Increasing the Quality in IT-supported Knowledge Repositories: Critical Success Factors for Identifying Knowledge

Lena Aggestam
University of Skövde
lena.aggestam@his.se

Anne Persson
University of Skövde
anne.persson@his.se

Abstract

IT-supported knowledge repositories are an important part in Knowledge Management (KM) work. The success of an IT-supported knowledge repository is dependent on what is stored in the repository and hence the ability to capture the right knowledge is a key aspect. Therefore, to increase the quality in an IT-supported Knowledge Repository, the identify activity, which starts the capture process, must be successfully performed. While Critical Success Factors (CSF) for KM and KMS are frequently discussed in the literature, there is a knowledge gap concerning CSF for this specific knowledge capture activity. Based on an interpretive field study and a literature review, this paper proposes and characterizes CSF for the identify activity. For example, we highlight the importance of having organizational knowledge about what knowledge to capture and where to find it, i.e. having knowledge about potential sources of knowledge.

1. Introduction

Knowledge Management (KM) success requires that appropriate knowledge is provided to those that need it when it is needed [19]. It is a prerequisite for effective KM (e.g. [15], [43]) and a key form of KM is IT-supported Knowledge Repositories [22]. We consider IT-supported Knowledge Repositories to be one part of the organizational memory.

Knowledge processes can be categorized with respect to whether they concern knowledge creation or knowledge reuse [9]. The stages in knowledge reuse, capturing or documenting knowledge, packaging knowledge for reuse, distributing or disseminating knowledge and reusing knowledge [3], [4], corresponds to processes that a knowledge repository requires. However, since knowledge repositories also aim to eventually accumulate knowledge inside people, i.e. that people learn, we argue that knowledge repositories also concern knowledge creation.
further increase the body of knowledge about complex issues related to the capture process. To achieve the goal, a qualitative research process comprising a literature review and an interpretive field study was conducted.

The main target groups for the work presented in this paper are project leaders of KM implementation projects aiming to result in a Knowledge Repository and the KM research community.

The paper is structured as follows. Our points of departure are described in Section 2 and the research process is presented in Section 3. Since an interpretive field study is an important part of our research process, this section also includes a description of the case. Our contribution, which is a characterization of complex issues in the form of CSF related to the identify activity, is included in Section 4. We conclude the paper by some final remarks in Section 5.

2. Points of departure

The setting of the paper is Knowledge Management (KM), or more precisely IT-supported Knowledge Repositories. In the KM context, IT has two generic capabilities: codifying knowledge and creating networks [13]. IT-supported knowledge repositories include codified knowledge which is disseminated in some sort of network created by using some sort of Internet. In the forthcoming we define relevant concepts and give a brief overview of the setting.

Even if learning and accumulation of (new) knowledge always start from the perspective of an individual [20], there are different types of KM. One type accumulates knowledge outside people in order to disseminate knowledge to support learning [42]; this is the type to which IT-supported Knowledge Repositories refers. IT-supported Knowledge Repositories enable both individual and organizational learning, and hence support the other two types of KM described by Wiig [42]: to accumulate knowledge inside people and to embed knowledge in processes, routines etc. When analysing Binney’s [5] views on KM we conclude that developing IT-supported Knowledge Repositories 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 [31]. The application of technology when building the repository embeds knowledge in the application and the use of it. Binney [5] terms this transactional KM, which is a side-effect of building knowledge repositories.

Different types of knowledge are frequently discussed in the literature (e.g. [6], [11], [25], [31], [41]). From the perspective of an employee, external knowledge is organizational knowledge, i.e. knowledge that remains in the organization even if employees leave their employment. Tacit knowledge is difficult to identify and to express since it is highly personal and concerns insights and intuition [31], [6]. 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 conceptualizes and summarizes the discussion so far.

![Figure 1, A conceptualization of IT-supported knowledge repositories from a general KM perspective (developed from Aggestam and Backlund 2007)](image)

IT-supported Knowledge Repositories requires capturing, packaging and storing 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 is generated that has potential relevance for incorporation in an existing knowledge repository. The latter is critical for having updated knowledge repositories and furthermore to maintain usefulness and trust in the repository over time.

