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How to identify knowledge and evaluate knowledge management in organization – case studies report

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Abstract

Knowledge is recognized as the most important strategic asset every organization has. It is very important to identify, capture/acquire, share, reuse and unlearn knowledge. These activities are managed through Knowledge Management (KM). It is a rather challenging task to evaluate the level of KM in an organization. Framework for Information System Due Diligence (FISDD) can be used for different information system (IS) due diligence activities and one of its objectives is to define and evaluate Knowledge and Knowledge Management in the observed organization. Another methodology is COBIT 5, which is daily used by IS auditors around the globe for various IS audits. In the last couple of years, COBIT 5 methodology has been redefined and now it also includes IS risk, information security, and value of information communication technology (ICT) processes, which allows an enterprise to effectively govern and manage its information technology. Now COBIT 5 has also two new defined processes: Manage human resources and Manage Knowledge. The paper presents case studies regarding the implementation of two methodologies (FISDD and COBIT 5) to facilitate information system knowledge management. More specifically, the study presents a comparison of the two methodologies. The research objective is to identify how explicit and tacit knowledge could be assessed by FISDD framework could be used for assessing in observed organization, and also identify how COBIT 5 framework could be used for assessing the level of knowledge management in observed organization.

Keywords: Information system due diligence framework, COBIT 5, knowledge management, knowledge, knowledge identification, knowledge assessment

Introduction

The next step beyond data and information is knowledge (Gray, 1999). Knowledge is recognized as the most important strategic asset to every organization. It is very important to successfully identify, capture/acquire, share, reuse and unlearn knowledge. This is managed through knowledge management (KM). Moos et al. (2011) argued that a key challenge is to disclose how an organization can acquire and utilize relevant knowledge and how is this related to organization's innovative success. Nonaka described that "in an economy where the only

certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge" (1991, p. 96) and they also explained how Japanese organizations are dealing with knowledge, innovations and their success. Nonaka and Konno (1998) described how Japanese organizations are managing the place ("Ba") to locate the knowledge and how to share it. Another issue is knowledge sharing. There are several research papers describing this topic. Pirhonen & Vartiainen (2007) argued what kind of knowledge transfer is required to reduce the risks when replacing a project manager. Nodari et al. (2013) made a review of scientific writings and a research model that relates the intra-organizational and inter-organizational sharing process to absorptive capacity and organizational performance. Recently, numerous scientific papers describing knowledge creation in software development teams have been published. Spohrer et al. (2013) described the role of pair programming and peer code review. Dissanayake et al. (2013) described knowledge creation in agile software development and the important aspect of creativity.

A great challenge is how to identify levels of: knowledge, knowledge identification, knowledge creation, KM and knowledge sharing in an organization. Henczel (2000) suggested performing an information audit as the first step towards KM evaluation. The author is trying to find an answer to her question whether an IS audit could define the level of KM in an organization and the plan how to get this result is described further in this paper.

The paper consists of the following sections. In the next section literature review regarding knowledge, knowledge life cycle, KM and KM systems are presented. This is followed by a brief presentation of two approaches for information system (IS) analysis in the section used methodologies. Section four describes the research objective, which is followed by a description of the research in section case studies. The contribution describes the current status and related work. The conclusion outlines the implications of the research in practice and further possible research activities.

Literature review

Knowledge is considered to be an important resource to maintain the competitiveness of an organization (Mahapatra and Sarkar, 2000). Nonaka and Takeuchi have defined knowledge by comparing it with information – "Knowledge, unlike information is about beliefs and commitment" (1995, p. 58). They also say knowledge, "like information, is about meaning" (1995, p. 58). Another explanation is "knowledge is a function of a particular stance, perspective, or intention" (1995, p. 58). Knowledge is an asset, but its value is much harder to assess than that of physical assets. Knowledge may be categorized into two types: tacit and explicit (Ragab and Arisha, 2013). Polanyi (1966) defines tacit knowledge as personal, context-specific and thus not easily visible and expressible – nor easy to formalize and communicate to others. Professor Levy described tacit knowledge at the KM2013conference very graphically, "tactic knowledge is what someone has between the ears". Polanyi also describes tacit knowledge as "we know more than we can tell" (1966, p. 4). On the other hand, he refers to explicit knowledge as being transmittable in some systematic language – such words, numbers, diagrams or models (Polanyi, 1966). Nonaka and Takeuchi expand Polanyi's tacit knowledge into two dimensions, technical

