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# PERSPECTIVES ON THE SUPPORT OF KNOWLEDGE WORK

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## ABSTRACT

*This report discusses information systems as support systems for knowledge workers. A case is presented discussing the introduction of two types of information systems into an organisation as support for knowledge workers. The case is interpreted using a set of theories from knowledge theory and the area of knowledge management. The aim of this report is to give empirical input to the understanding of the conditions of knowledge work and information systems. An interpretative framework is presented consisting of a set of perspectives on knowledge work and the use of information systems.*

## 1. INTRODUCTION

Knowledge workers can be seen as symbolic analytical workers (Reich, 1991). This perspective on the problem area is based on a traditional view of organisations as information entities (Galbraith, 1967) where cognition is one central problem. This perspective is also present in the concept of the knowledge worker, for example in the works of Malchup (1962). Knowledge workers are people that rely on personal knowledge in their work (Davis and Naumann, 1997) and their work is to produce or reproduce knowledge and information (Stehr, 1994). Davis and Naumann (1997) see knowledge work as including acquiring knowledge, designing knowledge output, decision-making and communicating the designed output. Support systems should be able to help these activities and be implemented as human based activities or as information technology solutions. Knowledge can also be viewed from a social perspective, for example as constructed in social processes (Berger and Luckmann, 1966). Knowledge workers have been discussed from this perspective (Lave and Wenger, 1991, Blackler, 1996, Hayes and Walsham, 2001), focusing on variables such as social context, political aspects, communities, power, human action and so on.

The aim of this paper is to deepen the understanding of the problem area of knowledge workers and information systems. The goal is to gather understanding of how these two perspectives can be used to understand knowledge work. It is assumed that both of them are more or less present in every knowledge work situation and understanding both aspects is crucial for the correct application of the right mix of support systems. The research approach of this paper is to investigate a case and to draw some conclusions regarding the important factors that determine the development of support systems and their success or failure in organisational use.

## 2. METHOD

The empirical material of this paper is based on a project at a Swedish public organisation. The scientific approach is to interpret the case in search of the important perspectives that influenced planning, using theories of knowledge and knowledge work. This research is approached using the interpretative/hermeneutic research tradition (Alvesson and Sköldböck, 2000). This implies an orientation towards an understanding of texts and creating new meaning and understanding. The main part of the empirical material consists of interviews with administrators, together with personal

observations and written material from the organisation in general and the project in particular. This empirical material is considered as a text that is interpreted and reflected upon. Further, the case is presented in a typified way. The dominant features of it are brought forward in order to illustrate certain problems and challenges for understanding the problem area.

### **3. BACKGROUND THEORY**

#### **3.1 Context of knowledge work: general developments**

The general background is the change in the environment towards increased turbulence (Huber, 1984) and globalisation (Castells, 1996). As countermeasures to these trends, better information handling has been suggested (Huber and McDaniel, 1986) as one approach. Flexibility (Evans, 1991) and the ability for continuous change (Galbraith, 1997) are other suggested approaches. Drucker (1988) points at the crucial element of self-governing of experts in dealing with a changing environment. All these point to the individual and personal knowledge and the knowledge processes that are implied by these perspectives. An additional problem in this development is the effort to meet economic crises with leaner organisations (c.f. BPR Hammer, 1991). This is the pretext leading to the need for knowledge management, which is a set of strategies to make knowledge into an organisational resource. Then, the failures of a technological approach have spawned a personalisation of the field (Nonaka and Takeuchi, 1995) and a focus on personal knowledge theory (Polanyi, 1958, 1966).

