this section.

5.3.2 Additional information

The section is very different from the other post at the Children's Clinic. Since the primary treatment of the patients is a long-term rehabilitation, coordination among the cross-disciplinary medical personnel is planned beforehand. The weekly planning of the patients is also done in advance; for this reason, there are no surprises or spontaneous visits from the patients. Everything must be planned ahead of schedule. Collaboration and coordination between the medical personnel in SCN is the key principle in planning the long-term treatment for each patient.

The staffs have similar cellular phones that are in-use as a means of communication. They have their own phone numbers specially assigned to them. During my observation, the landline telephone rang. The nurses at the working station looked at each other with curiosity. They mumbled and said that it was surely a wrong number because no one calls on the landline number. One of the nurses answered the phone and it was a wrong number as was expected. As one of the nurses told me, the landline could not be trusted because of its abnormal functions.

The work place cannot be distinguished as a clinic or as a subsection of Rikshospitalet. The first time I entered the lobby, I though that the people that roams around me were visitors or relatives of the patients. The medical staffs wear civilian clothes and only an ID can tell about who they are. Even the doctors are not wearing a white coat.

In their break room where the meeting was held, there were different kinds of forms hanging on the wall. They also have 2 white magnetic boards, 2 book shelves and a box filled with playstation games. I asked one of the nurses about the presence of these numerous games marked with numbers. She told me that some of the patients like to engage in such an activity. Those games are costly and lending it out without supervision can lead to the loss of the games.

The section has their own cafeteria but is only available for the patients and their relatives. Patients and their guardian can eat here for free. Meals are usually served three times a day; during breakfast, lunch and dinner. They have kitchen staffs that are responsible for cooking and serving meals. The patients and their respective guardian eat together.

5.4 Use of the Clinical Portal (qualitative & quantitative)

The qualitative portion of the use of the clinical portal will be based on my observations and interviews. During my observation, particularly during the doctors' endorsement meetings, I have recorded the number of times that the clinical portal was used on a patient to patient basis. While at the nurses working station, I documented the use of the portal every time it was being opened and used. In the interviews, I asked them about their thoughts and experiences with the portal. I asked open-ended questions based on the guideline I have.

For the quantitative part, I organized the answers into three groups. "Never" and "seldom" falls under the colour green. I have interpreted it as a negative response. "Sometimes", "often" and "always" falls under the category of positive feedback and is coloured yellow. The light green colour falls under the group of unclear. This includes questions that don't have any answer or questions with two or more answers.

5.4.1 Ward 2
Qualitative (Observations and Interviews)

The use of the clinical portal was particularly observed during the morning meetings with the doctors. As I mentioned earlier, this meeting is held separately in the nurses' break room and at the nurses' working station. I have only observed the latter. During this meeting, the clinical portal was opened by one of the doctor. Using a rolling chair, she switches her view back and fort from the computer and from the table. A total of six patients were being

discussed in this session. The clinical portal has been used every time except from the last one. The function that has been used was for the results of laboratory tests. While they were discussing, the paper-based patient journal and the temporary folders were also on top of the table. They have a parallel use of information when it comes to the patients' condition. They have also encountered that one of their patient was not on the list inside the post 2 on clinical portal. One of the doctors also noticed it the day before. The same patient has not yet been updated on their post. They have agreed to check the incident with the secretary.

As I have noticed, there were few print outs of the laboratory test on the paper journal or on the temporary folder. When it comes to printing a copy of the results, it depends upon the doctors. One of the nurses have informed me that some of the doctors are smart to use the computer and thinks that it is okay while the others demand for a copy that should be placed into the temporary folder of the patient. Printing of the laboratory results is one of the main topics in the clinical portal. Since the results are electronically available for the medical personnel at all time, there will be no reason to print its results. The doctors have an additional obligation to receive and sign whenever the result is available. The nurses, on the other hand, are not obliged to print the result or remind the doctors about it. However, one of the nurses has expressed that printing out the laboratory results all depends upon the resident doctors. Not all the resident doctors have obliged them to print out results or to check it for them. It is not a part of her duty to remind the doctors to sign on the receipt of the laboratory result but it seems to be this way.

> R[24]: *"Is it your duty as a nurse to remind the doctor if the result (laboratory test) is already available and is ready for signing?"*
> N1.2[25]: *"No it is not, but it seems to functions maybe like that. It is not my duty."*

The usefulness of the functionalities available at the clinical portal highly depends upon the medical personnel's view about the system. The idea behind the portal is very promising but how it functions as a system is questionable. The opportunity for the medical personnel to have a complete overview of the laboratory results of the patient can be counted as a very positive one. Most of the users are complaining about the portals' slowness problem. It is a

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[24] Reasercher
[25] Nurse 1 of ward 2

big deal for them because every minute on their work plan schedule counts. The problem really affects the doctors meetings and their pre-visits. As one of the pioneer doctors quoted:

> D1.2[26]: *"It (the portal) uses too much time to get into the different functionalities [.....] One should sit and wait for a long time in order to view the results [.....] They (IT department) have implemented the portal too early... it is a very defective product [.....] We, as doctors in the hospital, have too many things to do. And I feel that with the clinical portal, we can get a helping tool that can make our working day easier but now I am using more time than before [.....] the idea behind the portal is very good, it will be very nice if it will just work properly like it was planned."*

The problem of slowness is not the only dilemma that the users are experiencing. They have also encountered being thrown out of the system. Sometimes, the portal just locks-up and hang. For them, it is very irritating and annoying. It is very time consuming to log-out and inn again on the system. It only delays their work.

> D1.2: *"There are times, one out of three tries, that the portal will tell you that you have only twelve minutes again. But the system closes and will prompt you to log in again. And it often happens that the portal hangs."*

If such problems have been encountered, they have to shift and find another way in retrieving the information they needed. They usually check the result individually on the systems like what they used to do before the clinical portal was born. The same incident also happens when they are encountering problems in opening the DocuLive inside the portal. This functionality doesn't work well. Some of the users have tried opening the Doculive but the others just didn't care. On one of my observations, the nurses have tried to compare the time on opening the Doculive on its own and opening it inside the portal. They have succeeded to open the DocuLive inside the clinical portal after three attempts. The result is really devastating. Opening the DocuLive alone consumes only half of the time than opening it inside the portal. It took them 3 minutes to open the EPR inside the portal while at one point, it took fifteen minutes opening it alone. Slowness is not the only problem when opening the Doculive inside the portal. Double logging is also a problem for the users.