and cognitive. Technical is often referred to as "know-how" and the other consists of beliefs, ideals, values, schemata and mental models (Nonaka and Takeuchi, 1995). Knowledge creation takes place through the transformation of tacit knowledge to explicit and back as Nonaka and Takeuchi (1995) explained in their knowledge life cycle with a knowledge spiral that contains the following phases: socialization, externalization, combination and internalization.

One of the simplest definitions of KM is: "conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance" (O'dell et al., 1998, p. 6).

Chen and Edington (2005) argued that measurement of knowledge is one of the most difficult KM activities. The need to measure the knowledge within an organization emerged as a key area of interest for both researchers and practitioners within a KM domain (Skyrme, 2003). There are different frameworks and methodologies to measure the knowledge: for instance MinK (Measuring Individual knowledge) as presented by (Arisha and Ragab, 2013). Tow et al (2011) argued about very first activity within each organization – knowledge identification, and most important is how an organization manages the flow of knowledge linking to Henczel (2000) approach, to conduct an IS audit. Kankanhalli and Tan (2005) presented several approaches for measuring the KM which includes: House of Quality (QFD – Quality Function Deployment), Balanced Scorecard and American Productivity Center (APQC), Skandia Navigator, IC index and Intangible Assets Monitor. Smith and McKeen (2005) presented several frameworks for KM evaluation, they argued the importance of: paying attention to what is measured; no silver bullet; importance of business metrics; measurement of different levels; monitor leading indicators and clarify what value means. Alavi and Leidner (2001) described KM systems (KMS) as IT based systems developed to support the processes of knowledge creation, storage, retrieval, transfer and application. Jennex and Olfman (2005) presented a framework for assessing KMS, based on success factors and success model.

Over the past few years papers have described further developments of KM and KMS and their assessment and evaluation. Some of them cover interesting domains. Aggestam et al. (2010) identified a specific type of risk - knowledge loss (2010). They identified seven types of knowledge loss. Paliszkiewich and Koohang (2013) conducted the research on how organizational trust has a positive influence on organizational performance. They mention that modern organizations have identified the importance of trust related to KM as a means to gain and sustain competitive advantage. In the presence are and in the future there will be scholars and practitioners with their researches on KM and KMS related frameworks.

Used methodologies

The variety of methods, standards, tools, and frameworks can be used to conduct, analyze, or deliver a specific type of IS analysis, IS audits or even IS due diligence of a particular IS area. Some of them such as: MinK, House of Quality, IC index have been mentioned in the literature review section.

Due to familiarity as well as practical applications in the real world, this research focuses on two frameworks, and these frameworks are utilized for the purposes of several analyses, several IS audit activities and several IS due diligence tasks.

FISDD (Framework for Information System Due Diligence) enables the delivery of a rapid IS due diligence and also has an integrated decision model (Delak and Bajec, 2013b). This framework consists of four phases: preparation, realization / on-site review, analysis and decision. Each of these phases consists of specific activities, sub-processes, supporting documents (questionnaires, templates, etc.), and results. The time frame for each phase may vary depending on the size of the observed organization, the location(s) and available documentation. The FISDD approach with some basic questions regarding KM was earlier used in some cases to identify KM in IS due diligence processes (Delak and Bajec, 2013a).