#### **3.2 Aspects on knowledge**

Two central perspectives can be applied to knowledge. First, the level where knowledge is studied either on a personal level or on an organisational level. Second, how we understand knowledge from a cognitive aspect or from a social aspect. A similar view on the latter is the subjective and objective perspectives on knowledge investigated, for example, by Schultze (2000). Knowledge from an organisational aspect is a resource (Grant, 1996) that is used for producing goods and services. In Polanyi (1958, 1966) knowledge is discussed as something personal. Here an epistemology is outlined, which includes two kinds of awareness: focal and subsidiary. From these two types of awareness, Polanyi shows that two kinds of knowledge are possible, subsidiary/tacit and focal/explicit. Focal/explicit knowledge is knowledge that we can express explicitly, in some form, and subsequently transfer to other people. The subsidiary knowledge is every thing we know but cannot really express. This is the tacit dimension of human knowledge, a complex web of clues that we use in order to interpret and produce explicit knowledge. Explicit knowledge is not possible to have without subsidiary/tacit knowledge. From the social aspect, knowledge is developed in social interaction with other people. In their theory of knowledge sociology, Berger and Luckmann (1966) claim that a sense of reality is given to our awareness through social interaction with others. A person's knowledge is dependent on the social context to which that person belongs. A more cognitive perspective on knowledge systems is gathered from Ackoff (1989). Here the knowledge problems are divided into two aspects: knowledge and wisdom. Ackoff presents a model of a knowledge/wisdom system, where data, information, knowledge and wisdom are essential concepts. Wisdom is the ability to know what is right or wrong (Ackoff, 1989, p. 6). This demands an ability of judgement of what is good or bad, based on areas of ethics and morals.

#### **3.3 Knowledge management**

The central knowledge management perspective is that it is the art of creating value from an organisational resource (Grant, 1996). Two essential knowledge management approaches are recognised, a technology focus and a people focus (Alvesson and Kärreman, 2001). From the technology aspect a functional point of view is taken. Here the key question is how to use IT for the support of the key knowledge management processes of creating, acquiring, capturing, sharing and using knowledge (Prusak, 1997). A more people-oriented approach is given by Nonaka and Takeuchi

(1995) who explore the possibilities to arrange work in an organisation for knowledge creation. A special focus lies on how tacit knowledge can be created and converted into explicit knowledge and by that into a useful organisational resource. Creating knowledge is mostly about giving people possibilities and encouragement to experience and learn. The organisation directs this learning effort into areas that are useful for the organisation. This planning step is based on the founding values of the organisation and directed by problems encountered in planning processes or other activities of the organisation. The values of the organisation are developed by top management and shared by the whole of the organisation in a spirit of co-operation.

## **4. CASE STUDY**

In a public organisation (“the organisation” in this text) in Sweden, an IT solution for managing the information environment was developed. The approach was a technical one, with a “cheaper and better with IT“ mentality. The general approach was to change the technology for distributing internal information, from paper to IT. We can characterise this as an information distribution system. As a side project another information system was developed, focusing on communication and connecting the people of the organisation.

### **4.1 About the organisation**

The organisation of the study is organised with one central organisation (CO) that supervises a number of local (county) organisations (LO) that deal with individual issues. The decision in the individual cases is made by administrators in local offices within the local organisations. The outer frame is the law, which the decision-makers must follow when they decide on cases. It is the duty of the central organisation to insure that these laws are upheld. The CO is responsible for auditing and supporting the local organisations. The administrator responsible for a decision can be seen as a knowledge worker. It is the ability of the knowledge workers to stay informed, to understand and apply the laws that will determine the efficiency and effectiveness of the organisations operations.

### **4.2 Problems in public administration**

There is a general productivity problem in public organisations. The problems with public service are pointed out by Castells (1996) as an essential factor of the economic decline during the 1970s, which lead to market reforms and privatisation later on. Castells also points out that the effects of IT on productivity have had problems in reaching the service sector in general. One major problem in the current organisation is that the variations over the country as a whole as well as between different kinds of decisions are considerable. The problems have been and still are substantial. The general solutions proposed by the CO are the development of information technology based support systems.

