EDM BUSINESS VALUES IN A SME ENVIRONMENT IN TERMS OF KNOWLEDGE MANAGEMENT

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Abstract

Electronic document management (EDM) emerged in the mid 1990s and has now developed into the accepted approach to managing electronic documents in business. Much research focus has been on technical issues within EDM, and less on organizational issues. One of the stated benefits of EDM is managing and utilizing an organization's corporate memory, which can be described as organizational knowledge. Yet the information systems research community has shown very little interest in EDM in SMEs, which are an important factor in economic growth, especially in sparsely-populated areas regions. This research takess an organizational perspective on EDM and has been guided by the research question: How can EDM support the stated and implied needs for management and utilizing of the corporate memory in an organization of SME type? The research is based on a case study in a SME in Mid Sweden, using an interpretative approach. The findings indicate that the SME has a pressing need to manage both explicit and tacit knowledge for their business needs. While EDM provides the opportunity to manage explicit knowledge, it is more difficult to manage tacit knowledge. Capturing the context in which documents are created, together with an integrating a business process perspective were identified as possible solutions.

Keywords*: Corporate memory, Electronic document management, Knowledge management, SME*

1 INTRODUCTION

The concept of electronic document management (EDM) emerged in the mid 1990s when more and more documents began to be produced in computer-based information systems. Electronic document management comprises "…/ the utilization of IT for the functions for creation, storage, organization, transmission, retrieval, manipulation, update, and eventual disposition of digital documents to fulfill an organizational purpose." (Päivärinta, 2001, p. 19). Many organizations have implemented electronic document management systems (EDMS) (Meier & Sprague, 1996; Päivärinta, 2001; Sprague, 1995) to support the organization's business processes. EDMS aim to support the whole management of documents, which sometimes also includes preservation. Sprague (1995) and Meier & Sprague (1996) presented three categories of benefits or business values for EDM that support organizational performance: 1 Spreading and communicating some form of message often between different actors in an organization, 2 As a vehicle for supporting business processes, 3 Managing and utilizing an organizations corporate memory. But probably the most important value is to make the document management more efficient than the management of paper-based document can be.

The central component in EDM is the *document*. In this paper the following definition of a document is adopted: "…/ a logical unit of recorded data, which can be presented meaningfully for one or more human beings in at least one socio-organizational context. If the data are recorded on digital media, we can speak of a digital document." (Päivärinta, 2001, p. 19). Documents are sometimes described as sources for knowledge within organizations (Gladney, 2004; McKemmish, Piggott, Reed, & Upward, 2005; Menne-Haritz, 2001; Sprehe, 2000) and can be defined as "institutional memory" (Sprehe, 2000). Capturing, storing and sharing of knowledge can give an organization advantages in productivity and innovation (Nunes, Annansingh, Eaglestone, & Wakefield, 2006). EDM supports such activities and is implicitly involved in an organization's knowledge management. Nunes et al (2006) also emphasizes that a working knowledge strategy maximizes and strengthens an organization's chances of survival in the modern economy. EDMS is one of many possible IS/IT systems, which can be parts in an organization's knowledge management strategy, and plays an important role in managing explicit knowledge (Carvalho & Ferreira, 2001).

According to Päivärinta (2001) information system (IS) research on EDM and EDMS has mainly focused on technical issues, and less on organizational issues. Sprague (1995), and Meier & Sprague (1996) were, according to Päivärinta (2001), among the first that represented an organizational approach to research on EDM a research tradition that also correspond with the Scandinavian IS research tradition (cf. Dahlbom, 1996).

The research presented in this paper is based on a case study within one small and medium sized enterprise (SME). SMEs are important businesses, supporting economic growth in peripheral regions (Ballantine, Levy, & Powell, 1998), but in a competitive economy they need to adopt new technologies to survive (Caldeira & Ward, 2003). The SME in this study has recently implemented an EDMS with the purpose of increasing the quality of their management of electronic documents and to provide more effective information management that was necessary to support business processes. The SME has also worked to constantly improve their management of electronic documents during the last two years.

In order to gain a picture of the level of interest EDM in SMEs had gained from IS research we searched the major academic outlets and databases, but found no evidence of IS research that has focused on EDM and SMEs[1]. The research question that has guided this research is: How can EDM support the stated and implied needs for management and utilization of the corporate memory in an SME type of organization?