The process of capturing new knowledge starts when knowledge with the potential to 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. It is crucial to understand that new knowledge is not regularly generated, e.g., once or twice a week, and, accordingly, knowledge must be continuously captured, i.e. continuously identified.
The ability to continuously capture new, relevant and correct knowledge challenges the long-term survival of a repository, since failure will eventually result in a repository that is out-dated and irrelevant. Furthermore, this ability decreases the amount of knowledge that escapes identification and increases the awareness of knowledge loss. This is in accordance with the first piece of advice that the American Productivity & Quality Center (APQC) gives in “Capturing Critical Knowledge from a Shifting Work Force” [14].

3. Research approach

The proposed 4 CSF (Section 4) are based on both theoretical and empirical data since the research process included a literature review and an interpretive field study. Using a single case study can be justified if it is purposeful and provides a large amount of information [12], which we consider to be relevant in this research.

Before summarizing the qualitative analysis that merges the theoretical and empirical data (Section 3.2), we briefly describe the interpretive field study (Section 3.1).

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), a three year project that was completed in 2007. To ensure the quality of this interpretive study, the work was guided by ideas that are conceptualized in the principles proposed by Klein and Myers [23].

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. Three types of healthcare organizations were included in this project: Home healthcare, Primary Care and Hospital. The objective of these stakeholders is to provide the patient with the best possible treatment and one essential resource for this is knowledge, and the sharing of it.

The approach used in EKLär, Enterprise Knowledge Patterns (EKP), combines Enterprise Modelling (EM) with organizational patterns [37], and is characterized by a strong emphasis on stakeholder participation and the use of Organizational Patterns to package knowledge.

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

“Qualitative findings grow out of three kinds of data collection: (1) in-depth, open-ended interviews; (2) direct observations; and (3) written documents.” [33] 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 2 visualizes the aim for each phase as well as relates the different ways of collecting data to the different phases.

A critical step in all projects is to make the result survive after the project is finished. In EKLär this meant to keep the repository up-to-date over time. Hence, in the implementation phase, after creating the repository, our work focused on ensuring long time survival of the repository by linking individual processes to organizational processes in order to continuously identify and capture knowledge. One part of this work was to find out where and when knowledge in the organization, which has potential for being stored in the repository, had been created. In this work an important issue was defined as the discovering 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 discover these situations.

The EKLär case was selected for several reasons. It includes both creation and maintenance of a repository. Results from the evaluation phase, based on Jennex and Olfman [18] KM success model, together with the fact that the repository, two years after the project, is
still in use indicate that the EKLär project was a successful KM project. Furthermore, it enabled prolonged engagement, persistent observation, and triangulation, which, according to Lincoln and Guba [24], increases the credibility and dependability. E.g., we have used different types of data collection and data collection techniques (Fig 2), as well as collected data at different points in time and from different people with regard to profession and location. Furthermore, in order to test our interpretations and conclusions, we have sent documents such as protocols and models back to members of the project group and collected their feedback.

3.2. The qualitative analysis

The qualitative analysis, which merges the data, comprised the following five steps:

1. Summarize success factors (SF) in KM work already described in the literature. Output: an account of SF for KM work
2. Analyze the account of SF with respect to if, and in that case how, they influence the capture process. Output: An account of SF for the capture process based on theoretical data.
3. Analyze data collected in the interpretive field study in order to find SF that influence the capture process. Output: An account of SF for the capture process based on empirical data.
4. Analyze the two accounts of SF for the capture process aiming to extract those success factors that influence the identify activity. Output: An account of SF for the identify activity based on both theoretical and empirical data.
5. At this stage we have a large number of SF for the identify activity, but CSF is a limited number of factors. Thus, aiming to discover the critical SF, we conceptually analyze, organize and group the SF with regard to how they influence the identify activity as well as each other. Output: An account and a characterization of CSF for the identify activity. The characterization also includes a conceptual model showing factors that influence the CSF (Fig 3).

In accordance with Webster and Watson [40] Step 1 creates a firm foundation for advancing knowledge about CSF for the identify activity. E.g. SF10 in Jennex and Olfman [17] is in accordance with our ambition to link individual processes to organizational ones in the EKLär project.

Step 4 included conceptually organizing groups of SF from the perspective of whether the factor mainly influences the capture process’s identify activity or evaluate activity. SF that were difficult to link directly to any of these activities form an own third group. Since the largest number of success factors were related to the identify activity, this work further revealed the critical importance of the identify activity. Together with the fact that the identify activity triggers the capture process the need of our work is further strengthened.