### **4.3 Analysis of interviews**

This section presents some of the empirical material of the project. The analysis process involved selecting and generalising interesting comments from the transcript. These were then classified into one of three categories. 1) Practical problems that make knowledge work harder. 2) How can work be supported? These are examples of how people experience what is good support. 3) The role of information systems or application of information technology as support for knowledge work. This is a mix of wishes and these are to some extent satisfied today. Then a two-way split of the material was made, into one cognitive aspect and one more social aspect on knowledge. The three categories were then aligned so they corresponded to each other.

<b>Problems</b>	<b>Support activities</b>	<b>Information systems (IS)</b>
<i>A cognitive view of knowledge</i>		
Changing organisational environment, internationalisation and globalisation.	Avoiding information overload.	Information systems as a mean to personalise information sources.
Knowledge and information age quickly and it is hard to keep pace with updates and changes in personal knowledge.	Need to spreading news quickly.	IS for faster transportation of information, making updating of information or knowledge more frequent.
How to combine different areas of knowledge, such as different laws.	Background sources, explaining the basic arguments and giving a broad understanding of the problems and rules given	To make it easy to search databases or other information sources.
Time to process a case vs. quality of the decision.	Support of routine work, how to fill in a form, conduct interviews, make a request and so on.	Traditional symbol manipulation – important to make it easy to use the support system.

*A social view of knowledge*

Relationship with higher levels of the organisation, guiding knowledge work.	Communication compensates for problems in written sources Communication is a part of work	Telephone and personal meetings still important media for learning and information sharing among individuals.
Knowledge is often personal and confined to individual workers.	Need for answers from experts.	E- catalogues for organisational competence.
Examples do not support solving complex, difficult and unusual problems.	Conferences – meeting with peers from other parts of the organisation and with experts. Providing a more diverse set of information and examples.	IS for bringing people together, sharing experiences and spreading the latest knowledge on a topic, e.g. e-conferences.
Consistency in decision making over the organisation as a whole.	Cases are used for knowledge sharing within workgroups.	Supporting collaborative work, sharing knowledge resources.
Consistency between work process description and information/knowledge sources.	Texts combining the work process and references to information sources.	Coffee meetings, talking to nearby co-workers, local and situated learning.
Problems of language, for example, natural language vs. formal or judicial language.	Examples are important for the support of learning and are used to verify personal knowledge	Case databases with comments and a discussion forum for interactions with others.

Table 1. Interview opinions on problems, possibilities, and information systems.

The empirical material shows that it is possible to construct two perspectives on knowledge work support. These are the cognitive and the social aspects of knowledge, which should be supported with respect to their special views on knowledge. At the same time it must be remembered that this is an analytical picture, in the problem situation many of the problems are interconnected. Each problem

has a cognitive and a social side and the support of them must be in tune with each other. The support systems must be in line with the aspects that they support without interfering with other aspects.

#### **4.4 Knowledge management situation – problems and support**

The organisation could be understood as a knowledge system. This implies a number of knowledge processes and activities that must be in working order. These are supported by written material (for example, different kinds of books, articles, examples and so on) for distributing the necessary information to the administrators. The main direction is from the CO to the LO and the administrators. Conferences and courses are also arranged to spread knowledge about how laws should be applied in individual cases. These activities and material aim at increasing the quality and productivity of the organisations output, that is, the decisions. Some major knowledge processes can be identified. One knowledge process is the creation of knowledge about how laws should be applied. This process takes place at all levels, not only at the CO level. Then there is the process of distributing knowledge to the administrators. Connected to this, there is the use of knowledge by the administrators. In the case, the existence of the information was assumed to be enough to enable the administrator to create personal knowledge. Looking at the support side, an essential element was the handbooks, which provided both facts and procedural knowledge. The idea was that the administrator should just follow the book, and the decision would be correct. This provided a sense of security at work. Another text that was constructed by the central organisation was a mix of examples and law text and was very popular among administrators. This provided a learning environment for the administrators. The problem was that the texts were hard to keep updated and they were not very suitable for a changing world. This support situation was threatened by the introduction of some new information system.