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[26] Doctor 1 of ward 2

D2.2[27]: *"It is very hard and demanding to open the Doculive inside the portal. I have to log on thrice in order to get such those information that I need for the patient. It is very time consuming to wait for the very slow machine."*

One of the doctors also added:

D3.2[28]: *"It is very irritating [.....] When you are in the klinisk skrivebord, it always says waiting for the connection between the Doculive. I think that there's a lot of waiting time opening the Doculive. And then, you got again this message to log into the Doculive [.....] If you have opened the clinical portal first and then the DocuLive, you must still open the Doculive again."*

The doctors have also experienced that some of the patients names could not found on the Doculive when it was opened inside the portal. Often times, the patients name and its information was mistakably fetched onto the Doculive when performing it inside the portal. It means that the patient from the portal that you are working at the moment is different from the information given by the Doculive inside the portal.

D2.2: *"It is not often that I can find my patients there (on the Doculive) [....] I therefore open the Doculive alone."*

The IT department have gradually implemented the clinical portal. Not all the functionalities of the portal can be found during its first version. The edition that became very useful to its users was when an overview of some laboratory results can be seen in one screen. In that picture, one can see the whole process of what laboratory tests were ordered and its result. It will be easier for the users, especially the doctors, to compare the results with different dates. The graph which shows the recent activities of the tests makes it easier for them to monitor the condition of the patients. The users are pleased with this type of functionality.

D2.2: *"The concept of getting all the laboratory results of a patient in one picture is very good. I think it is very ideal."*

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[27] Doctor 2 of ward 2
[28] Doctor 3 of ward 2

The clinical portal was put into service without any user training. Unlike the Doculive EPR, there are series of courses that the medical staff should go through. The developers of the portal confidently said that the portal is a very user-friendly system. No training is required in order to use the portal because of its simplicity. A doctor told me that it will be smart to have a tutorial course for the portal. One of the nurses likes the functionality of the portal but preferred not to use the portal on a daily basis because of insufficient training.

> N1.2: *"I'm not using it (portal) everyday because I didn't have any training and I didn't know what function I am suppose to use and on what basis."*

The IT department didn't oblige the medical personnel to use the system. The portal is integrated in the computer and it's up to medical staff if they are going to use it. The IT department have given them freewill. But some of the users will not translate it like that. They have contrasted the idea of freedom of choice. They felt an obligation of force. As one of the pioneer doctors commented:

> D1.2: *"They (IT department) have implemented a new system (portal) that we are forced to use [.....] No one sends us laboratory results on paper anymore, what else are we going to do [.....] Isn't it a forced action?"*

Quantitative (Survey)

WARD 2
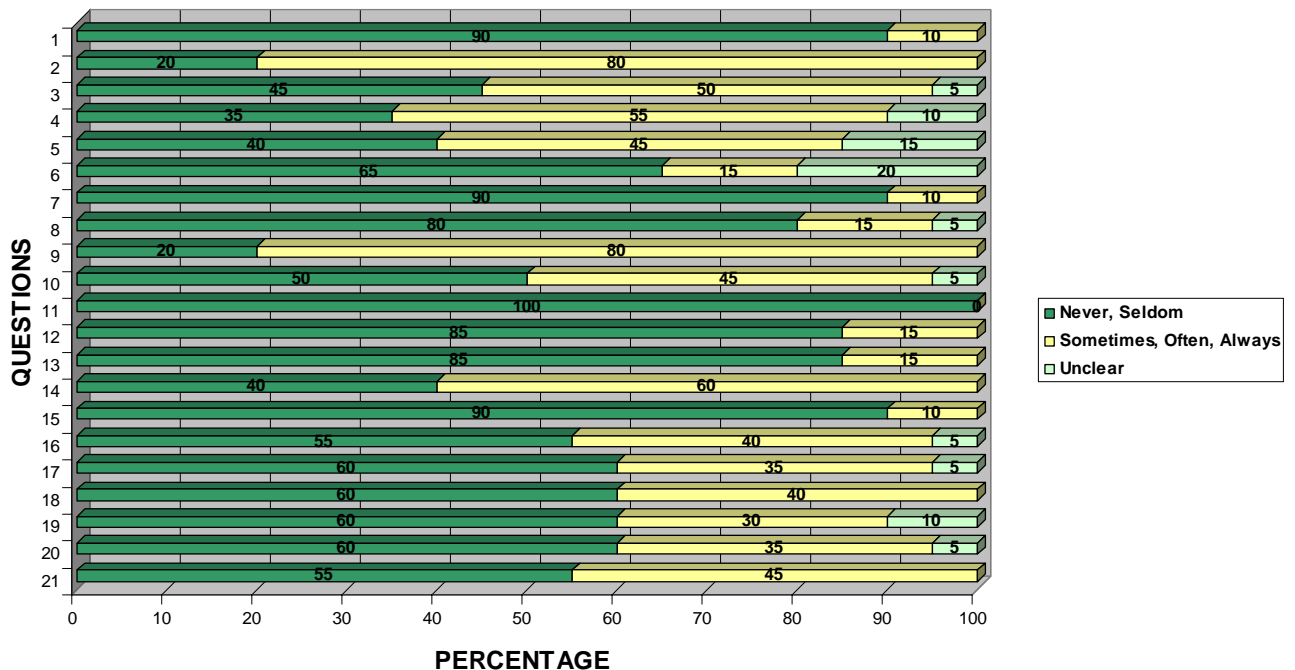
The total numbers of nurses working at ward 2 are forty-six. Out of these forty-six nurses, only twenty of them have answered the questionnaire gaining a total of forty-three percent. The questionnaire was handed out to the head nurse. She had the responsibility to inform her section about the survey. The researcher has given them enough time, a span of two weeks, in order for them to fill out the forms. A sample of the questionnaire can be found at the appendix 2.