Although we found success factors for the identify activity in both the empirical and theoretical data, its appearance is more common and clearer in our empirical data. For example, in the EKLär case, two main approaches for exploring knowledge were revealed: 1) Focusing on eliciting existing external knowledge and the experience based knowledge of the nurses and doctors 2) Focusing on extracting knowledge from daily work processes and activities. The first approach was used when building the first version of the repository, and the main focus was on external knowledge. The second approach was used when preparing for maintenance, and here the focus was on embedded knowledge. From the perspective of organizational knowledge, embedded knowledge can be regarded as organizational tacit knowledge (Fig 1).

KM work should include different types of knowledge. The two approaches together with how they relate to different types of knowledge, revealed the need to iterate the capture process during the implementation phase. When trying to find out where relevant knowledge can be found, it is important to search both for different sources where relevant knowledge is likely to be created as well as different signals which indicate that knowledge may have been created. SF2 in Jennex and Olfman [17] includes the need to find sources, but more from a general strategy perspective.

In the literature, the identify activity is mentioned more in passing or implicitly when the management and capture of knowledge is discussed in general. For example, while the importance of managing tacit knowledge is frequently discussed (e.g. [7], [31]), and designing work processes including knowledge capture as a SF [17] as well as the need to learn from failure (e.g. [8], [26]), the identify activity is not explicitly explored. Davenport and Prusak [10] discuss the identification of knowledge that is appropriate for reaching business goals, and Chua and Lam [8] argue that valuable knowledge remains obscured, because of a lack of effective mechanisms to distill knowledge from debriefs and discussions. These two references are examples of the identify activity being more explicitly mentioned, although only in passing. We claim that without the empirical data the risk of missing the crucial importance of the identify activity would have been higher.
Step 5 included modeling of how the factors influence each other as well as the identify activity. This work enhanced the exploration of four groups of SF. We reviewed these groups and paraphrased them into four CSF. Each included SF in the groups helped us to characterize the CSF.

4. CSF for the identify activity

Based on our analysis the following four CSF for the identify activity have been identified:

- **CSF1**: Employees are willing to contribute with knowledge
- **CSF2**: Work processes and IT systems enable input from different sources
- **CSF3**: Organizational knowledge includes knowledge about where potential knowledge to be included in the repository can be found
- **CSF4**: Organizational knowledge includes knowledge about what knowledge to capture

Figure 3 shows how these CSF influence the identify activity as well as factors that in turn influence these CSF. The used notation in the conceptual models is inspired by the EKD notation [34] used in the EKLär
project.

To enable that knowledge is continuously captured, the identified work processes and IT systems must enable input from different sources (CSF2) which in turn also requires knowledge about where potential knowledge to be included can be found (CSF3).

Enabling input from different sources (CSF2) includes integrated technical infrastructure [17], but also that the identify activity is integrated in work processes. One way to facilitate the latter is to use work role descriptions as “a link” between the individual and organizational levels [2]. Furthermore, knowledge sharing through IT-supported Knowledge Repositories involves people contributing knowledge to the repository as well as people seeking and using knowledge from the repository for reuse [22], and, hence, whether employees are willing to contribute with knowledge or not is really critical (CSF1). Since this willingness is a part of a learning and knowledge sharing culture, we want to emphasis that this is in accordance with Jennex and Olfman [17] who describe this type of culture as a SF for KMS and O’Donovan et al. [32] who argue that to incorporate knowledge sharing in the organizational culture is perhaps the most important factor for successful KM system implementation.

Identifying knowledge that has potential for being stored in the repository requires organizational knowledge about what knowledge to identify (CSF4) and where to find it (CSF3). Organizational knowledge about what knowledge to capture includes knowledge about what the users want to learn and what the knowledge providers want to be known in order to achieve the goal for the IT-supported Knowledge Repository and hence increase work performance (CSF4). To have a clear goal is a SF for KMS [17]. What knowledge to capture can be described in, e.g., a knowledge map which in turn can be compared with a detailed description of the goal for the repository. This revealed the importance of already from the beginning have detailed knowledge about the purpose of the repository, i.e. the project goal. Knowledge repositories aim to counteract asymmetry and localness of knowledge and hence knowledge about potential sources of knowledge is needed (CSF3) as, e.g., already stored information both inside and outside the organization, employees’ internal knowledge and embedded knowledge in daily work processes. One potential approach to go when trying to capture new knowledge in daily work is to work with capture points as we did in the EKLär project. To enable that identified knowledge is continuously identified, somebody must be responsible for regularly doing it, and to appoint somebody to this task is the management’s responsibility.

