



Would you like to know who knows? Connecting employees based on process-oriented knowledge mapping



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ABSTRACT

Employees' knowledge as the guarantor of companies' success is an important asset of the enterprises' value. However, this knowledge is often not optimally used or even visible and available for employees and management within companies. This intangible knowledge leads to continuously reinvented wheels within organisations and employees misspend time learning processes in a cumbersome way on their own. To overcome this problem, we present a new approach aimed at connecting employees socially. The main novelty is the use of the organisation's business processes as basis for connecting employees by indicating their process-related areas of expertise. The goal is to enable enduring sharing and distribution of knowledge within an organisation to support decision making in process execution. Our evaluation results from two financial services companies show that employees perceive such a network as very helpful. Our approach leads to easier access, better search results and more opportunities to connect knowledge with other employees.

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1. Introduction

Employee knowledge is essential to the prosperity of an organisation [71]. However, time-consuming searches by employees for missing information, or the redundant development of already existing knowledge, are a common problem [1]. Non-existent documents, missing contact persons or incomplete information are some examples. To execute daily work correctly, the required knowledge documentation is often inefficient [2]. Thus, tacit knowledge built on individual experience and intuition is not considered properly, and consequently this knowledge is often not available to other employees [3]. Thus, an organisation's efficiency suffers due to a non-optimal usage of resources [4].

To provide employees with such knowledge, business process related knowledge plays a major role. Business processes are crucial to an organisation's success [5] and can be considered as the DNA of an organisation. This genetic information describes how employees, machines and information systems are interconnected to produce services and goods [6]. Therefore, business processes are the core of an organisation's value chain, and empower employees to execute the business model. Thus, questions arising in daily work situations are mainly referring to knowledge being used in executing processes.

Knowledge can generally be separated into explicit and implicit knowledge [7]. In contrast to explicit knowledge, which can be documented in numerous forms, e.g. as databases and process models [8], tacit knowledge is not documented and needs to be developed or accomplished by employees [9]. While some approaches try to support employees with process (un)related explicit knowledge [e.g. 10,11], the majority of knowledge still remains implicit and is difficult to maintain and distribute in an explicit form [12]. Tacit knowledge is individual-specific behaviour and practical know-how [3]. This kind of knowledge often guides the daily work of employees without being consciously perceived [3]. In comparison to explicit knowledge, tacit knowledge is difficult to transfer from one employee to another due to personal characteristics and context sensitivity [13,14]. Additionally, especially the aspect of ensuring an effective knowledge transfer in a given social setting of a company requires intensified research efforts to understand and support these mechanisms better [15]. A preferable method to present knowledge to employees is the concept of knowledge maps [16] visualising knowledge connections [17]. Consequently, the following research question arises: How can employees be provided with adequate knowledge maps in the execution of their business processes?

By analysing prior research we identify requirements regarding such a knowledge map and develop a process-oriented social knowledge system. The system enables employees to connect with each other with regard to business-relevant knowledge. In particular, the exchange of tacit knowledge is encouraged and stimulated, accompanied by facilitated

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management of the knowledge by the organisation. The novel aspect of the system is the connecting element of explicit and tacit knowledge related to business processes and the systematic social knowledge network within an organisation.

In the next section, the research methodology used in the paper is described. This is followed by the theoretical foundation. On the basis of existing approaches from the literature, the research gap is identified in the section on related work. Afterwards the description of the system and its elements is presented. The following section gives insights into the evaluation procedure and questionnaire design. Evaluation results are presented, and the article closes with a discussion and an outline of future work.

2. Research methodology

The research methodology applied follows a design science approach, based on Venable [18] and Hevner et al. [19]. Design science provides a procedure for creating new approaches (also called artefacts), such as frameworks and methods. It is also used in the domain of developing knowledge mapping solutions [e.g. 20]. The development of the approach presented follows the framework of Venable [18]. In line with Venable, we follow the design science research cycle and conduct theory building, and subsequently develop a solution technology and evaluate the developed approach.

“Theory building” should occur as a precursor for the “solution technology invention” and induce as a result a “Utility Theory” or hypothesis, which defines an approach to decreasing or solving a problem [18]. The objective of the proposed process-based social knowledge system is a solution that allows connecting employees and their knowledge with regard to business processes. Overall, for theoretical reasoning social exchange theory is used to identify relevant prior research as knowledge exchange is seen as interaction between persons which is interdependent but dependent on other persons [12]. We conduct a literature review following the approach of Rowley and Slack [21]. “Knowledge map” was used as the search term within Ebsco Business Source Premier using the integrated search feature, which includes ABI/INFORM Complete, Business Source Premier, Emerald ManagementXtra 150, JSTOR, PsycARTICLES, ScienceDirect and Springerlink. The search results were analysed by two researchers independently and articles were selected based on title and abstract first and if relevant identified by reading the text second. From an analysis of this literature, the requirements for an approach to answer the research question are derived, which form our utility theory.