As we can see, question numbers two (patient) and nine (history) have the highest rating with its eighty percent of positive answer. Next to the ranking is sixty percent in question number 14. On the third place is question number four (status of requisition) with its fifty five percent of positive answer. Questions two (patient), three (requisition history), four (requisition status), five (lab result), nine (history of lab result), and thirteen (contact info) have the overall highest ratings when it comes into positive feedback while questions one (patient's list), seven (graphical view), eleven (planning), twelve (patient info), fourteen (Riksnett) and particularly ten (calendar) gained the most negative feedbacks.

Questions pertaining specifically to the use of checking laboratory results achieved an optimistic view while questions pertaining to patient calendar and planning had the least favourable response.

5.4.2 Post 3

Qualitative (Observations and Interviews)

I have observed the use of the clinical portal on the nurses working station and during the morning meetings with the doctor. All of my three observations included the pre-visit meetings with the doctors. I have shadowed two nurses on one of my observations. In this session, I have recorded the number of patient being discussed on that day prior to the number of use of the clinical portal.

During my first observation, the team was composed of a resident doctor, two assistant doctors, the head nurse and I. One of the assistant doctors was accessing the computer. She opened the clinical portal and started browsing the names of the patient under their post. While the discussion was going on, the assistant doctor in front of the computer carefully followed the pattern of information. Even though the clinical portal was not used for every patient, the information at hand (the patient that they were discussing at the moment) had to be parallel to the information on the screen. At that time, there were a total of nine patients. They used the clinical portal on five of their patients. Retrieving the laboratory results was usually the incident when they made use of the portal. It was checking of the microbiology result. They have tried to open the DocuLive on one of the patients but failed to do so. The system would not just continue. It was locked. Desperately, they checked the laboratory results instead. Astonishingly, they found out that the results written on the journal was different from the portal. The resident doctor immediately changed the number on the journal and trusted the result on the portal. There was also an incident that they have no choice but to check the information of one of the patient because the paper-based journal was missing couldn't be found. They assumed that it was at the other departments. The nurse agreed to double check all the departments that the patients have been to. In one of patients' case, they were not satisfied with the result that the clinical portal gave them. The micro-plasma result could not be seen and the doctors couldn't do anything else unless they had seen the result.

The assistant doctor who accessed the clinical portal during the meeting willingly showed me the problem that she always encountered with the clinical portal. We sat in the nurses break room because there was no available computer anywhere else. She tried to open the clinical portal more than ten times and failed to do so. A message always appeared on the screen saying "utdata fil". She had no idea what was it all about and felt very irritated. At last, after a number of attempts, she got through the clinical portal. She demonstrated the opening of the DocuLive inside the portal and succeeded this time. She found the double logging very annoying.

During my second observation, there were fourteen patients. The clinical portal was only used twice and one of the attempts failed to give a result because it was still unavailable. I have noticed that almost all of the laboratory tests was printed out and inserted to the paper-based journal or temporary patients' folder. As one of the nurses commented:

> N1.3[29]: *"I preferred using hard copies instead of sitting in front of the computer [.....] I like it (the paper copies) always available at hand instead of spending using extra time loging inn and out of the machine. It takes a lot of time sitting in front of the screen and that time was taken away from the patient."*

On my third observation, eleven patients were being discussed. Out of these patients, the clinical portal was used for three of the patients. They used it to check three types of laboratory result and one of it was the blood test. Based on what I have observed, the portal was used rarely during the meeting because of the printed material available before hand by the nurses that were enclosed on the paper journal. The nurses checked the results before the meeting and printed it out. It so happen the result was not yet available during that instant (when the nurses checked), so the portal on the meeting room was used in order to double check the result. Otherwise, the portal would be ignored.

The doctors are the only authorized persons that can sign on the receipt received from the laboratory and tests results. One of the resident doctors said that he acknowledged the receipt if he sees it or if the nurses try to remind him; otherwise it will be left unsigned. It happens and is still happening that the patient has left the hospital premise and has been fully

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[29] Nurse 1 of ward 3

diagnosed leaving behind an unsigned laboratory receipt. For him, it is not too dangerous to leave it blank unless it was already seen and used during the diagnosis. Even though it is not the responsibility of the nurses to check the laboratory results now and then, it seems to be interpreted like that. It was proven by one of the nurses.

> N1.3: *"The responsibility of checking the blood results on the portal is not my responsibility, it is the doctors'. I am not sure if it is a negative or a positive side of the clinical portal that only the doctors could do the marking. Out of my responsibility, I am used to checking the results by myself and remind the attending doctors to receive it. Normally, it takes a while for the doctors to check recent laboratory results. This leads to a delay in the treatment medication for the patient. And that is the reason why I am, even if it is out of my boundary, continuously checks the results round the clock."*

Most of the users are not aware of any new changes integrated on the system and think that they are not properly informed. Since the IT department didn't offer courses concerning the clinical portals' use, most of the users have been suggesting a short-term updating orientation. He also added:

> D1.3[30]: *"Most of us (doctors) use the functionality which appears to be simple, but did hesitate to try using those functionalities that appear to be complicated. We are afraid that something might happen when we click for example the wrong button."*

They also encountered problem with too many clicking's on the keyboard. There are also too many "back" buttons. One of the doctors stressed that before he tried to go back to where he wanted to go, he becomes worn out already because of the never ending clicking. He uses a lot of time in clicking and thinks that the system is slow. As one of the doctors commented:

> D2.3[31]: *"The principle behind the clinical portal is very good but the system is a little bit slow. It will be better only if it will function faster."*

The question of free will in using the clinical portal was also my topic during the interviews. Although the IT department gave them the freedom of choice, they also felt that they were

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[30] Doctor 1 of ward 3
[31] Doctor 2 of ward 3

forced to use the system. The IT department gave them the responsibility to receive the laboratory results. One of the doctors argued that they would not receive those results if they will not use the system. They also felt neglected.

