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Abstract

Information Technology (IT) usage is increasingly focused on interaction processes rather than data storage and transaction. This change fundamentally transforms work practices, and these practices in interplay with human agents and technology in turn affect the boundaries for scope of action. In this paper, we explore nurses' use of Electronic Patient Records (EPRs) for sensemaking and other elucidating processes that support, co-create, and mediate collective learning and social practice, thereby contributing to individual and organizational knowledge.

Keywords

Scope of Action, Processes of Organizational Meanings (POM), Sensemaking, Information Technology (IT), Electronic Patient Record (EPR), Nursing, Learning, Interaction

INTRODUCTION

The implementation of Information Systems (IS) in organizations is a manifestation of the decision makers' hopes for smoother functioning work processes and more efficient work on the whole. IS designers therefore naturally strive to create systems that meet user-centered usability requirements and expectations in order to advance adoption of new system designs. Yet, in spite of all efforts to design high quality systems, most IS today fail to meet the requirements of their users. We believe that one main reason for this is the fact that an excessive amount of attention in IS research and development has been directed toward the interaction between the Information technology (IT) *structures* and users, while we believe that IS implementation success ultimately depends on an interplay of complex *processes* involving individuals and groups, technology and work practices.

In this paper, we propose that the constantly ongoing interaction between individuals, technology and the organization can be seen as IT-adaptation and re-adaptation, which is in turn affected by human sensemaking processes (Henfridsson, 1999, Söderhamn and Köhler, 2004). We maintain that engagement in social practice always entails sensemaking and, therefore, learning is an integral process of everyday work. Increasingly, today's work often incorporates dealing with Information Technology (IT) artifacts in some form, and this means that the learning is mediated through the IT. If we are interested in understanding how people work and

learn in social practice, we cannot neglect the fact that we make our experiences with the help of mediating tools (Säljö, 1998, Säljö, 2000). Rather, we must acknowledge that sensemaking processes in contextual relationship to IT usage are of vast importance in influencing how the IT will be perceived, used and adapted.

This is a timely subject, as today's use of IT is becoming increasingly focused on interaction, communication and collaboration instead of merely storage and processing of data and transactions – i.e., we are leaving the so called *Information* Society and are entering the *Interaction* Society (Wiberg, 2005), which further adds to the complexity of the processes. Thus, in order to enable efficient use of the IT artifacts of today and in the future, we need a much better understanding of these processes than we currently have.

Scope of action is a particularly meaningful concept for studying the interaction between human agents, IT and work. This concept is a translation of Löwgren and Stolterman's 'handlingsutrymme' in their earlier work in Swedish (1998) and thus is synonymous with the term 'social action space' used in Löwgren and Stolterman's later work in English (2004). The phrase acknowledges that an implementation of a specific IT artifact always aims at creating a certain scope of action. Some actions are made easier, others are made more difficult or even impossible. This scope of action has to some extent been deliberately designed, but in the end the specific scope of action perceived by each individual is constituted by a constant interplay between IT, its usage and the context in which the use takes place. Thus, certain elements are fixed, but individuals and groups in interaction still can affect the resulting scope of action through their way of adopting/not adopting the technology. In prior research on scope of action or similar concepts the main focus has been on giving concrete form to, and defining the factors that constitute and affect scope of action (see for example Eliason, 2003, Levén, 1995, Ågerfalk, 2003). What has not been accounted for to the same extent is the dynamic part of scope of action, that is, the complex processes (Lundberg, 2000) between people, technology and organization that shape the individual's scope of action. Neither have the organizational implications of individuals' scope of action been considered, only the implications on an individual level.

Healthcare today represents a domain with rapidly increasing use of IT. The Electronic Patient Record (EPR) is one example of this, and it is being introduced in order to improve the handling of information, reduce the number of mistakes, give the opportunity to optimize the workflow, as well as improve the quality of treatments (Svenningsen, 2003). Unfortunately, healthcare is no exception when it comes to the high degree of IS failures (Berg, 2001, Fölster et al., 2003, Goorman and Berg, 2000). We therefore find it especially interesting to analyze the interaction between human agents, IT and work in this context. For this purpose we have chosen a stroke-rehabilitation unit where the EPR has been in use for the past four years.

