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Seven Types of Knowledge Loss in the Knowledge Capture Process

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Abstract

Society is based on knowledge and the availability thereof. Access to knowledge empowers people, and organizations must reuse knowledge to be competitive. The right knowledge to the right person at the right time is important for success, and IT plays an important role in order to achieve this goal, for example in the form of Electronic Knowledge Repositories (EKR). The success of an EKR depends on what is stored therein, and the ability to capture the right knowledge is hence a key aspect. This, however, is a complex issue. The goal of this paper is to identify and describe different types of knowledge loss, seven of which have been identified and characterized. As an example, one knowledge loss shows that not all knowledge can be stored, and critical knowledge elements may therefore be lost when attempting to store it. Some knowledge loss may be desirable, since an organization should not want to store everything. The results contribute to capturing the right knowledge, and hence to successful EKR. The results thus contribute to elevating the competitive power of an organization

Keywords: Electronic Knowledge Repositories (EKR), capture, knowledge loss, success factors

1 INTRODUCTION

"Knowledge is power" (Sir Francis Bacon, in Religious Meditations, Of Heresies, 1597). The quote by Sir Francis Bacon is old, but nevertheless more true than ever. To be competitive organizations must reuse knowledge from earlier experiences and learn how to not do the same mistake over and over again, i.e. they need to perform Knowledge Management (KM) work. "*If failure is ignored, denied or repressed, the opportunity to learn from past mistakes is lost.*" (Chua and Lam, 2005, p. 7). Successful KM that contributes to improved organizational effectiveness requires provision of appropriate knowledge to those who need it, when it is needed (Jennex et al, 2007). Storing knowledge in an IT system results in the rudiments of a KM process (Sandelands, 1999), and this is the focus of this paper.

Knowledge sharing through the use of Electronic Knowledge Repositories (EKRs) must, however, be regarded as a means, not an end, to the purposes for sharing knowledge (Carlsson and Kalling, 2006). The success of an EKR depends on whether or not the repository is actually used. For a knowledge repository to be used, the users must perceive that its usage will greatly enhance their work performance (Sharma and Bock, 2005). Hence, *what* is stored in the repository is critical for success. Before knowledge is stored in the repository, it must first be captured. Thus, to be able to manage knowledge, the ability to capture it is a key aspect (Matsumoto et al, 2005). Knowledge capture is about: *identifying* as much knowledge as possible, *evaluating* it and then sorting out the knowledge which should not be stored. The remaining knowledge should be *passed* stored in the repository. Identifying, evaluating and passing concern the interface of the capture process.

Capturing the *right* knowledge is necessary for KM success (Jennex et al, 2007). This means that "all" knowledge should be identified and evaluated for possible storage in the EKR. In the capture process there are different types of knowledge loss. The concept knowledge loss refers to a knowledge loss from the perspective of a particular EKR and means that no new knowledge is stored in this repository. Furthermore, the concept is related to the capture process since the activities in this process decide what knowledge to store. The effective management of knowledge loss concerns both decreasing the amount of knowledge that is unidentified, i.e. decrease unwanted knowledge loss, because if knowledge is not identified it will not even has the possibility to be stored, but also increasing the amount of knowledge that not should be storedi.e. increase wanted knowledge loss, because storing all identified knowledge causes information overflow and low quality in the EKR as well as problems to find the required knowledge. As put by an HR manager in a big Swedish company. "It's difficult to make people remember that they don't need to store everything.". There is a lack of awareness of the complex issues related to an effective knowledge capture process and the benefits achieved through it (Hari et al, 2005), including awareness of different types of knowledge loss. Since the ability to capture is a key aspect in KM (Matsumoto et al, 2005), this is a problematic knowledge gap. With the purpose of decreasing this gap and increase the body of knowledge concerning the capture process, the goal of this paper is to *identify and describe different types of knowledge loss*. This work is a continuation of the work by Aggestam (2007), and to the best of our knowledge, no one else has addressed the knowledge capture process from this knowledge loss perspective. A qualitative analysis was conducted, including theoretical analysis and an interpretive field study. Results include the identification and description of seven types of knowledge loss, and an updated version of the framework for IT-supported KM (FIT-KM) (Aggestam, 2006).