D1.3: *"Of course we are forced to use it (the portal),I do not think that we can do something about it. This was a decision made from the head. We were never asked for our opinion."*

Quantitative (Survey)

WARD 3
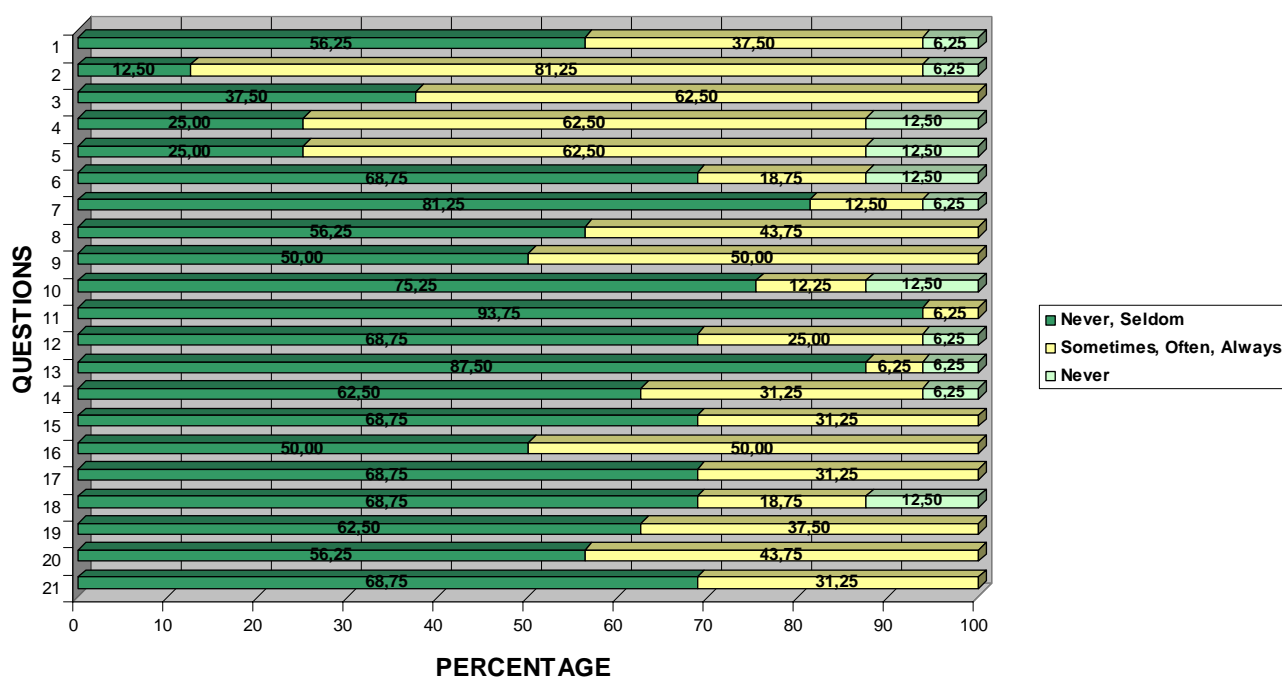
The highest pointer on Ward 3 is question number two with its eighty-one percent . On the next ranking with a feedback score of sixty-two percent are questions two (patient), three (requisition history)) and four (requisition status). Questions nine (history) and fifteen (employee) shared the same spot on third place with both fifty percent of neutral feedback. Question number eleven (planning) gained the most pessimistic view at eighty-seven point five percent. There are six questions with the same sixty-eight percent of negative answers. It is questions six (lab result), fourteen (riksnett), fifteen (employee), seventeen (courses), eighteen (activity), and twenty one (doculive).

Questions with the highest ranking of positive feedbacks deal with a single searching of patients' information and checking for laboratory results. Those with negative view questions are scattered within the portals frame. It deals mostly with the use of Riksnett, email and opening of the Doculive EPR inside the portal.

5.4.3 Section for Child Neurology

Qualitative (Observations and Interviews)

As I have mentioned earlier, this section is entirely different from the other post in Childrens' Clinic. They didn't use computers during their morning meetings. During my observation, I didn't saw anyone of them used the clinical portal. In fact, most of the nurses didn't know their passwords at all. There were three nurses on duty that day; two of them have never tried to log in inside the portal. The remaining one has the responsibility to check laboratory results such as blood and urine samples when needed. The responsible nurse acts as the super-user of their section and offers help whenever her colleague is experiencing difficulty when using any system on the computer.

I have also interviewed one of the therapists at their section. Her first impression of the portal was that it looked weird because of the presentation and the colour. But after getting more acquainted into the system, it became more clear and understandable. She agreed it is a user-friendly system. She uses the portal at least once or twice a week to check blood or urine tests results during the patients' visits. She remembers that the first time that she used the Clinical Portal was before Christmas 2004. She has used it ever since but lost her password about a month ago (October) and hasn't got a new password yet.

I didn't have the chance to interview the doctors in this section. I tried to contact them several times but unfortunately, I could not get an appointment. I have been told by one of the nurses that the doctors use the clinical portal.

Quantitative (Survey)

The presentation below was taken only by one person. There is only one nurse responsible for using the clinical portal. She uses the portal at a maximum of three times a week and depending upon the availability of the laboratory requests. Out of 9 nurses at the SCN, 5 of them answered the questionnaire and 4 among did not access the clinical portal at all. As we

can clearly see, she never or seldom uses the clinical portal in her work schedule. Question fourteen (mitt skrivebord) up thru eighteen (other activities) pertaining into patient planning is totally negative. A different system specially made only for their section is being used.