#### **4.5 Information distribution supporting knowledge processes**

An information distribution system that provided a series of information repositories was put into place for administrator. The aim was to decrease the need for detailed handbooks, instead letting the administrators search for the required information using the new system. These sources of information could be called “potential knowledge sources” if they are regarded as for being a source for learning. The set of texts that was included in the system was impressive, most of the written sources were facts, from law texts to old cases. The system was text-based and the user friendliness was not very developed. The time to compile and to construct the handbooks was saved and instead the worker dealt with the material directly. In addition, there was a hope that more flexibility would be added to the work when the rules approach was abandoned. The big change was from an information push principle to an information pull principle. The administrator must find the information that was needed, instead of it being provided by some expert. The administrators did not easily accept the support system, the focus was put on the information logistics between the centre and the LOs. The focus was not on the knowledge worker or on knowledge creation and use.

#### **4.6 Communication support system and knowledge creation**

As a support system for the creation, storage and sharing of knowledge within the organisation, a “suggestion support system” was developed. It was christened “The box”, associated with the manual box where staff could put their suggestions outside the boss’s office. The basic outline of this is to capture ideas in operative parts of the organisation that are gathered and used to improve the organisation’s work. A manual system of this kind existed and the development of an IT-based support system aimed at the automation of the existing process and in improving it. This system was an extension of the current system in that it could provide one-to-one discussions all over the organisation, over geographical distances and organisational levels. The idea was that both problems and solutions were to be submitted into “The box”. These suggestions were structured to force entry of certain information in order to ensure their usefulness. At the same time, a “free-text” approach was used in order to get close to ordinary and natural human use of information. In connection to this, a

thread of discussions of the issue could be conducted, in order to debate or to enhance the suggestion. The full form included both a problem and a solution. However, just one of them was required, that is, good practice could be described just to inform others of it. Good suggestions could be rewarded, the originator being given some benefits depending on the usefulness of the suggestion.

#### **4.7 Summary of the case – an initial interpretation**

This case displays a series of difficulties associated with knowledge work, support systems and information technology. The outcome of the projects at large was twofold. First, the big information distribution application was not used, it did not seem to be in touch with the demands of the potential users. To some extent, this was caused by the technology that was used and how the system was introduced. At the time, when the system was introduced and this study was performed, very few actually used it or even knew what it was good for. On the other hand, when the communication support system, “The box-system” was demonstrated for potential users, it immediately caught people’s attention, and was praised by users. Due to a lack of consistency with the technological platform, the system was not brought into use, at least during the lifetime of the project. “The box” was aimed at the part of knowledge work that is suitable for social aspects of knowledge by the support of communication between organisational members. The distribution system was aimed at solving a necessary problem, i.e. the cost of moving texts. However, the usefulness of the texts depends on the ability to understand them. The administrator develops this by evaluating personal experiences and juxtaposing them in social interaction with others. “The box” provided a virtual arena for these discussions, which could complement existing face-to-face meeting at their workplace or at conferences.

### **5. PERSPECTIVES ON KNOWLEDGE WORK**

The case highlights and exemplifies a series of difficulties in planning support systems. An analysis could provide us with a set of perspectives leading to understanding the consequences of the use of the systems, both direct and indirect.