We want to emphasize that managing knowledge loss and hence capturing the "right" knowledge is not enough for ensuring success. The way in which the captured knowledge is packaged, stored and made accessible to the users is also crucial, since it must be possible to find the knowledge when needed. However, failing to capture the "right" knowledge can never be compensated by successful packaging. The paper is structured as follows: Our background is described in Section 2 and the research process in Section 3. Section 4 describes the result which consists of seven types of knowledge loss. We close the paper by some concluding remarks.

2 BACKGROUND

The setting for paper is Knowledge Management (KM), or more precisely Electronic Knowledge Repositories (EKR). Before going into the specifics of the seven identified knowledge losses, relevant concepts will be defined and an overview of KM given, as well as a more detailed description of EKR.

KM aims to create value for the organization by enabling learning. Even if learning and accumulation of (new) knowledge always start from the perspective of an individual (Jensen 2005), there are different types of KM. One type accumulates knowledge outside people in order to disseminate knowledge to support learning (Wiig 1994); this is the type to which EKR refers. EKR enables both individual and organizational learning, and hence supports the other two types of KM identified by Wiig (1994): to accumulate knowledge inside people and to embed knowledge in processes, routines etc. With respect to Binney's (2001) six elements: transactional KM, analytical KM, asset management KM, process-based KM, developmental KM, innovation/creation KM, developing EKR includes both a product and a process perspective. There must be processes associated with the management of the knowledge repository and improvements of work processes in order to support different types of knowledge conversions as described by Nonaka and Takeuchi (1995). The application of technology when building the repository embeds knowledge in the application and the use of it. Binney (2001) terms this "transactional KM", which is a side-effect of building EKR.

There are different types of knowledge. Wiig (1993) terms knowledge that people hold in their minds "internal knowledge". Knowledge in e.g. books and IT systems is referred to as "external knowledge". From the perspective of an employee, external knowledge is organizational knowledge, i.e. knowledge that remains in the organization even if employees leave. An EKR is a part of the organizational knowledge. Another common distinction in literature is between tacit and explicit knowledge (see e.g. Gore and Gore 1999, Loermans 1993, Nonaka and Takeuchi 1995, Wiig 1993). Tacit knowledge is difficult to identify and to express, since it is highly personal and concerns insights and intuition (Nonaka and Takeuchi 1995, Blodgood and Salisbury 2001). Explicit knowledge is easier to express and can, in contrast to tacit knowledge, also be processed by a computer (Blodgood and Salisbury 2001, Nonaka and Takeuchi 1995). From an organization's perspective, organizational knowledge stored in a repository can be regarded as explicit and organizational knowledge stored in the culture and embedded in work routines as tacit. Figure 1 summarizes our KM conceptualization.

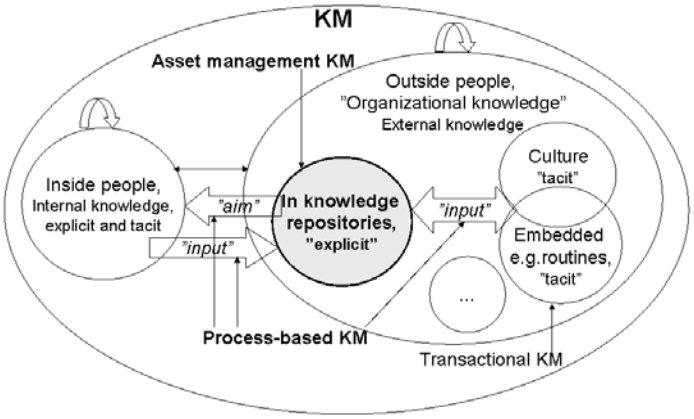

Figure 1 Different parts of KM and their relations (developed from Aggestam and Backlund, 2007)