SECTION FOR CHILD NEUROLOGY
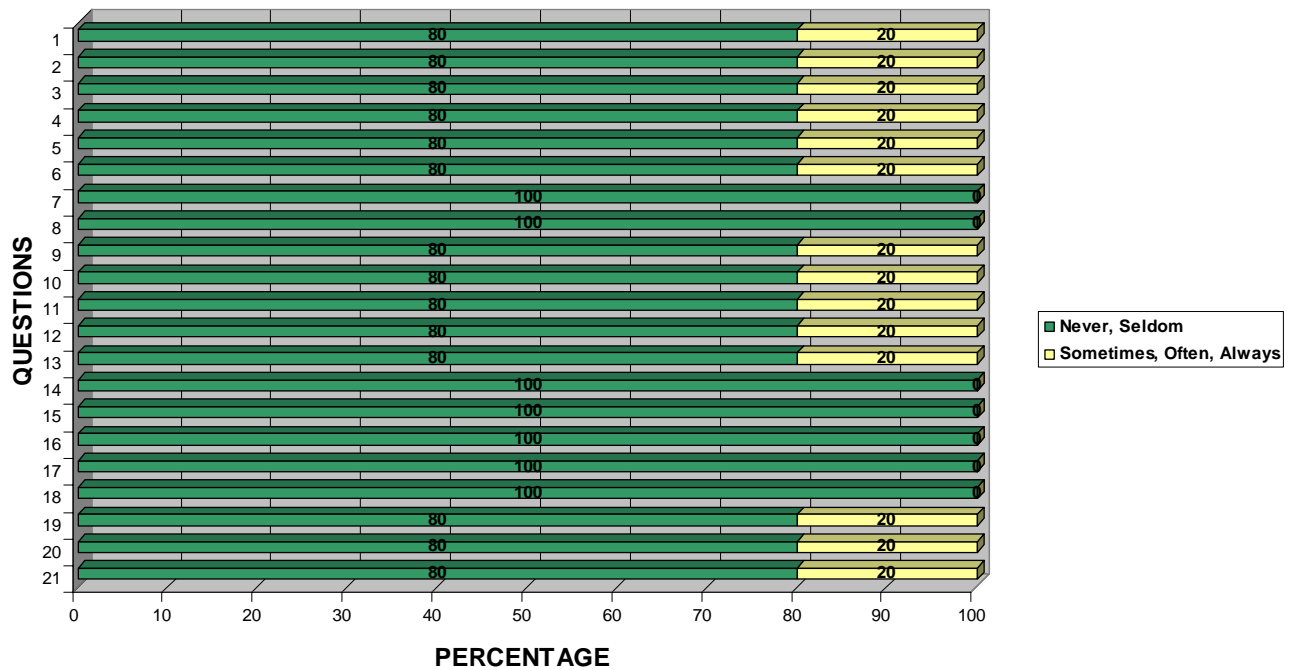
Chapter 6 Analysis

Introduction

Organizational change is a difficult situation for everyone. Everybody have different experiences in particular condition and some people deals with it better than the other. Control over the situation is the first thing that the users must go through. They have to understand the reasons on why they must encounter such difficulties and evaluate if proper support and considerations are given to them. The users must also realize the real purpose in using the system and what benefits would they gain by using the system. Change often starts with a new beginning. New processes and activities evolve during this organizational change. In this chapter, I will discuss and analyze how new activities evolve in using the clinical portal and what are the factors which affect its development.

I discussed the empirical materials that I gathered on the area of my research in the last chapter. Using the human agency perspective of Bourdeau and Robey, and the basic structural model of activity of Engeström, I will in this chapter analyze the visions and challenges of the clinical portal. In subsection 6.1 is the analysis using human agency perspective, consequently followed by the analysis using the basic structural model of activity in subsection 6.2. Finally, I will finalize the analysis of both qualitative and quantitative approach on subsection 6.3.

6.2 Analysis using Human Agency

I will first analyze my findings based on the human agency perspective by using its three fundamental elements. It is composed of inertia, improvised learning and re-invention.

Inertia

The users were oriented about the clinical portal through departmental information meetings and orientations. It is voluntary act among the users. They were not obliged to attend the orientation. The management says that the users were properly oriented about the clinical portal. The users were given information through meetings, emails and newsletters. They were updated constantly about the improvement and new functionalities that could be found on the portal. The users on the hand felt that they were not properly oriented about what's new and how to use the newest functionality. Little importance on the orientation part was recognized.

> D2.2: *"I am not aware of what's new about the clinical portal or what functionality is already available. I think that we must be informed every now and then."*

There are no training courses with regards to the use of the clinical portal. It was not given because the developers didn't want to oblige the medical personnel in using the system. They also think that by giving the users this kind of freedom, it would increase the popularity of the portal. Since the expected training will be in the form of peer to peer information, the developers are aiming to attract its users by not verbally forcing them to use the system. Another reason is that the portal for the developers is a very user-friendly system and it is easy to navigate. Not all the users of the system agree with this argument:

> D1.3: "Yes, the presentation is easy to understand but the navigation is the problem. Too many clicking… And also too many back buttons before you can get to the next patient […] It uses too much of my time and makes my work slower."

The first impressions of the users about the clinical portal are positive. Almost all of the users that I interviewed considered the portal as a genial approach. It provides a complete overview of the laboratory results and at the same time compares these results with other types of laboratory findings. A complete history of data such as analysis, orders, results and requisition on different dates can be easily traced back. With the presence of the graph analysis, the users could immediately interpret the results by simply looking at the graph.

> D2.2: *"The clinical portal is very convenient in terms of viewing the laboratory results especially the blood samples. The graphical representation which shows tae recent activities of the tests makes it easier for us to monitor the condition of the patients."*

One of the nurses called the clinical portal as "All-in-One". She means that one could find everything in just one place.

> N1.3: *"The integration of the clinical portal is a very good idea. It (the portal) offers a good overview about certain patients and their records. [...] With the presence of the portal, results are always made to be available at once and can be viewed in a very attractive but comprehensive manner on the computer screen. With the presence of the graphs, we can immediately notice the recent changes that occurred."*

The management uses a voluntary approach in the use of the portal. The system is available to every body and there are no external forces from the developers that oblige the users to engage with the portal on their every day work situation. The availability of the portal anytime and anywhere is one of the focuses of the clinical portal. The users think on the other hand that they are forced to use the system because of lack of choice.

> D1.2: *"They (IT department) have implemented a new system (portal) that we are forced to use [.....] No one sends us laboratory results on paper anymore, what else are we going to do [.....] Isn't it a forced action?"*

The users have different experiences about the use of the clinical portal. Deficiencies of the system have also been encountered. The users are experiencing difficulties in getting the right information when opening the DocuLive EPR inside the portal. Slowness of the computers also hinders the users to use the clinical portal. Some of them have also been thrown out of the system at the beginning of the logging menu. It was very frustrating and irritating for the users to encounter such problems.