Hence, the aim of this paper is to elucidate the interaction between the nurses, the EPR and work practices in a stroke-rehabilitation unit, and subsequently the sensemaking processes within this interaction. Checkland and Holwell's (1998) model for Processes for Organizational Meaning (POM) will be used in order to obtain insight into the interaction. Although the POM model originally was developed for the purpose of Information Systems Development (ISD), we see ample benefits with using it as a sense making model for studying the processes in which individuals and groups create meaning while using an already existing IT artifact. This since the POM model is especially well-suited for describing interaction (Rose, 2002) and for disentangling the ball of yarn that the different social processes, which include the use of IT, constitute within an organization.

In the following, we begin by giving an account for our methods for generating and analyzing the data, together with an outline of the context for the study. Thereafter we explain the main features of the POM model. Next, the analysis of the nurses' sensemaking when using the EPR is presented, and this is followed by a discussion and our conclusions regarding the nurses' sensemaking when using the EPR.

THE SITE

The location for the study was a stroke rehabilitation unit in a Swedish hospital. The unit is divided into two teams and altogether the unit has capacity for 20 patients in ten rooms, and the rooms have between one and four beds. If the rest of the hospital is filled to its capacity, the stroke rehabilitation unit can take in a total of 24 patients. The unit has about 30 employees and the work in the unit consists of rehabilitating patients who have suffered from a stroke with the aim that the patient should function as well as possible in their daily life. In order to achieve this, the unit strives to have a well-developed teamwork involving physicians, nurses, staff nurses, physiotherapists and occupational therapists in order to create a holistic view of the patients. The work processes in the unit are similar to most other hospital units, with regular care for the patients and rounds to decide and follow up on treatments and examinations. Once a week each team has what is called a *team round* - a meeting between a nurse, a staff nurse, the physician, a physiotherapist and an occupational therapist, where each patient's progress is reviewed and goals for the coming week are set.

The nurses are by law obligated to document something about each patient every day. The documentation work of the care provided at the ward consists of a total of three *day/night notes* a day (two day shifts and one night shift), where the nurses document how the patient has been, if he or she is improving or getting worse, any

measures (medication, examinations, tests, treatment, care) that has been taken during the day/night, and things that need to be followed up. In addition to these daily notes, one specific note is written concerning things that are being discussed during the round, called the *round note*.

In this unit they use the EPR for making round notes and day notes, and for making a summary of the patient's time at the unit at the point of discharge. The IS for EPRs at this specific ward consisted of text based documentation only (to be compared with EPR-systems that also could contain x-ray pictures, electronic medicine subscriptions, electronic admission notes etc). The documentation structure in the EPR builds on a classification system called the VIPS-structure. The acronym VIPS stands for the four key concepts in good care (in Swedish: välbefinnande, integritet, prevention, säkerhet): wellbeing, respect for integrity, prevention and safety. The concepts emerged from studies of the nursing literature during the construction of the classification (Ehnfors, 1993, Ehnfors et al., 1991). VIPS consists of a number of key words on two levels. The first level corresponds to the phases of the nursing process, i.e. assessment, planning, realization and evaluation. The second level consists of subdivisions for possible use in practice, i.e. nutrition, elimination, activity, sleep, pain, skin, communication etc. The documentation in this unit is being carried out in two steps: the nurses use pen and pad out in the unit and then transfer their notes to the EPR in the nurses' office later on in the day. In combination with the EPR, there is a ring binder for each patient, which is used for immediate documentation and retrieval of information on temperature and medicines.

At the first encounter at the stroke-rehabilitation unit the EPR had been in use for about four years. The nurses, physicians, physiotherapists and the occupational therapists documented their work in separate places in the EPR; it was however possible for one specific occupational group to read the documentation made by other groups. The staff nurses did not document in the EPR, instead they reported to the nurses who documented the staff nurses' work in their part of the EPR.

The day and the evening shift differ in how the report between the shifts takes place. First thing in the morning, the nurse on the day shift receives an oral report from the nurse from the previous night. This is followed by an oral report from the day nurse to the staff nurses working during the day. In the afternoon, however, they have what they call a *reading report*, where one of the nurses reads out loud from the EPR on the screen to the staff nurses.