Knowledge derives from information (Davenport and Prusak, 1998; Wiig, 1993), and knowledge should also produce new information (Schreiber et al, 1999). Knowledge creating activities take place within or between people (Davenport and Prusak, 1998), but the real transformation process, when information changes to knowledge, is individual. Thus it is impossible to store "knowledge"; it is information that supports knowledge transformation that is stored. However, people tend to regard stored information as knowledge, because this is the way it is used, and we can thus also refer to such

stored information as external knowledge. An EKR requires capturing, packaging and storing of relevant knowledge. These processes take place when a knowledge repository is created for the first time in a KM implementation project, as well as every time new knowledge that has potential relevance for incorporation in an existing EKR is generated. The latter is critical for ensuring that the EKR is updated and furthermore for maintaining usefulness and trust in the repository over time. Hence, the importance of the capture process is apparent. The Framework for IT-supported KM (FIT-KM), see Figure 2, describes KM work using an EKR. FIT-KM visualizes how the capture process relates to other processes and flows in this context, i.e. its interface. The process of capturing new knowledge starts when knowledge which can be incorporated in the repository is *identified* and closes when the identified knowledge has been *evaluated* and passed onto the process of packaging and storing knowledge, or a decision is made that the identified knowledge should not be stored.

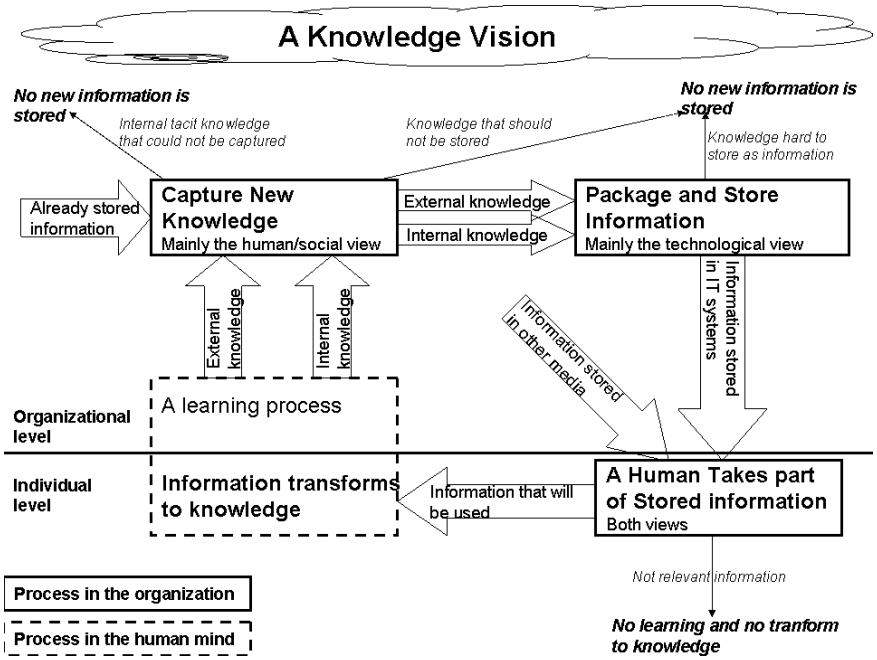

Figure 2 FIT-KM describing KM work using Electronic Knowledge Repositories (Aggestam, 2006)

3 RESEARCH PROCESS

The proposed knowledge loss types (Section 4) are based on both empirical and theoretical data since the research process included a literature review and an interpretive field study. In order to assess quality, the work was guided by ideas that are conceptualized in the principles proposed by Klein and Myers (1999). A single case study can be justified if it is purposeful and provides a large amount of information (Gummesson, 2001). To increase credibility and dependability, prolonged engagement, persistent observation, and triangulation have been conducted (Lincoln and Guba, 1985). There are two main types of triangulation: method triangulation and source triangulation (Williamson with Burstein and NcKemmish in Williamson, 2002). Efforts towards both have been made, e.g. we have used different types of data collection techniques, as well as collected data at different times and from different people with regard to profession and location. Two techniques that aim to strengthen credibility are member checking and referential adequacy (Lincoln and Guba, 1985). We tested our interpretations and conclusions by sending protocols, models, and the report back to members of the project group. *"A review of prior, relevant literature is an essential feature of any academic project.* (Webster and Watson, 2002, p.xiii) and our theoretical data results from such a review. Before summarizing the qualitative analysis (Section 3.1) we will briefly describe the interpretive field study.