#### **5.1 People and technology**

One problem that has been recognised is that knowledge management has often been seen as a form of information management (Swan et. al., 1999) and a technical problem (Scarborough and Swan, 1999). In the case the basic problem observed was the split between the technological aspect of support and the knowledge work aspect. From a technological perspective, the information distribution system would bring a faster pace of work. In a sense, this was the case, less time and effort in transporting facts was needed. However, from a knowledge perspective a new work situation was constructed, a new structure of the knowledge work was created. The problem is to understand the knowledge work not just as a problem of moving data but also as an interpretative act. This falls back on the view of knowledge as subjective and personal (Berger and Luckmann, 1966, Polanyi, 1958). The problem is that these social and personal knowledge processes must also be supported by data/technology focused solutions. It is the duality of knowledge work and the subjective aspect that must lead the way. A perspective on this is that some of the administrator’s work is repetitive and is possible to deal with in a structured way. In a structured situation, information becomes synonymous with knowledge, the interpretation is uncomplicated and institutionalised (Berger and Luckmann, 1966). It is in an unknown and complex situation that the knowledge perspective becomes problematic and activities outside the common use of information systems are necessary. This is about fitting the right type of support system and the contribution of IT, to a special situation. In a situation when an administrator handles a standard case, the support should be adapted to this situation. A complete set of basic texts might not be the best support, it could be a hinder if they began to search databases, resulting in time consuming work. Standard forms and simple rules are probably better. The support must fit the person’s knowledge work situation. In an unstructured case the big database is an important

complement but does not help interaction and building personal knowledge. These are social processes, the knowledge work must not only assemble facts of the case, but also construct a personal understanding of the case and then externalise it in the social/professional context of the work. The unstructured aspects are becoming more common in turbulent situations where time constraints are important issues.

## **5.2 New realities – turbulence and flexibility**

A rapidly changing world makes knowledge work harder. Both the time for learning and the time span when the knowledge is useful are becoming shorter. Many factors should be considered such as, globalisation, IT, new financial realities and people changing behaviour more rapidly (Castells, 1996). Globalisation affects the organisation. For example, people from Sweden move around Europe but keep contact with the Swedish systems. In interviews, this was pointed out as an increasingly difficult area. Change is the only thing that is certain (Galbraith, 1997). A turbulent environment is sometimes thought to be cured by increased information handling capability (Huber, 1984). This strategy seems to be used in the discussed case. Another type of solution is to give more responsibility to the individual knowledge worker. One approach to this strategy is presented in Drucker, (1988), where the concept of “information-based organisations” is discussed. In this vision, the organisations are carried forward by expertise. The organisation must actively create a learning environment that fosters these experts. Providing more facts to the administrator will not necessarily create experts. Using IT will, in the worst case, only add to the increased speed of work, leaving even less time for personal learning. The creation of experts turns the problem into how to support the creation of new knowledge and issues concerning learning.

## **5.3 Conditions of learning**

In the case, the work practice of administrators was changed. Handbooks that combined a work process and necessary facts were replaced with a selection of databases providing information. Following rules is not necessarily a knowledge intensive process, but the rules were replaced by information support. In this “new world”, with change as the key factor, knowledge work becomes important. In knowledge work, personal knowledge activities come in focus, including processes where facts are perceived, interpreted, and internalised as new knowledge. These processes are personal which means that the interpretative frame of the individual becomes the central part of the process. In this situation, more and faster information is not always a cure, it can even add to the inability to learn and change interpretative frames (c.f. information overload, Ackoff, 1967). The database searches provided to them were not seen as something bad, but a complement solution. The law text, as a book, is an example of the way that an essential knowledge source was handled. This is a trustful companion of any administrator. But, what made it useful was the personal knowledge developed during working with it. The administrator noted these experiences in the margin of the book. Here, the experiences from individual decisions were recorded. There was not an automatic step forward when the texts were made available in electronic form.

The personal nature of learning and knowledge development is well investigated (c.f. Nonaka and Takeuchi, 1995). The active processes in learning are the interface between the person and the problem situation and face-to-face meetings between people. This falls back on not only the idea of personal knowledge (Polanyi, 1958), but also on the concept of knowledge as socially constructed (Berger and Luckmann, 1966). Polanyi shows knowledge as something in the mind of the individual and rooted in that person’s tacit knowledge. Berger and Luckmann claim that people do not know anything before it is reaffirmed in their social environment. Reality becomes real in interaction with others. At the local organisation, people who had sticky problems dealt with them at group meetings or in discussions with colleagues over a cup coffee. Social interaction with others seems to be an important part of learning for the administrators, both locally and together with other local organisations around the country. This points to the need of supporting creation of groups and the phenomena of networking.

