

Some thoughts on knowledge management

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ABSTRACT

In this paper we try to understand certain characteristics of knowledge management by discussing it in interoperation with other management disciplines. To do so, we focus on different aspects in organizations, like processes, people, structures, control, and artifacts. Our goal is to understand the complex setting in which we try to introduce approaches for knowledge management. We study the relation between creating and maintaining different types of knowledge, the possibilities for volatility and changes in an organizational context, and the ways how to manage knowledge. Furthermore we discuss how knowledge management is connected to process, IT, and change management.

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K.4.3 Organizational Impacts: Computer-supported collaborative work

General Terms

Organizations; Knowledge Management; Human Factors.

INTRODUCTION

Knowledge is crucial to organizations to deal with their work processes. No matter what type of business we are talking about, knowledge is needed. Some organizations are good at finding out the right information at the right time to achieve certain goals. Others lack completely, especially when the environment is changing. State of the art of research and technology development provide enough options how to deal with gathering, storing, and accessing knowledge in an organizational context. Although there are several approaches to knowledge management, the interrelations to other management disciplines are not studied enough. Only from certain

perspectives, mostly from the point of technical implementation, some authors or companies developed approaches and systems to this problem.

In this paper, we try to understand the relation of knowledge management to other management disciplines. First we define our research setting, then we use and extend a knowledge life-cycle model to identify the interrelations between knowledge management and process, IT, document, and change management, before concluding the paper.

RESEARCH SETTING

For our analysis we use the definition of *organizations* as a network of processes, people, structure, control, and artifacts [2].

- *Process* is a set of dependent or independent activities carried out by one or many people to achieve personal and common goals. It is “the means by which work gets done” [2, p.2]. In processes, work flows and information flows. There are several approaches to model and manage workflow, and several IT system to manage the flow of information. People are involved in single or multiple processes. Cooperation and coordination mechanisms are needed, which hopefully are connected to the IT systems supporting the information flow and dealing with work artifacts.
- *People* do the job in an organization with certain roles and responsibilities. They are the knowledge producers and knowledge carriers. They are successful and appreciated when they are motivated, capable of doing things, and their job really fits in with organizational and personal objectives. Knowledge must be seen as a people-related matter. People’s skill and experience contribute to further development of knowledge. This is one of the main reasons, which makes its management difficult.
- Organizations are *structured* and embed relations and control. A structure can be very strict and predefined, but it can also be very flexible and changeable during the course of work. Organizational structure has impact both on people and processes. A chaotic organization has also a structure, it is not regulated or hierarchical, but it is structured. People know who is in charge of what and who makes the decisions.

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- By means of visible or invisible *control* mechanisms processes are monitored and measured, either by systems or people. Good examples of controls are business rules, corporate policies, measurement, and feedback systems. Control mechanisms are coupled to processes that might change. Changes of processes trigger changes in control mechanisms.
- *Artifacts* are objects used to carry out the work in organizations. Knowledge workers produce, read, annotate, modify, check, evaluate, communicate, and delete artifacts in the course of their individual or cooperative work. Artifacts mediate articulation work between actors by acting as an intermediary with a specific material format. For Kuutti “instruments, signs, procedures, machines, methods, laws, forms of work organization” are examples of artifacts [1, p.26]. Furthermore “an object can be a material thing, but it can also be less tangible (such as a plan) or totally intangible (such as a common idea) as long as it can be shared for manipulation and transformation by the participants of the activity” [1, p.27]. Artifacts need to be stored, managed, and accessed by all in case of need.

APPROACHING KNOWLEDGE MANAGEMENT

If we look carefully we can find knowledge in several formats and density in organizations. It is up to the organizational culture and the IT systems established, how much use can be made of the existing knowledge people provide and systems embed.

Knowledge in work processes

Organizations define their processes based on their experiences or on known approaches available. Some copy from other organizations. Some implement new approaches published in scientific or non-scientific journals and in most cases learn by doing and adapt if they can. Processes contain tasks and their temporal and logical dependencies. Tasks are assigned to people or groups of people. Single persons or groups put their knowledge into artifacts while working, which they usually share and modify. To articulate distributed activities, specialized artifacts are used [5, p.162], like timetables, schedules, catalogs, classification schemes for large repositories. They help reducing the complexity of articulation work in work groups and alleviating the need for ad hoc deliberation and negotiation. Schmidt and Simone called these specialized artifacts, the mentioned conventions and procedures coordination mechanisms [5]. They also noticed that the role of coordinative protocols – as part of coordination mechanisms besides artifacts – varies from situation to situation [5, p.174]. They can be used as weak stipulations like maps or as strong stipulations as scripts. Coordination mechanisms as a whole contain other type of knowledge than the single artifacts. They are about coordination and organization of work, challenges faced during the execution of certain (collaborative) tasks, solutions found or decisions made – sometimes with alternative options considered.