3.1 The Interpretive Field Study

The interpretive field study was conducted through participation in a KM implementation project called *Efficient Knowledge Management and Learning in Knowledge Intensive Organisations (EKLär)* which ran for three years and which was completed in 2007. EKLär was a healthcare project based on the prevention and treatment of leg ulcers Three treatment units were included: Home healthcare, Primary Care and Hospital. The objective of these stakeholders was to provide the patient with the best possible treatment and one important resource for this is knowledge, and the sharing of it and the EKLär project aimed to develop an IT-supported Knowledge Repository for learning and sharing of best practices with respect to treatment and prevention methods for leg ulcers[1]. The approach used in EKLär, Enterprise Knowledge Patterns (EKP), combines Enterprise Modelling (EM) with organizational patterns (Stirna et al, 2006) and is characterized by a strong emphasis on stakeholder participation and the use of Organizational Patterns to package knowledge.

"*Qualitative findings grow out of three kinds of data collection: (1) in-depth, open-ended interviews; (2) direct observations; and (3) written documents.*" (Patton, 2002, p. 4), and all these kinds of data collection were performed in the interpretive field study. The EKLär project was carried out in three phases, preparation, implementation and evaluation. Figure 3 visualizes the aim for each phase as well as relates the different ways of collecting data to the different phases.

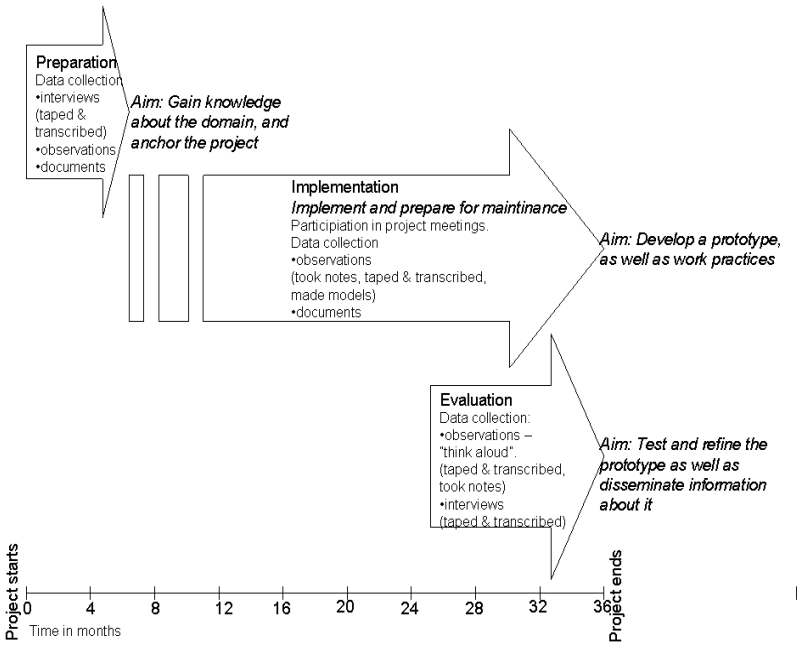

Figure 3 The EKLär project – An overveiw

A critical step in all projects is to make result survive after project completion. In EKLär this meant to keep the repository up-to-date. Hence, in the implementation phase, our work focused on ensuring long time survival of the repository by linking individual processes to organizational ones in order to continuously identify and capture knowledge. Part of this was to identify where and when knowledge in the organization, which has potential for being stored in the repository, had been created. An important issue was defined as the identification of situations when knowledge, with the potential for storage, in daily work, was exchanged between employees. Our working name for these situations was capture points and much effort was invested in order to identify these situations. The EKLär case was selected for several reasons. It includes both creation and maintenance of a repository, and results

[1] The resulting IT-supported Knowledge Repository can be found at www.vgregion.se/skassarwebben (in Swedish)

from the evaluation phase, based on Jennex and Olfman (2006) KM success model. This and the fact that the repository still is in use indicates that the EKLär project was successful.

3.2 The qualitative analysis

The work presented in this paper is focused on knowledge loss. There is a relationship between success factors (SF) in the capture process and the different types of knowledge loss in the same process. Success factors are conditions that need to be met in order to ensure success (Poon and Wagner, 2001). Improved management of success factors in the capture process when identifying knowledge results in an increase in the amount of new knowledge that is identified, while decreasing the amount of knowledge that escapes identification. Hence, unwanted knowledge loss is reduced. Improved management of success factors when evaluate identified knowledge for possible storage in the EKR results in increasing the amount of the right information being stored and decreasing information overflow. Hence, wanted knowledge loss is increased.