In order to get as a complete picture as possible of the nurses' experiences of using the EPR, semi-structured interviews were made with 11 out of the 16 registered nurses (RNs) in the unit. (Unfortunately, interviews with all the nurses could not be arranged due to sick-leave, vacation and night shifts) The interview guide focused on their work as nurses in general and their use of the EPR in their daily work in particular. The interviews were made in the unit over a period of 11 months, recorded and transcribed verbatim.

SENSEMAKING IN AN ORGANIZATIONAL CONTEXT

The POM model (see Fig. 1), emanating from Soft Systems Methodology (SSM) (Checkland and Scholes, 1999), rests on a social constructivist and interpretive foundation as opposed to the goal oriented and rationalist view within hard systems thinking. In brief, the model depicts the relationships between the organizational context (elements 1-5) in which individuals and groups create meanings and intentions, leading to purposeful action (element 6) being taken, with the help of information support (element 7). In the following we describe personal as well as organizational sensemaking surrounding the EPR in terms of the POM-model.

The Personal Process of Sensemaking

According to Checkland and Holwell (1998), we as individuals select sub-sets of facts from the great mass of *data* based upon our interests, experience, values and so on. This first step in our sensemaking process is an innate part of our mental process that is performed tacitly, without us making conscious decisions about what data to select. It is being illustrated in the POM model by elements 1 and 2 and the interaction between them. The interaction involves selectively perceiving reality and making judgements about it in filtering processes that influence what individuals choose to pay attention to. The selected data, based on individuals' cognitive settings and acquired through this interaction, is termed *capta* by Checkland and Holwell (1998).

We then start putting the capta in context and relating it to other things. By seeing the capta as a part of a larger whole it gains significance - we attribute meaning to what we see, thus acquiring *information* and, when related to larger structures, *knowledge*. This personal process of meaning creation is depicted in element 4. Organized IS and appropriate IT together with IS/IT skills (element 7) inform and enrich the meaning creation. Säljö (2000) further emphasizes that IT as a tool *mediates* reality for people in a specific situation where IT is being used. This means that we are not in immediate and un-interpreted contact with our surroundings. On the contrary, we deal with it with the help of physical (e.g., IT) and intellectual (e.g., language) tools, which constitute integrated parts of our social practices. We then make judgements about the world through comparing the information to our norms and values in an appreciative iterative process. These judgements help us to form

intentions (element 5) to take particular action before we carry out those actions (element 6). The norms and values on which we base our judgements are the result of previous experiences and history. Our current standards will subsequently change as we go through life and experience new things, as explained by Vickers' theory of how we learn through experience (Checkland, 1994, Checkland and Casar, 1986).