Based on theory building, a *solution technology* has to be developed. Our process-based social knowledge map is designed according to the identified design requirements and we describe the developed information system. The system is implemented in a department of a large German bank and a second German bank to conduct a *naturalistic evaluation*. Naturalistic evaluation is described by Venable [18] as evaluation in the field, i.e. how an artefact works in a real environment. Such an evaluation can cover case studies, survey studies, field studies and action research. Contrary, artificial evaluation is done with an exemplary dataset or environment, e.g. computer simulations, role playing simulations and experiments. As the proposed process-based social knowledge map is mainly addressing the needs of employees, we use a quantitative survey to question employees based on research regarding the evaluation of information systems. The details of this evaluation are described in the [Measures and procedure](#) section. To ensure reliable answers, we ask users of the first bank to compare our new approach with the existing knowledge system, which is not targeting the defined requirements. Within the second bank, we gather data two years after introduction and compare the results with the first bank. We compare the results of the introduction phase of the first bank with results of continuous usage without the introduction phase to ensure an independent comparison.

3. Knowledge in business processes

Within a business process, an input is transformed into an output (process result) in various sub-processes by the necessary resources, for instance employees, machines and information systems [22]. The transformation is performed on process instances, e.g. a car, an insurance claim or a house-building permission [23]. The resources of a process are connected by the possible links between the sub-processes involved. Every process instance passes the net of sub-processes on an individual path, i.e. different paths of process instances through the net are possible [24]. The execution of business processes across organisational units is an important characteristic, thus, the necessary knowledge for the production of goods and services should be connected in a process-oriented way and not to focus on functional-oriented organisational units [25]. Applying the idea that business processes are the basis for the production of goods and services within an organisation, the management of process-oriented knowledge becomes a key factor for success [23]. If process-oriented knowledge is not captured, stored and applied, an organisation is likely to fail [26].

Knowledge can be separated into explicit and tacit knowledge [13]. Explicit knowledge is codified, i.e. independent from a certain person, and can be transferred easily most of the time [7]. Typically, explicit knowledge is covering declarative knowledge (“know what”), i.e. facts [27]. Contrary, tacit knowledge is associated with individuals and covers mainly declarative knowledge (“know how”) [13,14]. Tacit knowledge is “typically acquired on the job or in the situation where it is used” [28,p. 28]. As such it refers to individual-specific know-how and behaviour [3] that, however, can partly be explicated using knowledge elicitation techniques and is then termed as implicit knowledge [29]. Such implicit knowledge refers to implicit rule-based knowledge (easy to explicate and codify by individuals) and know-how (highly contextual and thus not codified) whereas tacit know-how (difficult to verbalise) and deep tacit (underlying beliefs) cannot be explicated by individuals [30].

Based on this characterisation of explicit, tacit and implicit knowledge, three knowledge forms can be identified in the context of business processes, [8]:

1. Explicit knowledge in the form of process documentation shows how resources should be combined for the production of goods and services in the organisation [23]. The relevant process-steps, their relationship and the assignment of employees, machines and IT systems are captured.
2. Explicit knowledge as a result of monitoring and analysing process execution [31]. These facts cover how efficient a process has been over time in the past. This knowledge is mainly necessary for the management of an organisation in order to achieve the targeted process performance.
3. Procedural knowledge regarding processes, that contains tacit knowledge of employees executing the process [32]. It is a combination of cognitive processes and factual knowledge and regulates how an individual completes tasks and solves problems. It refers mainly to tacit know-how and deep tacit, but covers also implicit know-how in the context of process steps that is not codified.

Moreover, process related knowledge is vulnerable as a result of job changes and terminations within an organisation. This leads to vanishing tacit knowledge and the resultant unnecessary recapturing effort. To avoid this squandering of resources, organisations can try to make tacit knowledge explicit to a certain degree [33]. The visualisation of business processes empowers employees to understand their activities, business processes and information systems [34]. Nevertheless, several problems can occur during the attempt to explicate tacit knowledge [13]. Explicit knowledge persists in the abstract through the limited possibility of documentation to visualise reality and the intangibility of process execution. Because of the rapidly changing environment of organisations, a high degree of effort is essential to keep the explicit

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