As described in our analysis, these four CSF are grounded in both theoretical and empirical data. Our way of working means that is impossible to separate and align each CSF with only one of the studies: “... theory generating and theory testing are Siamese twins and not separate, consecutive stages“ [12], p.40. On the other hand, it is possible, for each factor, to trace its roots back to both empirical and theoretical data. In the following we will give some examples of these roots2:

The importance of a knowledge sharing culture, of which willingness to contribute is a part (CSF1), is well known in the literature (see e.g. [8]; [38]; [7]; [10]; [27]). The willingness to contribute was also a matter of course in the EKLär project: “We want to disseminate our knowledge. If we do this, they will learn and our telephone calls will decrease” (quotation from one of the nurses in the project group). Knowledge about where potential knowledge to be included in the repository can be found (CSF3) requires knowledge about asymmetry which according to Davenport and Prusak [10] often causes KM to be inefficient. Knowledge about potential sources of knowledge is also a part of CSF3. Our two main approaches for identifying knowledge in the EKLär project revealed the importance of this. Furthermore, descriptions in the literature about different types of knowledge ([31]; [25], [6]), influenced our way working in EKLär when identifying knowledge. Similar to other processes, the capture process, where the identify activity is a part, is a selected stream of activities which are included in other activities [30]. Thus, the identify activity must be a part of business processes. CSF2, that work processes and IT systems enable input from different sources, concerns this. The literature describes that KM must be adapted to business and knowledge processes [35] and be fitted to the operational environment [27]. In the EKLär project, in the preparation phase, we conducted observations in the dermatology, and leg ulcer departments of the hospital. Data from these observations show, among other things, that some questions concern knowledge belonging to the repository. This means that other used IT systems, such as Telephone Advice systems, have potential for generating input to the repository. If knowledge is to be incorporated in the repository it must be in line with the purpose of the repository, i.e. it is critical to know what knowledge to capture (CSF4). A nurse in the project group in EKLär, when working with developing the Knowledge map, put it like this: “Which knowledge do we want to disseminate in order to reach the project goal? ... What do we want to teach the personnel?” The importance of the knowledge goal

2 For a more comprehensive description, please contact the authors
for KM success is well known in the literature, e.g., Jennex and Olfman [17]. However, in accordance with the three levels of inquiry [39], achieving the goal requires knowledge about what knowledge to capture.

5. Final remarks

High quality in the knowledge that is intended to be shared is crucial for all KM work and hence also for organizations’ competitiveness. With the purpose to decrease the lack of awareness of complex issues related to an effective knowledge capture process, this paper describes 4 CSF for the identify activity, which is the activity that starts the capture process. We claim that awareness of these factors increases the quality in IT-supported Knowledge Repositories.

CSF1 is important for all KM work and accordingly discussed in the literature. CSF2 corresponds to SF1 and SF10 in Jennex and Olfman [17]. The novelty is that we relate them to the identify activity and hence clarifies how they relate to both each other and to the identify activity. CSF3 and CSF4 are to the best of our knowledge not described in the existing literature as KM critical success factors. Thus, we believe, that those factors are the most important contribution of this paper. Furthermore, these factors are also the ones which are most characterized in the conceptual model.

Our analysis also revealed some other important issues for implementing the identify activity in a KM project:

- When building the repository, it is important to focus on identifying existing external knowledge (i.e. already stored information) as well as project members’ own experience.
- When preparing for maintenance, it is important to focus on identifying knowledge in daily work processes.
- The capture process must be iterated during the KM implementation project.

There is in general a lack of systematic support for implementing KM in organizations (see e.g. [43]). Thus, based on the work presented in this paper, future work aims to develop guidance that supports practitioners in the identify activity. The presented CSF show which complex issues to support in the identify activity. The three issues above revealed that using the guidance must included iterating the identify activity during the KM project. The work with developing this guidance will include empirical studies where they can be tested and refined.

6. References