This research is in progress as part of a larger research project in the domain of SMEs[2]. The research is performed at a company henceforth named CompA. The project aims to find out to what extent EDM and the use of EDMS in an SME can increase their competitiveness. The result is expected to be general to categories of SMEs other than the SME acting as a case in this paper. This research further aim to contribute to a deeper understanding of how electronic documents are used in organizations and how high quality can be attained in EDM to fulfill organizational, legal and user requirements.

[1] We searched for the phrase "electronic document management" and "SME", in the databases of AIS, ACM, IEEE, EBSCOhost, Science Direct, Blackwell, and Wiley Interscience.
[2] http://www.miun.se/mhtemplates/MHPage____25537.aspx

2 RESEARCH METHOD

This paper is based on an interpretative case study performed at one SME, in a town in the north of Sweden. Interpretive case studies are a commonly applied research method in information system research (Walsham, 2002).

Interviews, a qualitative questionnaire and participatory observation were used to collect data. In all, five one hour semi-structured interviews, two group interviews/seminars, one questionnaire with 17 questions, and two 3 hours sessions with participant observations were undertaken. The interviews were recorded and the original recordings have served as the basis for data analysis. Although no pilot survey was conducted in this study, the questions in the questionnaire were designed in consultation with colleagues from the same research project who have used them in similar situations. The questionnaire served as a complement to the interviews and aimed to increase knowledge of information use behavior in CompA. 25 employees who comprised approximately 33-38 % of the total population at CompA, and represent the majority of the administrative staff answered the questionnaire. An employee at CompA handled the distribution of the questionnaire.

This study consisted of two phases; the first was to analyze the overall information management at CompA, of which electronic document management is only one part. This part is presented in the following section. The next phase of the study consisted of a deeper analysis about the benefits and business values gained from EDM. A qualitative approach was used to analyze the data. Notes from the observations and interviews were analyzed and categorized, and re-categorized as described in Strauss & Corbin (1998) among others. The questionnaire consisted of both open questions and multiple-choice questions, but the answers were not analyzed using quantitative or statistical methods. In this study the use of different ways of collecting data has similarities to a mixed method approach (Chen & Hirschheim, 2004).

3 RESULTS FROM THE CASE STUDY

The results from the case study at CompA are presented in categories that became visible through the process of transcribing and listening to the interviews, reading the questionnaires, and rewriting observation notes. This presentation of the CompA case focuses solely on how information management works at CompA. The categorization used here does not represent any formal analysis, it functions more as a tool to structure the results. Thus this section begins with a description of the CompA and follows by a series of sub-sections presenting findings from the CompA case.

3.1 Presentation of CompA

CompA is a production company producing products with lift capacity to different industrial needs. The entire company is located at one single site. CompA has between 65 and 75 employees (fluctuating in production need), and has sales offices in two other European countries: Germany and Great Britain, with a new sales office soon to be established in France. Sales outside Scandinavia and the above three countries are managed by local sales agents. CompA was formally started in 1964 and today more than 70% of their productions are exported to about 30 different countries. During the last 10 years CompA has changed its production to more customer specific products. The custom-made product sales are today

about 50 % of the total sales. CompA can be defined as a knowledge intensive firm (Alvesson, 2000; McGrath, 2005; Nunes et al., 2006), where there is strong awareness that the company relies heavily on individuals and those individuals' knowledge. Yet knowledge is not managed in formalized form at CompA.

CompA is dependent on technology in its business. The standard workplace is equipped with a PC with a standard office suite and MS Outlook as e-mail client. Three important additional systems are used in CompA: AutoCad[3] for constructing drawings, Enterprise Management system Movex[4] handles sales and accountants, and Caradoc[5] is used as EDMS. CompA aims to use Caradoc for all aspects of its business, to support design, production, sales, and administration. First implemented in 1996, Caradoc is currently only used for handling drawings, but even then not in full scale. When CompA began to identify internal problems with documentation it implemented a new and better version of Caradoc in late 2005 and early 2006. The design division has begun to standardize the documentation of their work when they are creating CAD drawings. Old and new drawings are added into Caradoc to keep all electronic drawings in one place with a common metadata structure. This is internally named the drawings archive. The purpose of using Caradoc is to facilitate management and retrieval of documents, drawings, and pictures.