#### **5.4 Communication and networking**

The case indicates that there was an interest for the communication-based support system (The box) from the administrator's side. The system would support problem-oriented knowledge development and transfer to the organisation as a whole. Both vertical and horizontal communication would be involved. It showed a promise to be an effective aid in turbulent times, meeting demands for faster development of new knowledge to rapidly changing conditions. A parallel to the "Garbage-can" model (March and Olson, 1976) of organisational decision making can be seen. The system creates a meeting place for people with similar knowledge interest, creating subgroups of the organisation. Meeting places as such are not new, as courses and conferences always have been important in the organisation. The contribution of the system is the flexibility of the creation of the groups. It is done in a network manner, people connecting around a common, emergent problem. These networks become places where a common understanding of a problem can be developed (Lave and Wenger, 1991, Brown and Duguid, 1991). These fast moving networks are harder to control and predict in the organisation. People at the central organisation, who were responsible for developing and distributing information/knowledge, suggested distribution of special information to certain groups of people by e-mail. A key issue according to them was to distribute the news about changes. This works in a group of people that have the same frames of reference. Here two approaches to the problems of turbulent environments are displayed. One organised centrally and one around current problems, the other around emerging problems in a distributed manner. The downside of this network building is the problem of excluding people (Castells, 1996). Personal knowledge is local knowledge and the same problem was built in to "The box"-system. The consequences are inconsistencies and problems with control.

#### **5.5 Knowledge for control or flexibility**

One approach to control in organisation is to make rules and in these code the knowledge that guides the activities of the individuals in the organisation. The employees are paid to follow rules and this is the guarantee for the stability of the organisation. In times of greater ambiguity and a more complex and rapidly changing world, flexibility is needed more than stability. This is achieved by letting the personnel closest to the turbulent environment take a greater responsibility for the business, as discussed above. In turn, this implies that they have to take responsibility for organisational knowledge creation. A monopoly of the higher levels of knowledge used for control is not viable in this scenario. But on the other hand flexibility is not only about change, it is a balance between change and stability (Evans, 1991). An understanding of both the changing conditions and the basic values must be weighed against each other for flexible action. Again, detailed rules that specify action, needed for good decisions about keeping to the plan, can be hard to apply. More general ideas about the basic ideas of the organisation, as expressed in visions and policies are needed but above all an ability to apply them in the special situation is required. The case describes a long knowledge process, starting in the social and financial reality interpreted in a political environment, expressed in law making, transported through the organisation and finally applied in decision making by the knowledge workers. By the time, this process has reached its conclusion the world might have changed. The individual administrator might see the effects of "old" laws that they have to apply in a new environment, maybe knowing that a new law is under development. For an insight into basic values, a wisdom dimension is necessary. The knowledge and information that earlier were spread very much as a control mechanism, now must serve as a means for fair survival in a turbulent world. Here the knowledge workers must rely on their personal knowledge and ability of "wise" judgement (Ackoff, 1989).

#### **5.6 Power and knowledge**

The control over what is possible or acceptable to be known is a source to power (Suchman, 1994). Setting an agenda and making definitions creates a firm grip over a social situation. When these

definitions are frozen into a computer system, they become even more dominant and very hard to change. The computer system also may hide logic of the language and separate the origins of definitions and their application in practical situations. If the persons using a rule are not involved in the making and the background of the rule it becomes harder for them to adjust and adopt them to the circumstances of a problem situation. In the case this process is a central problem area. The information distribution system can support this problem, in so much that extensive material on the background of a law, fresh examples or hard to find examples can be located in databases. The problem is when it comes to understanding and internalising this information and how to externalise it into socially accepted knowledge on the subject (Berger and Luckmann, 1966). Practically this is probably done in the local context, creating more local knowledge. The basic problem remains, the input to this process, the text stored in the database, is out of the reach of the administrators. To really get under the skin of a complex and ambiguous case one must interact with the people responsible for the rules and interpretations of these rules. This argument falls back on the works of Foucault (1979), who views knowledge as a construction by certain persons for certain purposes. Words and interpretations are constructed intentionally and they are means that people are given to understand a situation. Also, they will limit people's ability to act (Burrell, 1998 talking about Foucault). These means of interpretation are sometimes summed up as identity (Castells, 1996).