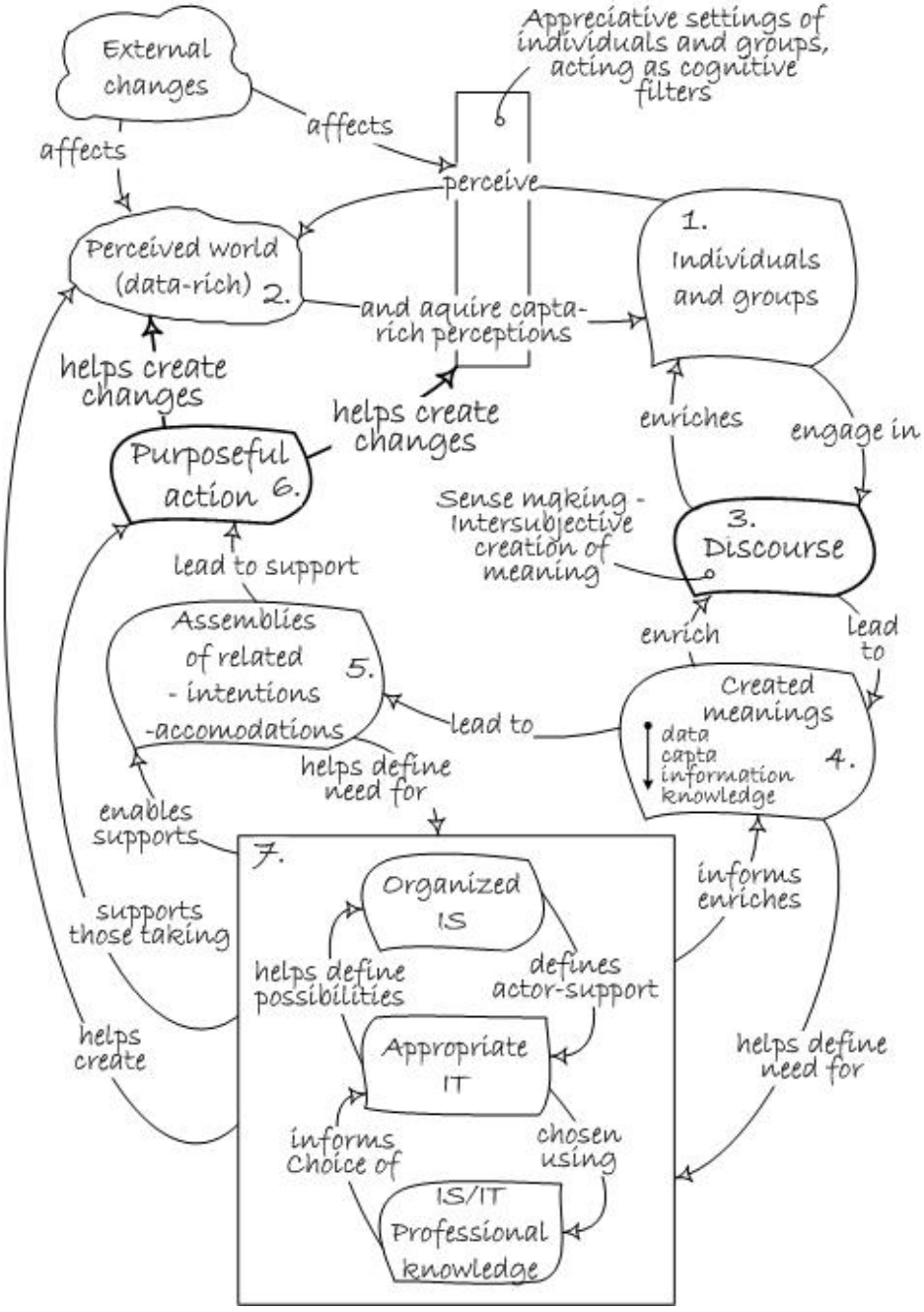

Figure 1. Processes of Organizational Meanings (POM) after Checkland and Holwell (1998)

The Organizational Process of Sensemaking

In addition to our personal cognitive process of sensemaking, we develop our ideas in dialogue with the people surrounding us (Checkland and Holwell, 1998, Säljö, 2000). We are part of different groups at work and in our spare time, and there we will continuously take part in a dialogue and discussion where we try to affect each other's perceptions of the world, meaning attributions, judgements, intentions and actions.

The POM model (Fig. 1) reflects informational and communicational interactions underlying information exchange and knowledge creation. Elements 1-2 represent identification of relevant environmental elements, a task that both depends upon and extends team members' data collection and analysis expertise as well as their appreciative settings. The notion that workplace information exchanges drive ongoing processes of creating meaning through organizational discourse is expressed in elements 3-4-5. The intention is to affect colleagues' appreciative settings. It follows then that dialogue and negotiation processes inform purposeful actions (element 6) based on accommodated views. Shared understanding then informs the formally organized information systems (element 7), by means of which informational support may be provided for collecting data (i.e., capta), analyzing (i.e., creating meanings), and decision making as well as operations support.

Thus, while the personal process of sensemaking earlier described still applies to the individual, much of the sensemaking in a social situation, and subsequently in an organizational context, will be carried out in interaction through verbal and written communication between individuals. This *discourse* (element 3), aimed at intersubjective creation of meanings, has as its purpose to affect the thinking of at least one other party. The discourse results in a change of the group members' *appreciative settings* (hence affecting our perception of future situations, what capta we select and so on). As a result of the developed discourse and the created meanings (element 4), common intentions and accommodations may be reached (element 5) which lead to support of action being taken (element 6). In the same way as within the personal process of sensemaking, IT (element 7) at the organizational level mediates reality for the organizational members. As is characteristic in systems thinking, the seven elements are seen as interacting - i.e., element 7 informs and enriches element 4, and it enables and supports element 5 even as it helps to create the perceived world (element 2).