People and their knowledge

Knowledge of individuals and groups are embedded in coordinative protocols and artifacts. On the one hand, the conventions and procedures make certain cooperative activities

persistent, on the other, artifacts like “plans are resources for situated action, but do not in any strong sense determine its course” [7, p.52]. There is a lot of knowledge and experience in pre-computations and the options for coordinative actions. And more important, success in executing processes depends on these actions established and people count on them. At the same time, people invent and use formal constructs [4] to deal with increased complexity of work that normally occurs when the scale of cooperation is increased. The so called “ordering systems” present the functionality and categories of common artifacts used implicitly and explicitly in organizations [6]. They show meta-level information about the piece of artifact, like who, when, what, and where data. How these ordering systems are defined and evolved determines their quality and acceptance in an organization.

People do not always know how to articulate what they know. Sometimes they are not even aware of their implicit/tacit knowledge. Mechanisms of externalization and combination help when they are integrated in work processes. If people do not feel secure they keep their knowledge for themselves. Especially in changing organizations when information is kept away from the knowledge workers, suspicious employees begin to resist to any kind of change and do not share what they know.

The role of artifacts

Artifacts can be atomic or composed. They can be multi-layered hosting information about different stages of work progress. They host knowledge created by different people at different points of time in processes. They are persistent and normally used as a mechanism of organizational memory. Access to artifacts is a complex issue, depending on organizational and technical systems established. The notion of multi-context systems help to understand the complexity of owning an artifact and sharing its certain parts with others in case of cooperation [9]. People’s knowledge and experiences are connected to structured data as annotations, attachments, or add-ons. Linking the additional useful information to known central data creates an opportunity to capture know-how, know-what, and know-why in an organizational context, if implemented user-friendly, without causing additional effort for information providers. At the same time, a visualization of a multi-context system can be a very useful resource for orientation in case of search for a certain person or project or any other type of information. Such an overview showing how single sources of information are connected to each other presents the relations between originators of this data. This can be sometimes a very powerful tool for troubleshooting or connecting to relevant people.

Besides thinking about the single elements of an organization, like processes, people, or artifacts, we need to consider the big picture in a work environment. An organization exists in an economic, social, technical, and political context, which has strong impact on organizational existence. Depending on the products or services or on the fact that time plays a definitive role in planning and execution of tasks, we can use a spiral knowledge life-cycle [8] to think about the dynamics in an organization around knowledge management. Not

only the business processes and the organizational structure impact the individual and organizational knowledge created and shared within and outside organizational boundaries, but also the volatility and change processes triggered by internal and external factors contribute to this dynamics. The type, quality, and characteristics of knowledge used in an organization changes in the course of work processes, depending on products or services it provides, on circumstances under which work processes are carried out, and on economic and technical factors having impact on activities and processes. The volatility factor causes changes or risk for organizations. Volatility has impact on the amount and lifetime of knowledge managed in an organization, which again is dependent on the dynamics in product or service development, or the temporal constraints given. The degree of volatility influences the ways how knowledge is created and handed over between actors involved. If the product is an innovative one with components which are new or delivered by third parties, the volatility is assumed rather high. In such settings, problems can occur, e.g., related to delivery time, quality, and compatibility of the components of a product. On the other hand, there are companies offering products of which production and maintenance are predictable. An organization with its schema knowledge and the certain degree of volatility for a representative period of time needs knowledge management for codification (externalization) or personalization (internalization) or combination of individual and collective knowledge.

In this paper we extend this model by relating it to other management disciplines like process, IT, configuration, document, and change management, to understand how they relate to each other (Figure 1).