The relationship between success factors in the capture process and knowledge loss was revealed during our work with success factors in the capture process. This resulted in that we, from the perspective of knowledge loss, made a second analysis of the data we collected researching critical success factors (CSF) in the knowledge capture process (Aggestam et al, 2009; Aggestam and Persson, 2010). How the data was collected as well as a summary of the SF that have influenced our findings are described in these papers. The researching work concerning CSF includes a literature review and an interpretive field study performed in the EKLär project. Hence, the proposed knowledge loss in this paper are grounded in both theoretical and empirical grounded

As mentioned, knowledge loss in the capture process means that no new knowledge is stored in the repository. All knowledge loss types in the capture process concern the interface between this process and its context. FIT-KM shows the capture process in its context (see Figure 2). Thus, FIT-KM has been used as an analysis tool. The block arrows “External knowledge” and “Internal knowledge” contain the output of the capture process. These block arrows include the result of the process “Capture New Knowledge”, i.e., they are not a part of the real process, and therefore not included in the analysis. Focusing on the remaining parts of the interface of the capture process, FIT-KM shows three different inputs (**a–c** in Figure 4), where knowledge loss may occur. It also indicates two generic types of knowledge loss that may occur; knowledge that should not be stored (**d** in Figure 4) and knowledge that could not be captured (**e** in Figure 4).

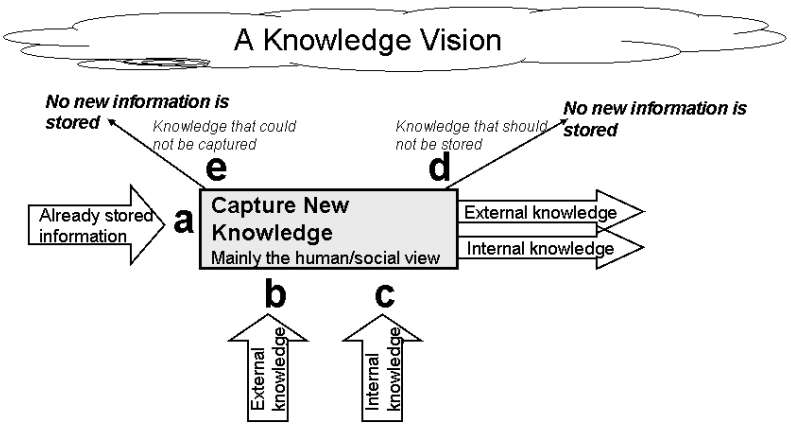

Figure 4: The Capture Process as an analysis tool

Neglecting to manage SF that influence **a, b** and **c** in Figure 4 will result in pieces of knowledge not even reaching the capture process, i.e. increasing unwanted knowledge loss. In addition, neglecting to manage SF that influence d and e will result in unnecessary and incorrect storing of knowledge, i.e., decreasing wanted knowledge loss.

For the purpose of identifying types of knowledge loss, we carried out a second analysis of the data consisting of theoretical and empirical SF for the capture process. The second analysis focused on how knowledge loss types influence the capture process interface, i.e. whether each factor mainly influences a, b, c, d, or e in Figure 4. Factors that did not belong to any of these groups probably do not influence the interface directly, and were therefore put into a separate group ("Other"). Grouping the SF according to how they influence the interface of the capture process provided a description of influences. In order to enhance traceability concerning the seven types of knowledge loss and SF used in the analysis, we summarize how the influences from the SF relate to the different types of knowledge loss in Table 1. Each group was analysed with the purpose of identifying potential knowledge loss. The result revealed the seven different types of knowledge loss (Section 4).

4 KNOWLEDGE LOSS TYPES IN THE CAPTURE PROCESS

Five of the seven knowledge loss types are *unwanted*, since no employee consciously chose not to capture the actual piece of knowledge. Two types of knowledge loss can be regarded as *wanted*, because an employee has, for some reason/s, consciously chosen not to pass this knowledge on to the next process. The analysis reveals some shortcomings in the FIT-KM model: there is no separation between internal tacit and internal explicit; there is no knowledge goal; there is no separation between information stored in and outside the organization; and there is no division of external knowledge and information. The analysis also reveals that the input "External knowledge" is both incorrect and unnecessary, since it emerged from the individual level and concerns *internal* knowledge that an individual created when using information. External knowledge is the same as information and, as such, input to the capture process already covered in FIT-KM. These shortcomings mainly concern the knowledge capture process, and the FIT-KM model has been updated accordingly. The part of the FIT-KM model relevant for this paper is presented in Figure 5, which also shows the model updates.