Checkland and Holwell further emphasize that although appreciative settings may very well be unique and thereby representing one individual's perception of the world, they many times can be attributed to a group of people - for example team members, department members or even the organization as a whole - since people who are closely associated with each other or have had similar experiences may have appreciative settings with common characteristics.

METHOD FOR ANALYZING THE DATA

The analysis of the interview transcripts consisted of a careful reading of the material, with the aim to identify those parts of the text that to some extent were dealing with sensemaking and meaning creation in interacting processes involving individuals and groups, technology and work practices. This analysis started out from the parts of the POM model tied to sensemaking and meaning creation, namely the appreciative settings, the discourse (element 3) and the created meanings (element 4).

However, since the POM model's emphasis is on interactions and systemic processes - which means that a change in one of the elements will lead to a change in the others - it was, of course, also necessary to in the following discussion consider the effects on the intentions/accommodations as well as on the purposeful action.

Appreciative Settings

In order to gain an understanding of the nurses' appreciative setting, Checkland and Scholes' (1999) 'social system' analysis and 'political system' analysis were used. In the social system model, the three elements roles, norms and values together constitute a 'social system'. Each of these elements is continually defining, redefining and being defined itself by the other two as shown in Figure 2.

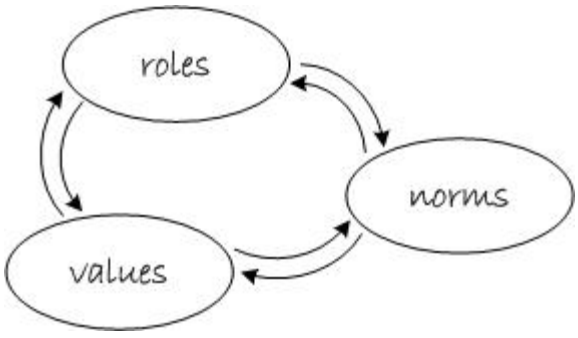

Figure 2. 'Social System' model after Checkland and Scholes (1999).

A 'role' is a social position seen as important by the people in the situation. The role can be either institutionally defined – in our case for example 'nurse' and 'physician' - or behaviourally defined, such as 'The Antagonist' or 'The Diplomat'. All these roles have expected behaviours which are characterized by norms. Finally, our values are the standards according to which we judge the actual performance (Checkland and Scholes, 1999). These are standards of what is good/bad, relevant/irrelevant etc. The standards are the result of previous versions of the process being described here and subsequently the standards will change over time as we gather new experience (Checkland and Holwell, 1998).

Any social process will have a political dimension and therefore one of the main determinants of the outcomes of that process is the distribution of power in the situation (Checkland and Scholes, 1999). This is what the political analysis aims at elucidating. For the purpose of this analysis politics is defined as "… a process by which differing interests reach accommodation" (Checkland and Scholes, 1999, p.50). The accommodations that are reached depend on dispositions of power. Therefore, it is important to try and understand how power is expressed in the specific situation studied. This is being made practical through considering what the 'commodities' (embodiments) are through which power is being expressed in the situation. Examples of commodities of power might be: formal (role-based) authority, informal leadership, access/lack of access to important information, or membership or non-membership of formal or informal groups.

ANALYZING THE NURSES' SENSEMAKING

In the following, part of the nurses' sensemaking and meaning creation in their work practices and its relation to the use of the EPR is being accounted for. We use the earlier mentioned parts of the POM model, that focus on sensemaking and meaning creation.

Appreciative Settings: The Cognitive Filter through Which the Nurses Perceive Their World

In line with Checkland and Holwell (1998), we believe that appreciative settings can be attributed to a group of people who are closely associated and/or have hade similar experiences. We found further evidence for this when going through the interview transcripts. Therefore, for the purpose of this analysis, we have chosen to talk about "the nurses''' appreciative setting, rather than different nurses' different appreciative settings. In explicating appreciative settings we focus on professional roles.