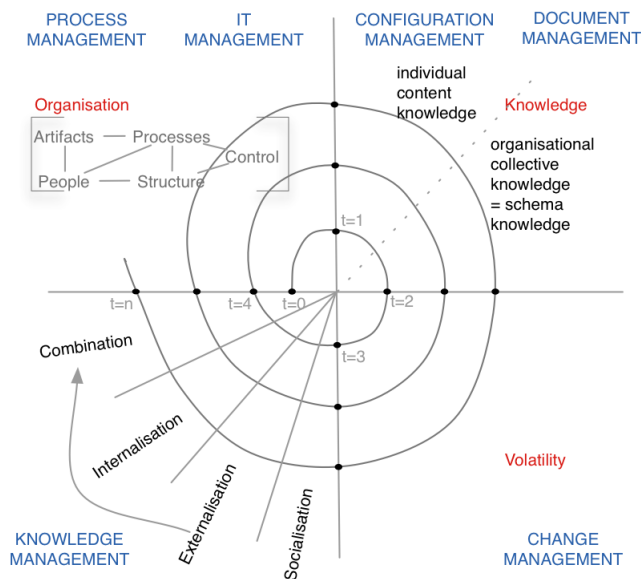


Figure 1. An extended spiral model of knowledge management (t=time).

Process management offers methods, techniques, and tools to support the design, enactment, management, and analysis of operational processes in an organization. It is based on the application of knowledge and skills that already exist internally

or bought from external resources. The goal is to improve processes to achieve organizational goals in a profitable way. Process management is very interested to capture and access the knowledge that is available in an organization. If changes to processes have to be made, the decisions must be based on solid experiences and lessons learned from previous activities. Process management is keen on accessing people's knowledge and skills in the right context and applying them in current situations to decide for improved processes and often to initiate changes on all operational levels.

IT management is one of the areas that evolves very quickly due to fast development of technologies and applications. Organizations have to react to changes in hardware, software, networks, data management, and differently scaled resource planning systems covering almost all areas of an organizational context. IT resources need to be aligned to organizational circumstances and its people's capabilities and requirements by considering the use context of information. Otherwise people refuse using IT in their daily work regularly. Sometimes the set up and configuration of an IT system can be the reason why know-how and know-what cannot be gathered, stored, and accessed as needed in organizations. IT management contains several sub systems like configuration and document management systems to which it delegates storing, retrieving, versioning, and archiving artifacts that host individual and organizational knowledge.

Change may happen in several areas in an organization: in ICT, production techniques, strategies with impact on further activities, business processes, and cooperations. Change management helps to plan and lead changes in an organization. It takes care about the changes which require dealing with all related implicit and explicit information available in the minds of people and in the artifacts of an organization. People in general do not want to change anything. From preserving to be willing and ready to change and adapt is not always an easy way for some. If people do not cope with the change situation in an organization, they will also be unwilling to share their knowledge, ideas, and experiences in a constructive way. No one likes uncertainty, insecurity, or chaos in work environment. Especially older employees are normally reluctant to changes. In extreme situations, which are not very rare, people can become the main problem of organizational change. This is of course a disaster from knowledge management point of view.

During the course of changes the organizational structure might be modified in several ways: Functions of organizational units can be separated to provide unique distribution of responsibilities. Structure or control mechanisms can be more precisely defined and introduced to avoid misunderstandings and problems caused by chaotic work processes so far. Each organizational unit can be autonomous in the future, which has impact on all, both within the unit and across all units. Responsibilities and roles are then changed. Units might get more power but also are made more responsible for their actions. To be more flexible, the most organizations want in general to introduce loosely coupled organizational units with flexible assignment of tasks and responsibilities.

This requires flexible task chains and networking across organizational units and also with external cooperation partners. If there is a problem, a solution must be found by going beyond the organizational boundaries. Business rules must be flexible enough to adapt in an ad-hoc manner without losing the focus and the common goal.

All these different options of changes influence the base of interaction and sharing among people. The impact is also on the people network and the network of artifacts. By support of IT management, access to common artifacts are provided or restricted immediately if organizational structures are changed. Suddenly one might not be able to access what he or she has produced or contributed in previous work. Knowledge management is again in charge to make sure that people are permitted to access data what they need for their work.

What we wanted to show is that knowledge management is more than just socialization, externalization, internalization, and combination [3]. It is connected to all other management approaches mentioned above.

CONCLUSION

In this paper, we tried to discuss how far knowledge management is related to processes, people, and artifacts in an organization, to different types of IT systems established, and to change situations with positive and negative aspects. It is a complex interrelationship between all these factors if it comes to define how to manage knowledge the most appropriate way in a particular organization or work group. Managers, people responsible for processes and changes in a work environment, must be aware of these complexities. They need to be informed about the details happening in an organization, the strengths and weaknesses of the people working there, the environmental circumstances surrounding the organization, the technological possibilities supporting knowledge capturing and maintenance, and so forth, before deciding for certain actions and especially for changes. This paper is an attempt to think about the interoperation between knowledge management and other management practices in an organization, with the purpose to make managers aware of these dynamics.

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