### **5.7 Identities and information technology**

As a logical extension, of the above identified aspects on information systems and knowledge work, ideas about the role of identity and information technology, as presented in Castells (1996) can be discussed. Castells argues that the identity is a basic organising principle, and that information technology is changing how identities are created and upheld. The basis for interpretation and understanding is a person's identity and as such the basis of knowledge. An identity is how a person recognises himself and is built on a number of cultural attributes. The symbolic communication between people, will, over the time, become crystallised into cultures. As noted in the preceding section, information can be used both as organisational control and personal creativity. Castells (1996) argues that the globalisation trend based on international information systems creates new identities. The existing social interactions within a physical workplace with its cultural spheres will be jeopardised. New social relationship without boundaries like time or geography will produce new identities, which are disconnected from the physical environment. The design and the development of the culture of a community will be an important determinant for how knowledge work is done (c.f. Schein, 1996). The question for the organisation of the case is what happens if more and more of the sense making activities and identity building are re-located to a virtual place. In the case, opinions of the importance of closeness to the organisations customers/clients are put forward by some administrators as the key source of knowledge for the correct decision in each individual case. This situation is based on its special assumption embedded in that section's culture, i.e. a collective identity (Castells, 1996). New kinds of networks will be developed, depending on how electronic media are used. These networks will support the creation of different collective identities, and thus different sets of knowledge. These different kinds of knowledge cultures will play a central role in knowledge work and subsequently how it can be supported.

### **5.8 Narratives and rules – learning as telling stories or deduction from texts**

Two approaches to the creation of knowledge seem to be present, one based on stories or examples and on more oriented towards rules. One example of the importance of narratives in creating organisation knowledge is Boland and Schultze (1996), where accounting is viewed from two perspectives, narration and calculation. Boland and Schultze (1996), citing the works of Bruner, (1986, 1990), discusses two modes of cognition, one dominant from cognitive psychology and one based on narratives. The first focuses on logical processing of information and forming of abstract concepts. The second concludes that the narrative approach is a powerful way of making sense of a situation, basically by putting actors and events in a meaningful sequence. This division is reflected in

the case, two knowledge interests are present: on one hand about the case and how to understand it and on the other hand, understanding the rules by reading law texts and the background work for that law.

## 6. DISCUSSION OF THE RESULTS

The argument of this paper is that in order to understand the need of information systems for the support knowledge work a dual view of knowledge, both social and cognitive, should be used. The case of this paper contains examples of attempts to support knowledge work. The communication support system (“The box”) was directed towards human knowledge problems and the social construction of knowledge. The system for distribution of information, with databases and search functions as technical features, support the cognitive perspective, i.e. logical information processing based on concepts and abstractions. If a support system is not aligned with the dominant aspect of the knowledge processes, problems will arise. At the same time, the cognitive and social aspects of the knowledge processes are both necessary. The goal must be a knowledge support solution that respects and cares for both aspects.