Figure 5 shows the seven types of knowledge loss from the perspective of a particular EKR in an organization. The model is generic and has potential usefulness in different types of organizations. The numbers in Figure 5 refer to the seven types of knowledge loss. 1-5 concern unwanted knowledge loss, because no employee consciously decides not to capture the knowledge. 1-3 refer to loss meaning that knowledge did not even reach the capture process, and the need of a structured approach to identify when new knowledge has been created is obvious. 4-5 refer to loss meaning that the actual piece of knowledge was identified, but for different reasons, for example, no employees were responsible for relevant KM tasks, it was not passed onto the package and store process. 6-7 concern wanted knowledge loss in the meaning that an employee chose not to pass the knowledge onto the package and store process, e.g. for irrelevance or legal reasons. We will now describe each knowledge loss and then in Table 1 further characterize them by relating them to success factors.

The *first knowledge loss* concerns knowledge of which corresponding information is already stored somewhere, e.g. in documents, books and/or protocols. Even if it is already stored, it will probably be hard to find and reuse unless it is integrated and related to other organizational knowledge. This stored knowledge can be found inside the organization, in the actual department or in another one, or outside the organization, and it is probably structured and stored for other purposes compared to the repository. If no one knows about these different sources of knowledge, or do not think about them from the perspective of the actual KM work, they will not be identified, and accordingly, never reach the capture process. Furthermore, there is also stored knowledge which is known, but the person who knows about it does not want to disseminate it. The *second knowledge loss* concerns internal explicit knowledge. The person who knows is the knowledge owner, and with regard to the fact that actual knowledge is explicit, it must be known. Thus, the main challenge concerning explicit knowledge is to increase employees' willingness to contribute it to the repository. Reasons for not wanting to contribute are, for example, that employees want to stay where they are and do not experience that they receive any benefits from sharing the knowledge. Another problem that may result in explicit knowledge not being identified is that the knowledge owner does not think about it as relevant.