> D1.2: *"We (doctors) are very busy. We though that the Clinical Portal as a tool would help us make our working day easier. But I think that I am using more time now than before."*

> D1.3: *"Things are much better if we didn't have this thing (the portal) available."*

The initial phase of the clinical portal reflected a negative view from the users. They expected that the systems as a tool would help their work situation easier and more efficient. However, they are confronted by the hardships and difficulties retrieving patient information using the portal. Instead of using the clinical portal frequently, they are trying to avoid the system. They also wish to get rid of the system and hope that the portal never existed.

Improvised Learning

Though the users of the clinical portal are experiencing difficulties in accessing and navigating the portal, they have managed to cope up with the system. The peer to peer approach emerged since no formal trainings were delivered. The users gain knowledge about the use of the clinical portal by sharing of experiences and by using each others idea. Exchange of idea, meanings and experiences were usually discussed during their break.

> D1.3: *"We (the doctors) usually discuss the use of CP during our break time. By means of this kind of exchanging ideas and experiences, we gather information on how to deal with some problems that the CP is producing. For me, whenever I detect mistakes or problems on the CP, I confide with my fellow doctors […]."*

New employees were oriented and trained by their fellow workers. Teaching how to use the clinical portal became a part of the nurses' orientation to new beginners. In addition to such peer support, the super-users from the DocuLive take the initiative to educate other users who lack proper knowledge about the portal.

For the doctors to solve the problem of delays on their meetings, the nurses were obliged to see and check or in any other case, print any available laboratory results prior to their meetings. This incident will help the doctors continue their meeting without intermission. With the slowness of the clinical portal, the doctors don't have the time waiting for the laboratory results to appear on the computer screen. They will rather spend this wasted time with their patients than waiting.

Out of the nurses' duty and obligation, they have to check the laboratory results consistently. They have to remind the doctors about the availability of the result in order to diagnose new

patient treatment based on the new findings. According to the nurses, some of the doctors are smart enough to use the system others are not. For the nurses, it will be easier for them to print all the available results for their respective patients without hesitation. They didn't have to think and remember those doctors that are not smart enough to use the portal.

> N1.2: *"When it comes to printing a copy of the results, it depends upon the doctors. Some of the doctors are smart to use the computer and thinks that it is okay while the others demand for a copy that should be placed into folder (oppholdsmappe) of the patient. I usually print a copy of the result and put it on the folder. After the patient left the hospital, I give the folder to the secretary. It is the duty of the secretary to sort and maculates the unnecessary documents on the folder."*

Improvised learning didn't follow any particular plan. One of the aims of the clinical portal is to minimize the use of paper. In this incident that I mentioned, paper copies are more applicable instead of electronic form. A different situation emerges and occurs because the users are trying to cope up with the functionality of the system. Even though the users didn't engage themselves as planned by the developers, they managed to learn from their experiences and use it as a foundation to compensate the deficiencies of the portal.

Reinvention

Through such tweaking or so called "workarounds", the users develop a new way of using the clinical portal on their behalf. The newly emerged division of labour among the doctors and nurses compensates the slowness of the system. Both the doctors and the nurses gain from the said result. The doctors save time in waiting while the nurses get an instant diagnose from the doctors. Although printing of the laboratory results is not the intention of the clinical portal, the doctors and the nurses found this technique remarkably applicable for their situation.

Opening the DocuLive inside the portal is one of the problems in the clinical portal. The doctors managed to avoid incorrect information by opening and using the DocuLive alone. They use the clinical portal to trace new events and activities, and then they open the DocuLive in another window to view the full version of the information. They are using the clinical portal as an index.

The responsibility of signing the laboratory results among the doctors is also "tweakened". One of the doctors told me that whenever she sees an available result on their ward, she immediately signs it. This will prevent unsigned results, even though the results are seen already by the doctors and the patients are discharged. It is not dangerous to sign the receipt in behalf of the other doctors because the patients, who are treated at their ward, have a history of acute illnesses which are well-known by the doctors.

The re-invention process of the clinical portal produces new activities and processes around the work situation of the medical staff. The users try to benefit from the system by using "workarounds". These tweakenings allowed the users to overcome the portals limitations and compensate the deficiencies of the system.

6.3 Analysis using the Basic Structural Model of Activity
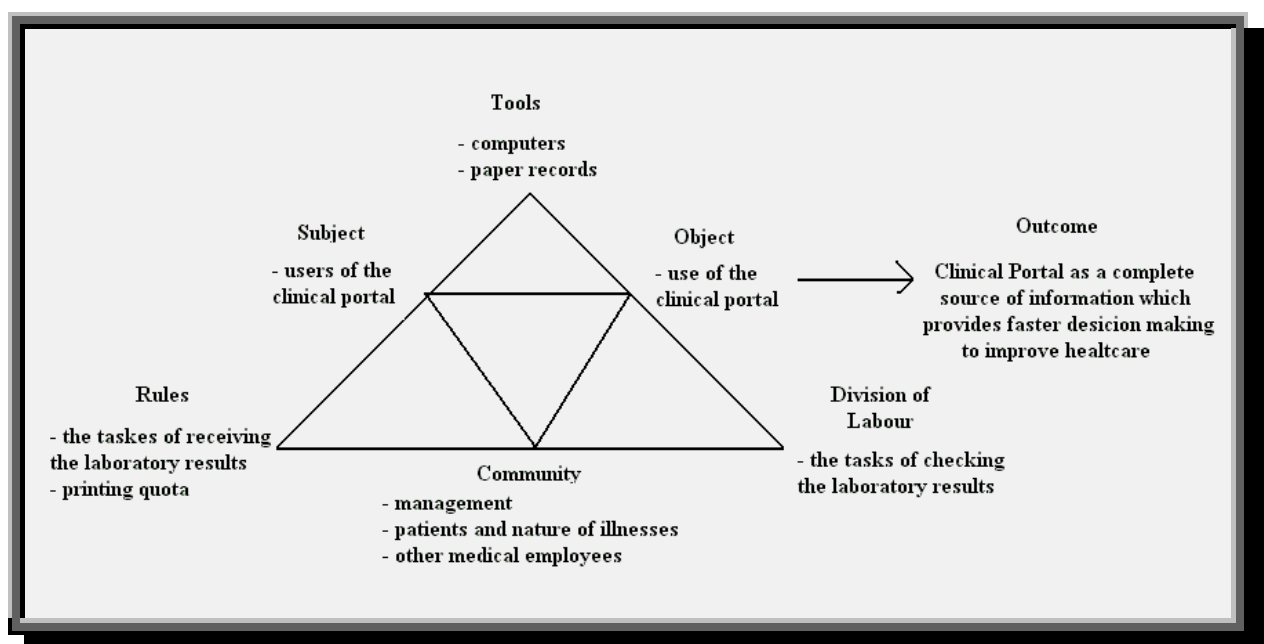
Figure 15: Analysis using Activity Theory