The Nurses' View on Their Professional Role

All the interviewed nurses consider the nurse role as primarily consisting of providing patients with care. Their dominant view is that the use of the EPR for documenting and retrieving information about the care is completely separated from the nursing; nursing is about taking care of patients and the documentation is being perceived as an administrative task. This view of the role of a nurse most probably derives from the norms in general about a nurse: her work should consist of 'hands on' taking care of patients, not spending her time in front of a computer. When the nurses themselves compare the expected behaviour in their role to what they actually do during a workday, they feel inadequate, frustrated and discontent.

The Nurses' View on the Physician's Role

The nurses' view of the physician's role is that s/he should have the medical expertise, as compared to their nursing expertise. Physicians are, for example, expected to make the decisions regarding medical treatments and examinations and when to discharge a patient. The physicians seem to meet the standards of the interviewed nurses except during one period of the study when the unit had a new physician every week due to shortage of staff. During these circumstances the physicians, according to the nurses, were prone to leave decisions like discharging to another physician, thereby not behaving in an expected manner.

A power factor is connected to the physician's role in the minds of the nurses. In keeping with the hospital culture norm, the nurses give expression to a perception that the physician's job and time are more important than the nurses'. A specific example of this, mentioned by many of the nurses, is that they feel that the physician does not have time to wait for them to document on a laptop out in the unit during the round. Whether the physicians themselves actually reason this way is of minor importance in this paper, since we are concentrating on the nurses' *perceptions*, since these in turn will influence the nurses' scope of action.

The Nurses' View on the Staff Nurses' Role

The interviewed nurses describe the staff nurses as their 'eyes and ears' out in the unit because it is the staff nurses who meet the patients and tend to them and then report to the nurses who, in turn, make sure that the care is being documented since the staff nurses have no access to the EPR. The nurses do not describe any particular expected behaviour from the staff nurses besides the above mentioned. However, they express a feeling of unease towards the staff nurses since they feel they have to spend so much time in the nurses' office documenting or doing other administrative work. Many of the nurses are worried that the staff nurses think that

the nurses are 'hiding' from care work behind documentation. Others express this a bit differently; they are concerned that the staff nurses are not aware of what is expected from the nurses besides taking care of patients. Thus, the nurses with their actual duties of today perceive that they do not fulfil the existing norms for the role 'nurse'.

Application of Sensemaking Processes According to POM

Judging from the interviews, the discourse in the unit is very much characterized by a focus on the patients and nursing is perceived as the part where the nurses are out in the unit taking care of the patients 'hands on'. As mentioned earlier, the documentation in the EPR is mainly perceived as an administrative task. However, when relating the material in the interviews to element 4 in the POM model it becomes obvious that the nurses use the EPR for communication, interaction and knowledge sharing - thereby learning about the patient, nursing and documentation in the process. From the individual sensemaking perspective, the nurse chooses what capta to document, for example, after the round. Similarly, she selects capta from the EPR when she is getting an update on a patient or when having a reading report on the evening shift. By putting this capta into context and relating it to the patient's history, e.g. previous treatments and responses, she gets information about the patient's condition and progress. This information together with related information form larger structures which thereby yield knowledge about both the patient and nursing. Yet, since the nurses perceive the documenting as separated from the 'actual nursing', that activity causes stress and frustration. The nurses do, however, seem to make a distinction between documenting in the EPR and retrieving information from the EPR. They consider the documenting as 'something that must be done', while retrieving the information is a necessity for doing a good job.

At the organizational level, the meaning creation is taking place in all activities involving more than one person, e.g. the traditional round, the team-round, and other opportunities for dialogue and collective communication. The organizational sensemaking involving the EPR consists of two parts, the reading report and the EPR-mediated communication. During the reading report, the nurse reads out loud from the EPR to the other members of her team at the evening shift. Here she, based on her appreciative settings - which among other things consist of nursing experiences and reading reports - selects capta from the large amount of data available on each patient to communicate to the others. Team members might ask about clarification or they might themselves add extra facts to the ones in the report, leading to the whole team acquiring important and collective information about the patient, thus creating a shared meaning. This process, in the same way as the personal sensemaking process, adds to the knowledge of the involved team members, and accordingly adds to the organization's knowledge.

Furthermore, the text in the EPR is a means for communication between nurses and between other occupational groups. In this form the text in the EPR is interpreted through personal sensemaking which, in the end, additionally involves social and organizational sensemaking. Through the interaction in work practices, in and between occupational groups, the written communication is made sense of and thereby adds to the knowledge on the organizational level.