Sales and economy staff use Movex. Movex also manages the stock catalogue, including all article numbers for the products and all spare parts. It handles the documentation of the entire sales process from receiving a customer question, making an offer to the customer, making the order, initiating production, managing delivery status, invoicing, and finishing the deal. Movex also provides the capacity for a person to add notes during a business process. That functionality is not mandatory, and sales staff often takes notes on paper. Those notes are supposed to be added to the printout of the finished deal, which is put in a loose-leaf binder.

CompA has a LAN with added storage capacity, where each employee can store documents and digitally created information, either on a private domain or on a public. This means that electronically created documents are stored and managed in a rather unstructured way (except by the design division), if they not are captured in Movex. The staff store these documents either locally on their PC, on their private domain on the server, or in a shared domain within the company. This results in a situation where many documents are stored on locations where no one but the person that created them can access them. Even if the document is stored on the public domain, only the creator knows where the document is and what name the document is given.

The staff at CompA agreed that the information systems are adequate for the business and work performed. The majority of the staff also regards Movex and MS Outlook as the two most important sources for information searches. The last year a major overhaul took place in CompA, to improve the internal information and document management to better support their business needs.

[3] http://www.autodesk.com
[4] http://www.lawson.com/wcw.nsf/pub/GlobalStartPage
[5] http://www.carasoft.se/

3.2 Communication at CompA

In CompA the administrative staff, designers, and sales employees are working in an open office environment, with only small screens between each office desk. The factory part of CompA is connected with the office building, which makes it possible to move easily between factory and office. This open spatial architecture of CompA results in regular live communication between employees. When employees have some questions, the majority chooses to ask a colleague instead of trying to search for the answer in any of CompA's information systems or in written or printed documentation. In communication situations, where information is needed to reach out to all or many of the employees at CompA, e-mail is used. The employees use groupware functionality in their daily work, given by their MS Exchange server. Besides using e-mail, they can communicate and share calendars, addresses, and what they call "common folders". In those folders weekly newsletters, product catalogue and similar types of information are stored. All employees have web access to their mail, calendar, address book, and folders in MS Outlook and MS Exchange.

New employees in sales positions are equipped with a sales manual in paper form, which is also available in electronic form. The sales manual is also given to other sales staff, but serves mainly as a handbook for new employees. The sales manual should support the employee in the whole area of sales. Even if the employees have the manual, they find personal communication quicker instead of searching for the correct answer in the manual. Stated reasons were that the personal communication gives additional knowledge of a tacit nature besides the wanted answer. Older employees share their experience with younger employees, something reading a manual does not provide. The same situation existed amongst designers. When they are assigned a design assignment and don't know how to solve a problem, they talk to more experienced colleagues. Designers often confront problems when designing and constructing a customized product. When they talk with colleagues they often find out that a similar product has previously been produced, yet they had been unable to find this information in any of CompA's information systems. Consequently they believe personal communication results in less waste of time.

3.3 Information search and retrieval

Figure 1 represents the time CompA staff spends on information search and retrieval both generally and when they not know where the information might be located. A majority of the employees prefer to search only for information they cannot find by asking colleagues. When employees search for documents they have created themselves and do not find the document immediately, some recreate the document instead of continuing the search.

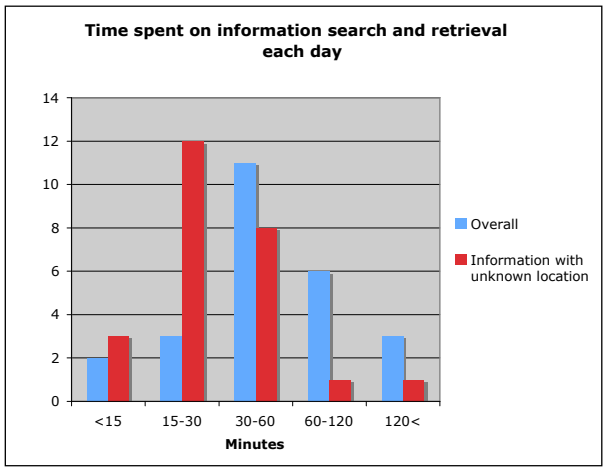

Fig 1. *Time spent on information search and retrieval*

It is recognized that there are problems with searching and finding information needed for work and business purposes. The following are answers from two employees about what they do when they don't find needed information;

"I run back and forth asking colleagues for an answer"

"I start to swear and continue my search and after a while contact my colleagues for assistance"

CompA is very much aware of the fact that this involves costs, or as the CEO says:

"We have very much information: it is not stored, managed in a systematic way. We are too dependent on what staff have gathered and remember themselves in their 'heads' and on our employees experience"

The CEO gives another example of problems with retrieval of documents and information, resulting in high costs, which is about custom made products. It is often the customer that contacts CompA with a problem he or she needs to solve by ordering a custom-made product. CompA can normally solve the problem, but in some cases the product is very specialized due to the customer's unique need and the cost is thus difficult to fully predict. The CEO said that there is often a difference between the preliminary calculation and the cost accounting sometimes resulting in losing money on the transaction or business deal. There is a need to make the cost accounting and preliminary calculation comparable and searchable, to prevent future deals being closed with loss of money for CompA. Even if the deal is preserved, they have problems finding it because the context of the deal itself is not searchable. According to the CEO they often have difficulties finding what they are looking for, and when they do it is normally because some of the employees remember the deal.

This need for searchable documents is also important for production, when developing new products. Too many times almost identical products have been produced; just because the designer wasn't aware of that a similar product already existed. This happens both for whole products and for product parts. According to the CEO, the problem is not that the sum total of articles is increasing, but the problem is the resulting cost of the duplicated work.

In the last couple of years two kinds of documents have been particularly problematic to manage because CompA has many of them: drawings and pictures. Those two are by nature

problematic to find after creation because they need added metadata to be searchable, compared for example to a text document that can be searched using a search engine. Therefore CompA has started an internal project to decide how drawings and pictures should be named and preserved, and what kind of metadata is needed to make them searchable due to CompA's need.

4 DISCUSSION

This section is an analysis of the results presented above focusing on whether EDM fulfills the stated and implied needs of management and utilizing of the corporate memory in CompA.

4.1 The need for both explicit and tacit knowledge management

Explicit knowledge can be defined as knowledge that in some sense can be codified and formalized (Nunes et al., 2006), and there are voices arguing that explicit knowledge is pure information (Wilson, 2002). On the other hand less formalized knowledge is tacit knowledge, knowledge that often is personally bounded. Experience is a good example of tacit knowledge (Blair, 2002; Nunes et al., 2006; Wilson, 2002). There is not a static border between explicit and tacit knowledge. Tacit and explicit knowledge can be transformed to each other in a continuous spiral, where tacit can become explicit and explicit can become tacit knowledge (Nonaka & Takeuchi, 1995).

CompA has both stated and implied needs to manage explicit knowledge, recorded in electronic documents. Information systems involved in EDM, in the CompA case the EDMS, and the enterprise management system, have the functionality to support this need. To capture, store, share, and disseminate explicit knowledge it has to be possible to formalize that knowledge. From the CompA-case a variety of documents of different formats can be identified, which contain formalized explicit knowledge. They are contained in groupware, in folders on the fileserver, in Movex, and in the EDMS Carasoft. The majority of them represent stored and preserved explicit knowledge. The CompA-case highlighted one dilemma. That is, even if explicit knowledge exists, and is formalized, captured and stored in form of an electronic document, the storage of documents does not necessarily enable a viable search and retrieval of knowledge. In an EDMS each documents is added with predefined and chosen metadata elements, which makes each document searchable and unique. To find and be able to share knowledge in forms of electronic documents, the user must be aware of what metadata is used and how to define the correct search question or search string. One of the most important reasons for the difficulties CompA's staff has in finding knowledge/ in document form is the lack of search-supporting metadata. For example all drawings of custom made products are not searchable because they do not have any metadata that can support search and retrieval. But many electronic documents are also stored unstructured on employees own computers, or on the fileserver in different folders, which makes them difficult to retrieve by users other than the creator.

At CompA younger employees seek knowledge from older colleagues, knowledge found in documents, as well as knowledge not found in documents. They find that live communication is the fastest way to find what they are is seeking. Information systems involved in EDM can not support tacit knowledge to the full extent, which requires rather advanced and costly knowledge management strategies (Nunes et al., 2006). Off course, the live communication

between employees is not the only purpose of knowledge searching, when communication is a natural and important social act between colleagues at work. CompA was defined above as a knowledge intensive firm (Alvesson, 2000; McGrath, 2005; Nunes et al., 2006), which is characterized by dependencies on key persons among the staff. At CompA key persons' experience, i.e. their tacit knowledge was crucial for daily business and decision-making. CompA has a need to capture and manage those experienced employees' knowledge to become less confined to individuals. Experience can result in a more effective and cost saving business, if more correct decisions can be made by taking advantage of it. Experience is very difficult to formalize. CompA does not have any strategies or directives that encourage a conversion of tacit to explicit knowledge in some kind of knowledge spiral as presented by Nonaka & Takeuchi (1995).