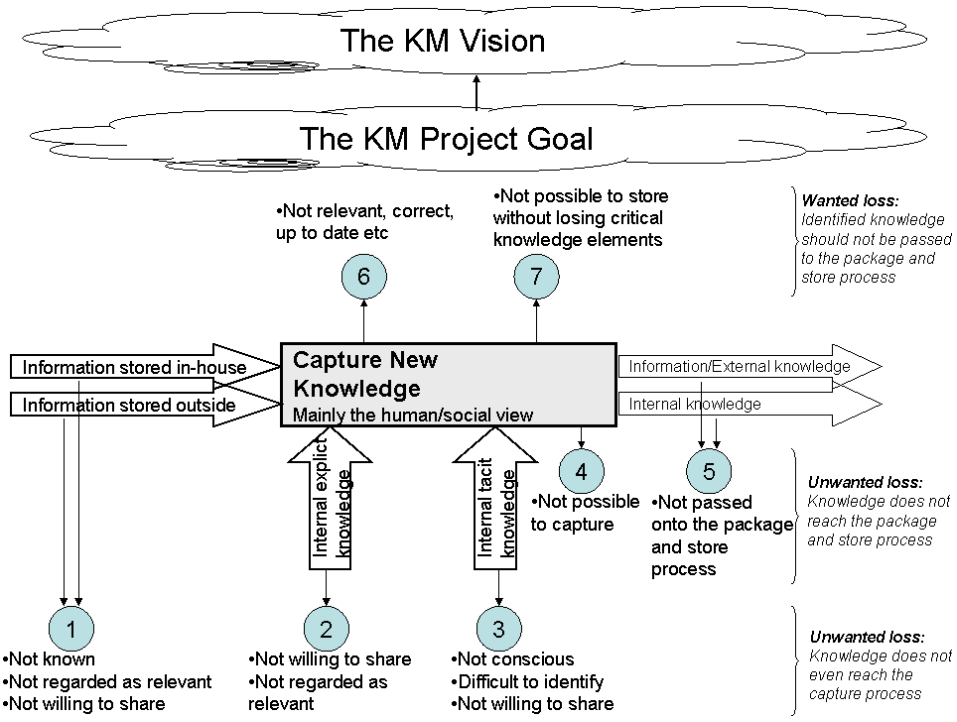

Figure 5 Different types of knowledge loss in the capture process

Knowledge loss 3 concerns internal tacit knowledge. Because the knowledge is internal, there are similarities to knowledge loss 2. The person who knows is always the knowledge owner, and if this person is conscious of the knowledge, reasons for this type of knowledge loss concern willingness or ignorance of its relevance for the repository. However, with regard to the fact that the knowledge is tacit may mean that it varies if the knowledge owner is conscious of the knowledge or not. Furthermore, tacit knowledge is more difficult to identify compared to explicit knowledge, and the need for suitable approaches to identify this type of knowledge as well as work procedures to try to convert tacit knowledge to explicit is clear. These conditions are also relevant for loss 4.

Knowledge loss 4 concerns internal tacit knowledge that is identified, but which could not be captured. Compared to number 3, the person who knows is conscious about it and willing to share the knowledge, but the organization lacks suitable tools, competences etc. to capture it. An alternative is to store information about the owner. If this type of knowledge loss is significant, there is also a risk that the organization lacks methods, work procedures, and so on, that enhance converting tacit knowledge to explicit knowledge.

This *knowledge loss 5* concerns all knowledge that has been identified and valued as important to disseminate through the repository. A critical issue is to pass the knowledge on to the package and store process. Employees must have time for performing these tasks, as well as IT systems' support. Furthermore, if this is not integrated in daily work processes, the risk that the knowledge will never be stored increases.

The *sixth knowledge loss* concerns knowledge that is identified, but should not, for different reasons, be passed onto to the package and store process. Reasons for not wanting to store identified knowledge are, for example, that it does not contribute to the knowledge goal, that it already is stored, or that storing is prohibited. Furthermore, this type of knowledge loss also includes deleting already stored information, which can be the result of revising the content. Documented evaluation criteria adapted to the organization's needs support this decision process. This is in accordance with the Ev-CSF described in (Aggestam et al, 2009).

Table 1 Influences stemming from the SF and how they relate to the different types of knowledge loss

Influence stemming from the Success Factors	**Loss no 1**	**Loss no 2**	**Loss no 3**	**Loss no 4**	**Loss no 5**	**Loss no 6**	**Loss no 7**
Relevant knowledge can be stored both inside and outside the organization	X						
Relevant knowledge can be stored only in one/some department/s of the organization	X						
Information can be stored in different forms (text, pictures, films etc.)	X						
Relevant knowledge can be structured and stored for another purpose compared to that of the repository	X						
Relevant knowledge can be held by employees that may not be willing to share it	X	X	X				
Relevant knowledge is not known meaning there is a lack of knowledge about that its existence and/or that it is relevant for the repository	X						
Relevant knowledge can be explicit or tacit		X	X				
Explicit knowledge is easier to identify compared to tacit		X	X				
Tacit knowledge can be transformed to explicit knowledge		X		X			X
Identifying tacit knowledge and explicit knowledge requires different approaches			X				
Storing tacit knowledge and explicit knowledge requires different approaches				X			
The KM project goal decides if identified knowledge is relevant						X	
If the knowledge already includes the identified knowledge it should not be stored again						X	
Storing new identified knowledge may imply deleting/revising already stored information						X	
There must be employees who can decide if the identified knowledge is correct or not						X	
All knowledge is not suitable for storing in the repository							X
When converting tacit knowledge to explicit knowledge there is a risk that critical knowledge element/s will be lost							X
Storing the identified knowledge may enhance imitation by external actors						X	
There must be documented evaluation criteria against which to evaluate the identified knowledge						X	
Restrictions for what kind of knowledge is allowed to be stored exist						X	
Management's commitment to the KM project	X	X	X	X	X	X	X
There is tacit knowledge difficult to capture and an alternative is to store information about the knowledge owner							X
There exist methods, work procedures etc. which enhance converting tacit knowledge to explicit knowledge				X			
The maturity of integration between daily work processes and the capture process	X	X	X		X		
Employees' allocated time for performing KM work	X	X	X		X		
The support of IT systems	X	X	X				
The structure of the content in the repository	X	X	X			X	
The used approach when implementing the capture process	X	X	X	X	X	X	X