The analysis of the clinical portal using the basic structural model of activity is seen on Figure 15. I will focus my discussion on the subject and the object, which is mediated by the community, tools and division of labour. The outcome that is produced based on the entities

provided result into the Clinical Portal as a complete source of information. It is known as one of the aims and visions by the management of the portal.

Looking deeper at the mediation between the object, subject and its community, we can see that the tasks of checking the laboratory results are placed under the division of labour. As I mentioned earlier, this tasks is newly generated because the relationship between the users of the clinical portals, how the users enacted on the technology and the factors that affects the enactment resulted into a different pattern of use.

The division of labour between the doctors and the nurses was affected by the slowness of the computers, deficiencies in the system, effectiveness of the paper journals, peer pressure and informal trainings. The users managed to enact on the given technology and benefits from it by producing an innovative work situation where the insufficiency of the system is handled. They are using the system in differently from what was intended. The outcome is considered to be similar from what was expected, but the way of producing this outcome is unintentionally expected.

6.3 Analysis using Qualitative and Quantitative Approach

The cross-validation of the results using both qualitative and quantitative approach gives me a positive result. The gathered materials from the empirical chapter from both methods are parallel to each other.

Based on my observations at ward 2, the use of the clinical portal during the endorsement meetings of the doctors are higher than my observations at ward 3. The usage of the clinical portal depends upon the printed copy of the laboratory results. Since it is the doctors who are responsible for asking the nurses to do this activity, the enactment of the nurses to the portal is dependent upon the attitude and nature of the doctor. I observed that in ward 3, the nurses consequently checks and print the laboratory results. The observation is parallel to the gathered questionnaires for the ward.

Section for Child Neurology is a different type of ward but the results from both quantitative and qualitative agrees with one another. Only one of the nurses is constantly using the clinical portal. I only used the questionnaire coming from this nurse because she is the only nurse at their ward who has engaged with the portal.

Chapter 7 Conclusion

In this thesis, I have studied the uptake, use and impact of the clinical portal. I have tried to answer my research questions stated on chapter 1, based on the findings that I gathered from the area of my research using both qualitative and quantitative method. The theoretical perspectives that I chose helped me to enumerate the answers that I have been looking for.

1. What are the factors that make the participants choose to use or not use the clinical portal?
   o Deficiencies of the clinical portal
   o Peer Pressure
   o Effectiveness of the Paper Record
   o Lack of training

Deficiencies of the clinical portal include slowness, inaccurate patient information, problem in logging, and uneasy navigation holds the users back in using the clinical portal. The absence of training also affects the users in engaging the clinical portal. The users are avoiding the portal because of these factors. The human agents have also seen the efficiency and effectiveness of the paper record. Instead of using the portal electronically during their meetings, the users choose to print the laboratory results before hand to avoid time delay.

2. How did the users manage to cope up with the clinical portal?
   o With the use of "tweakening" and "workarounds"

The improvisational of work situation is the result of tweakening in the case of Rikshospitalet. Old habits and practices at this hospital are very hard to change. With the integration of the clinical portal, the users faced a difficult situation where their work situation must change.

The users have generated possible solutions in controlling the limitations of the clinical portal at the same time, benefiting from both.

3. What new work routines and practices evolved after the implementation of the clinical portal?
   o Newly generated division of labour

After the "workarounds" of the users, a new division of labour among the doctors and the nurses arose. The new activity provided them to cope up and manage the deficiencies of the clinical portal. Even though it is considered as informal division of labour, the doctors and the nurses are able to benefit from this process.

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Appendix 1: ID card

Når du utfører disse oppgavene, hvor ofte skjer det via Klinisk Portal?

NB: SETT KRYSS (X) TIL RIKTIG SVAR

SYKEPLEIER	ALDRI	SJELDEN	AV OG TIL	OFTE	ALLTID
Klinisk Skrivebord Pasientsøk:					
▪ Sjekke dagens liste av pasienter					
▪ Søke pasient					
Rekvisisjoner:					
▪ Sjekke rekvisisjonshistorikk(når, hva og hvem har bestilt)					
▪ Sjekke status på rekvisisjon					
▪ Sjekke prøvesvar fra MBK, IMM, PNA, KOAG					
▪ Sjekke prøvesvar fra Risweb, Miclis-web, i-Lab-web					
▪ Bruke grafisk visning av analyse					
▪ Skrive ut rekvisisjon					
Undersøkelser:					
▪ Sjekke undersøkelseshistorikk av rekvisisjoner, bestillinger og henvisninger					
Pasientkalender:					
▪ Sjekke status av alle pasienter på hver post/enhet					
▪ Bruke dag, uke eller månedsplanlegging					
Pasient Skrivebord					
▪ Sjekke/Endre pasientopplysninger					
▪ Sjekke/Endre kontaktopplysninger					
Mitt Skrivebord					
▪ Bla gjennom Riksnett					
▪ Søke informasjon om ansatt					
▪ Bruke e-post					
▪ Bla gjennom fag og kompetanse					
▪ Søke aktiviteter og nyheter rundt Rikshospitalet					
Andre Aktiviteter					
▪ Diskusjon om tilstand av pasienter med andre sykepleiere foran pc (klinisk portal tilgjengelig)					
▪ Diskusjon om tilstand av pasienter med leger foran pc (klinisk portal tilgjengelig)					
▪ Åpne Doculive via portal (sjekke pasientinfo., skrive rapporter, bestille henvisninger)					