4.2 Context dependency

Captured experience can be derived from electronic documents that have rich contextual descriptions. For example, at CompA a drawing of a custom-made product can represent explicit knowledge. However, the drawing itself can never explain what decisions the designer has taken in order to finish the drawing. These decisions are part of the context of design and at CompA they are only preserved as experience within the designer's mind. This knowledge and contextual information is shared through personal communication at CompA. Context is what separates information from knowledge (Blair, 2002). In documents the context gives meaning to the recorded information. Even if explicit knowledge can be formalized, e.g. in the form of a document, the context must be attached to the document in some way to give a meaning to the inherent information in the document. IS used for EDM in CompA is to a limited extent optimal for capturing context. In archival science the concept of provenance is about context and the relationship between records in a business (McKemmish et al., 2005). A record is simply described as a document born in a business transaction (Reed, 2005; Thomassen, 2001). Provenance is the link between records and transactions, but also how they relate to each other. Provenance can also be the link between records, process and organizations. Without the provenance and the links between different records, understanding about what has happened will be difficult. Provenance documents the context of records. In an EDMS it is possible to add a wide variety of metadata, but there is often a limitation in metadata use, because it takes time to add metadata. At CompA only metadata considered as absolutely necessary were used, metadata that make each document unique. In order to make an EDMS support knowledge management, contextual metadata must be added to the documents (Blair, 2002). Contextual metadata should be able to answer e.g. why-, what-, who-, and how-questions. For example information (metadata) about why a product is made, what requirements were stated, who made what in the process, and how decisions were made during the process, must be captured when custom-made products are constructed a CompA. There is a variety of metadata sets, applicable and usable in EDM (International Standards Organization, 2003, 2004; Public Record Office Victoria, 2003).

4.3 Capturing the richness of documents involved in a business process

When electronic documents are managed in separate systems, without any relationship between each other, it is very difficult to capture the context. At CompA the process of a custom-made product begins at the sales department that initiates a case file in Movex. Then the design department gets the assignment and designs the product using AutoCAD. The

drawing is then added to Caradoc and tagged with metadata. The drawings are used by the production department which, when the product is finished, communicates with Movex. When the customer has received his or her product the case file is closed in Movex. Throughout this process various emails, freestanding documents and notes are also made that have something to do with the case. This rather sketchy and simplified example of a business process at CompA demonstrates that the business process and its context is dependent on more than just a few documents. There are at least two possible ways to capture context within a process: one is to add metadata that is so informative that it describes the context and the process; the other is to capture all documents in the process, and each document should be of such quality that it is obvious how it relates to others, and together they could be used to visualize the process. The relationship between the documents enables the understanding of the process and decisions taken within it.

5 CONCLUDING REMARKS

The research question that has guided this research was: How can EDM support the stated and implied needs for management and utilizing of the corporate memory in an organization of SME type?

Even if CompA find their EDM practice generates problems concerning management of explicit knowledge, EDM does have the capacity of fulfill their stated and implied needs. The existing problems are traceable to the fact that CompA does not have a full EDM strategy covering the whole company and the management of all electronic documents in the company. The company is working on one the problems, to improve the management of documents produced in the custom-made product process. But CompA has a great need to manage experience, a need not recognized before this study. Capture of tacit knowledge in the form of employees' experience is one of the major challenges for EDM at CompA. If experience could be possible to capture, store, share, and disseminate, EDM could become more important in decision-making at CompA and improve its businesses.

Two factors were identified by this research that affect the possibility of managing tacit knowledge. First there is the need to capture the context in which the document is created, i.e. capture the whole process for which the document provides part of the record. Second, capturing the context is possible if an integrated approach on EDM is taken, whereby EDM is seen as a strategy that goes beyond IS borders and follows the business processes instead. The need for knowledge management supported by EDM cannot be handled by single stand-alone systems. This research has also shown that CompA staff spend too much time in searching for information they need for their business, and that vital business documents are lost because of unstructured document and information management. This kind of problem can be solved with an EDM strategy.

Further research is needed to study whether it is necessary to adapt content management strategies to provide for the complexity of needs in SMEs.

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