There is tacit knowledge that cannot be stored without losing critical knowledge, e.g. smells, which is what the *seventh knowledge loss* is about. If there is a risk of losing knowledge during storage, it is important to judge if it is worth it or not. An alternative is to store information about who has this particular knowledge. Some of these aspects have been discussed in knowledge loss number 4.

The knowledge loss types have thus far been described on a general level, and have been related to the knowledge capture process. This is in line with the paper goal of identifying and describing different types of knowledge loss. However, it is possible to further characterize the knowledge loss types by describing how they relate to the success factors for the capture process (see Table 1). This was a step in the analysis process (see Section 3). The characterization also enhanced traceability between SF for the capture process, and knowledge loss types. As visualized by Table 1, the analysis reveals that some SF overlap between the groups of data. However, considering that some factors are quite general, this is not surprising.

5 CONCLUSION

The aim of this paper has been to *identify and describe different types of knowledge loss*, with the purpose of decreasing the knowledge gap concerning the capture process. The ability to capture knowledge is central to KM, see for example Matsumoto et al, 2005, in particular to capture the right knowledge (Jennex et al, 2007). The paper thus contributes to increasing the body of knowledge concerning the capture process, and thereby contributes to successful EKR. Our results reveal seven types of knowledge loss, which are displayed in a framework. Building awareness of knowledge loss is important (Hari et al, 2005), and we believe that our framework can be used in this respect.

In a way, loss 4 and loss 7 can be regarded as the same type of knowledge loss, because there is tacit knowledge which is difficult to capture without losing critical knowledge element/s. However, since these factors emphasize different aspects of knowledge loss, they deserve to be described separately. Otherwise, there is a risk of missing crucial aspects of knowledge capture and loss. Knowledge loss 4 is focused on the importance of both working with socialization and externalization in order to transform tacit knowledge to explicit knowledge. Knowledge loss 7, on the other hand, emphasizes that knowledge transformed to explicit knowledge may have lost critical element/s. There is also a relation between loss 6 and loss 7. Both concern that all identified knowledge should not be stored in the knowledge repository. However, loss 6 concerns evaluation of correctness, redundancy, relevance, etc of the identified knowledge, while loss 7 concerns that all identified knowledge is not possible to store in a repository. There is thus a need to assess if storing the actual piece of knowledge means such a loss of critical knowledge elements that storing it is meaningless. One example can be taken from healthcare and concerns the storing of smells. You can describe the smell in words, but cannot store the actual smell (yet). A critical knowledge element is thereby lost.

The results (the seven knowledge loss types) can also be used for example in the development of information systems as a way of capturing and evaluating knowledge in the requirement process. When analyzing an organization, it is essential to identify what knowledge needs to be stored, and what needs to be embedded into work routines when working with the IS. For example, not all knowledge can be stored without losing critical knowledge elements (see knowledge loss 7). It is important to capture *all* relevant knowledge, and not only the knowledge already included in the old system. Furthermore, all knowledge in the old system may not be relevant to include in the new system (see for example knowledge loss 6). Awareness and management of knowledge loss types is therefore essential in information systems development (ISD). Consideration to knowledge loss prevents organizations from storing the wrong knowledge, which is an important aspect of IS quality.

Our work extends previous research by Aggestam (2007), but even so, knowledge loss research is still in its infancy. Much work remains to be done. The presented types of knowledge loss is generic in the sense that it is not adapted to a specific type of organization and this a part of tuture work. Another part of future workis to to develop guidelines for the capture process in order to manage knowledge loss in an efficient way. The proposed research stream should build on Aggestam (2007), which showed a first step in this direction. Furthermore, current ISD methods should be analyzed from the knowledge loss perspective, in the sense of how these methods cope with knowledge loss. By doing so, existing methods can be complemented and enhanced in order to better cater for the needs of the knowledge society of today.

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