Hence, personal and organizational processes of created meanings are mediated through the use of the EPR. The EPR forms the base for deciding on the continued treatment of each patient. Here the information is assembled and communicated to the involved professional groups.

DISCUSSION

According to the POM model, the role of IT in an organization from an ISD perspective is to support the organization members in conceptualizing their world, finding accommodations, forming intentions and taking purposeful action. Even though this perspective on IS probably would lead to a larger number of success stories within ISD if used to a larger extent, we claim that one essential thing is missing in this perspective: IT is being described in terms of *giving support*, which we believe is much more in line with the Information Society than the Interaction Society. Thus, IT is being described as something separated from the sensemaking processes and the organizational context. However, as demonstrated in our study, the EPR is being used for communication, interaction, coordination and so on; the IT is not merely a support for organizational processes and meanings – rather it is a *co-creator* of them. This, we believe, is an example of the difference between a focus on structures (for supporting the people in the situation) and processes (as co-creators of the situation).

In the analysis, we identified a dominating view of a separation between nursing and documentation. However, there was one nurse in particular who in the interview explicitly talked about the documentation as part of the nursing. The documenting, and retrieving of information in the EPR, was seen by her as a very important part of the nursing. Thus, these two perspectives could be viewed as representing a support-view and a co-creator-view of the EPR which are the results of different created meanings. These two perspectives can also be related to the nurses' view on their professional role. In the traditional perspective, documentation supports the 'actual nursing', while in the emerging perspective the documentation in the EPR is being included as a part of nursing.

Against this background, we contemplate whether the professional role of nurses might be changing, or even should be changing, due to technology-mediated changes in work practices.

Another example of different views emanating from different sensemaking is that the nurses tend to make a distinction between entering data into the EPR versus retrieving information from it. While the documenting is being perceived as an administrative task, the retrieving of information is seen as vital for getting to know the patients and subsequently providing them with good care. This is very interesting and is an excellent example of how the nurses' sensemaking affect their scope of action since how the nurses interpret, make sense of and understand the EPR will affect their scope of action in a very direct way. Thus, when they consider the EPR as a time stealer from 'actual nursing' they perceive that their scope of action - in an organizational context, not merely in interaction with the computer - is affected negatively. On the other hand, their view on the retrieving of information from the EPR seems to affect their scope of action in a positive way.

According to Säljö (2000), both language and IT are important mediators of learning, at a personal as well as at an organizational level. In our study this becomes apparent in the nurses' communicating and interacting through the EPR. These complex processes, involving individuals, technology and work practices, are partly formed by our appreciative settings. Therefore, in order to successfully develop and implement IS, we cannot solely focus on the interaction between the user and the structures of the IT artifact. We also need a much better understanding of the meaning creating processes in interaction with technology and organization and the underlying cognitive filters.

CONCLUSIONS

The implementation of IS in organizations is a manifestation of the decision makers' hopes for smoother functioning work processes and more efficient work on the whole. However, the use of IT is increasingly focused on interaction rather than data storage and transactions, and this fundamentally affects and changes work practices. In these changes, the interaction between human agents, IT and work changes their scope of action. To elucidate interacting and sensemaking processes, a hospital unit and nurses' use of EPRs were our focus.

Through soft systems analyses we found that IT is not merely a support for organizational processes and meanings. Rather it is a co-creator of them. We also found two perspectives on the professional role as a nurse, in which one illustrated a separation between nursing and documenting in the EPR. In the other, these two tasks were perceived as equal constituents of nursing.

In addition, we found that the nurses tend to differentiate between documenting in and retrieving information from the EPR. The documentation was perceived as administrative work and thus stealing time from 'actual nursing' while the retrieving was perceived as a necessity for doing a good job. Further we found that the interacting processes via the EPR mediated learning in social practice and subsequently adds to the individual and organizational knowledge.

Finally, the interplay between individuals and groups, technology and work practices consists of complex processes that are partly formed by our appreciative settings. Therefore, if we want to reduce the number of IS failures, we cannot solely focus on the interaction between the user and the structures of the IT artifact. We need a much better understanding of the meaning creating processes in interaction with technology and organization and the underlying appreciative settings.

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