Andre kommentarer angående Klinisk Portal:

Appendix 2: Questionnaire

UNIVERSITETET I OSLO

Navn: Sverre O. Lie, clinical chief prof. dr med Barneklinikken, Rikshospitalet

Gate/vei: Songsvannsveien 20
Postnummer/sted: 0027 Oslo

Institutt for informatikk

Postboks 1080 Blindern
0316 Oslo

Gaustadalléen 23

Vår ref:
Deres ref:

Telefon: 22 85 24 10
Telefaks: 22 85 24 01

Gaustadalléen, May 2, 2006

DET MATEMATISK-
NATURVITENSKAPELIGE
FAKULTET

Fieldwork Application

I, Maricel delos Santos Espeleta, a master student at the Informatics Institute at University in Oslo will conduct my research at Rikshospitalet. It is a part of the long term agreement and cooperation between the Institute and Rikshospitalets IT-department that involves many researchers, PHD and master students who looks at the different aspects of implementation and use of IT-systems. My case will be focused on the use of Clinical Portal.

The research will target three main users of the portal which includes the doctors, nurses and secretaries. The methods that will be used are qualitative research such as observations, interviews and review of documents, and quantitative research such as questionnaire. My research will be divided into three consecutive parts: preliminary observations and interviews, questionnaire, follow-up observations and interviews. I will first conduct a three to four observations in addition to in depth-interviews before writing the questionnaire. In doing so, I will be able to get an overview on what questions should be considered on the questionnaire. After gathering the feedbacks from the questionnaire, I will conduct a minimum of five and a maximum of ten follow-up observations plus some interviews. Interviews and questionnaire will be on Norwegian language.

Target flow of data gathering:
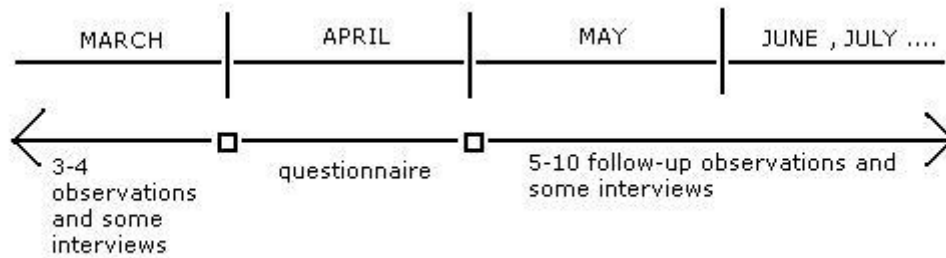
I have already signed in the "Rikshospitalets taushetserklæring" and a copy can be retrieved through Ivar Berge at the IT-department. I'm also processing my application to Datatilsynet regarding the privacy law on information gathered at the health sector. A copy of an interview agreement that I am going to use on all my interviews will also be attached.

My working problem statement

Rikshospitalet is considered as on of the busiest and complex university hospital in Norway. More than a hundred installed based systems running independently make it hard and difficult to adopt changes. During the past few years, the hospital is experiencing a transitional stage from digitizing its paper records and documents in order to decrease the burden of work load on the archive and to reduce the availability of paper documents as much as possible. Its goal is to become a "paper-free hospital" on the year 2007. Health providers and fellow workers confront and will be confronted with the new challenges and expectations that will surely affect their present work situation. But how will they tackle these condition will be one scope of my paper.

The availability of the Clinical Portal as one of the five strategies of CSAM(Clinical System All Merged) gives its users freedom to choose on how will they adopt themselves on the coming major transformation that the hospital will meet. I will also discuss users' view of the portal, its significance for them and what opportunities, benefits or none of these will the portal enable to bring them. I will also study the users of the portal on how, why, how long and what are they using on the system.

Oslo, February 17, 2005

Maricel delos Santos Espeleta
(master student, Inst. for Informatikk)

Appendix 3: Fieldwork Application

Interviews Children's Clinic
16-Feb.2005 Coordinator, Children's Clinic
30-March.2005 Chief Physician, Post III Children's Clinic
14-April.2005 Section Chief Physician, Post II Children's Clinic
15-April.2005 Nurse, Post III Children's Clinic
21-April.2005 Section Chief Physician, Children's Poly Clinic
07-June.2005 Nurse Post II Children's Clinic
07-Sept.2005 Section Chief Physician, Post II Children's Clinic
14-Sept.2005 Section Chief Physician, New Born Children's Clinic
28-Sept.2005 Therapist, Berg Gård Children's Clinic
28-Sept.2005 Nurse, Berg Gård Children's Clinic
20-Oct.2005 Section Chief Physician, Post III Children's Clinic

Interviews Skin Clinic
05-Oct.2005 Assistant Doctor, Skin Poly Clinic
02-Nov.2005 Section Chief Physician, Skin Poly Clinic
04-Nov.2005 Assistant Doctor, Skin Poly Clinic

Interviews in ITA
08-Jan.2005 IT-Project Leader
04-May.2005 IT-Consultant
IT- Project Leader
19-Oct.2005 IT-Consultant

Observations (31.5 hours) at Children's Clinic
09-March.2005 Post III 3.5 hours Morning meeting with doctors & nurses
10-March.2005 Post III 4 hours
17-March.2005 Post III 6.5 hours
21-April.2005 Post II 6.5 hours
07-June.2005 Post II 6.5 hours
28-Sept.2005 Berg Gård 4.5 hours

CSAM Presentation
December 2004 IT- Project Leader
21-Jan.2005 IT- Project Leader
02-Feb.2005 IT- Section Leader
22-April.2005 IT- Project Leader
14-Oct.2005 IT- Project Leader

Appendix 4: Overview of Fieldwork