The social / cognitive dimension was used for the analysis of knowledge work and information systems, but it was not fully explored. The fact that humans develop their knowledge by both perceiving their world and discussing the result of this cognition with others is rather straightforward. Just by looking from these two perspectives, different views of the information systems emerges. Some examples of the perspective discussed include:

- From the knowledge workers perspective, the human perspective, the information system can support problems of cognitive limitations. However, to create knowledge an interpretative process, that is connecting meaning to objects, is needed. This brings in the social perspective, here meaning is constructed in social interaction between people. If the result of cognition is within what is all ready known this not such a big problem. But, if this is the case then we are not talking about knowledge work.
- From a globalisation perspective, information systems can overcome distances in time and space, at least from a cognitive perspective. The same goes for the speed that the world is developing. Information systems are also suitable for overcoming a higher change rate. But the distances between people can only be bridged by social interactions, when it comes to sense-making and understanding of other peoples’ view points. To create new knowledge or to transfer knowledge between people there is a need for a culture or identity that can make sense of the new knowledge and can be used to bind the participants of knowledge exchange together. The flexibility needed in this new environment comes from the ability to change fundamental ideas about the world. Changes on this level are about changes in cultures and basic assumptions and this is done in social interaction between the people that uphold these cultures.
- Learning is a key element in knowledge work, either it is learning something new or learning from other people. Getting the facts, like searching databases or getting reports from all over the world is easily done with information systems. This is just a part of the learning process, to act on the information one must trust it. This trust (Polanyi, 1966) or sense of reality (Berger and Luckmann, 1966) comes out of social interaction with others.

These are some examples of how the cognitive/social dimension can be used to analysis information systems. Both perspectives can be supported using information systems, the cognitive may be to a greater extent and more easily than the social. More work is needed both into the theoretical background and into the application.

The use of the theories and stories related in the research should be put into work in practical use. This means incorporating it into existing methods for solving knowledge problems using information systems or building new ones. One approach is to form a methodology focused on information system

used for knowledge workers. Implementation strategies or methods answer questions like: “what is the problem in this organisation?”, “what is the desired new state of the organisation?”, “what activities are needed to get there?” (for example soft systems methodology, SSM Checkland, 1981). But, many methods, just like soft systems methodology are too general, they do not contain knowledge of the problem area. The idea is of course that the method helps the analyst to understand the problem and that a senior consultant with experience from the problem area is often the key factor for success. Knowledge management strategies (c.f. Davenport and Prusak) provides insights on the problem but do not give much practical advice on how to use it from a method point-of-view. A method or planning approach for this class of information system should be combinations of problem solving methods (for example SSM) and theories on knowledge work.

Already at this stage, some general characteristics of such a method or planning approach can be discussed. The essential ideas that should be focused on include: human aspects, multi-perspective and interpretation.

- The closer to one gets to the human side of technology the more complex it seems to be. The success of the IT-system becomes less a question of technical function and more about how they are used. Understanding the user and the situation of the user will be crucial for designing the technical artefacts and implementing them into the organisation. This seems to be extra important when it comes to knowledge work, obviously connected to the creation and recreation of meaning, which is a human affair. Ethics (Mumford, 1983) is one method that can provide steps that deal with understanding the human perspective.
- To be able to understand the complexity of knowledge workers, a multi-perspective approach should be used. The outlines for these perspectives have be the main objective of this paper. A framework built around these perspectives should be developed. The aim for such a framework would be to facilitate the interpretation of the possible impact of information systems on knowledge work.
- A method must include steps or techniques that enable interpretations of the problematic situation, knowledge work and the use of information systems. One example of a methodology that incorporates such features is the aforementioned SSM. It advocates several learning cycles, moving between abstract analysis using system concepts and empirical investigations of the problem. Looking for new viewpoints and paradigmatic shifts are important parts of the methodology. The intended planning approach for knowledge work should take the full step and use theory from the field of hermeneutics as a base for creating interpretative steps (c.f. Ricoeur, 1981, Gadamer, 1960).

The future work in this research area should be continued in a number of directions. First, work on the perspectives, their theoretical base and their interconnections. In connection to this, the social/cognition dimension should be made more explicit, likewise the application. Second is the empirical side, this could, for example, mean to come back to the organisation and to look at the development in order to get a richer picture of the problems of knowledge workers. A third line of investigation is how these findings should be incorporated into methods for planning and development of support systems.

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