COBIT 5 framework is used by IS auditors all over the globe, members of ISACA (Information System Audit and Control Association), and ISACA certified IS auditors use the COBIT (Control Objectives for Information and related Technologies) methodology in their day-to-day operations. COBIT was initially published and implemented in 1996 as a set of issues for IT audit and control. During last 18 years COBIT's scope has become wider and larger (IT control – COBIT 2 in 1998, IT management – COBIT 3 in 2000, IT governance – COBIT 4 in 2005). Finally ISACA issued updated framework COBIT 5 in 2012. One of COBIT 5's information and related technology goal is "*Knowledge, expertise and initiatives for business innovation*" (ISACA, 2012, p. 83). The COBIT 5 framework makes a clear distinction between governance and management. ISACA delivered additional publications of COBIT 5 Product Family in 2013. COBIT 5 provides the next generation of ISACA's guidance on the enterprise and management of IT. This version is aligned with other frameworks and best practices such as: Information Technology Infrastructure Library (ITIL), The Open Group Architecture Forum (TOGAF), Project Management Body of Knowledge (PMBOK), PRojects IN Controlled Environments 2 (PRINCE2), and International Organization for Standardization (ISO) standards (ISACA, 2012). With COBIT 5 there are some new and modified processes, with Manage knowledge being one of them. COBIT 5 framework also enlarges the different positions and roles regarding responsibilities for implementing processes.

Research objectives

Bhatia (Bhatia, 2007) explained the importance of following a structured method and FSDD is an example of such. The first evaluation was described by Delak & Bajec (2013b). Some limited evaluation of KM was made during two IS due diligence activities (Delak and Bajec, 2013a). The researchers' motivation was to expand some FISDD' questionnaires for KM evaluation and test it in the real case studies. Given that ISACA announced upgraded COBIT framework, it may be sensible to test COBIT 5's two processes as the tool for KM evaluation as well.

The research objective is investigated through the following hypothesis:

H1: FISDD enables identification of explicit knowledge and also tacit knowledge in an organization and its ICT activities.

H2: With COBIT 5 you can assess the level of KM in the observed organization and its ICT.

Both hypotheses have been transferred into the following research questions:

a) Is it possible to identify explicit knowledge and also tacit knowledge in the observed organization and its ICT with FISDD?

b) Is it possible to assess the level of KM in the observed organization with COBIT 5 framework?

They have been evaluated by observational methods with case and field studies.

Case studies

The paper presents case studies: preparation, delivery, analysis and results. The case studies were delivered at the end of 2013 in two companies in Slovenia, one is an internationally oriented software development company with its products installed in most continents of the globe (further on: Company INT), and the other one is a small IS consultancy and IS audit company dealing with national customers (further on: Company NAT).

Researchers have prepared special subset of FISDD main questionnaire (IS status questionnaire) based on (Delak and Bajec, 2013a), to synthesize important sub-questions which are relevant for knowledge and KM. This "IS status KM questionnaire" has 8 domains: General; Audit; IS management; IS resources; Information Security; Application – development, procurement, implementation and maintenance; Business Continue Management; and Business processes reengineering and risk management; with 179 questions. Researchers have conducted an open interview when filling in FISDD IS status KM questionnaire.

The base for this piece of research were two COBIT 5's processes – Manage human resources (APO07) and Manage knowledge (BAI08) (ISACA, 2012). Researchers have prepared COBIT 5 KM questionnaire, based on the activities described within COBIT 5 Enabling processes: These activities of each process described, how to implement process and their management practices with predefined activities in total fifty different questions. Researchers have conducted closed interview when fulfilling COBIT 5 KM questionnaire, where possible answers, where researchers have been looking for the existence of defined activities were: yes, no, partially.

After researchers have prepared questionnaires for both frameworks, it was necessary to identify the potential researched subject. Research has been mainly concentrated on Slovenian market at this point.

Initial discussions started in October 2013, and final decisions to conduct these case studies have been made in November 2014. The approach was the same for both companies, with both CEOs researchers have had two interviews. For FISDD framework, the interview took three hours, comparable to COBIT 5 framework which took one and a half hour. Analyses were completed at the beginning of December 2013 and took half a day each. The final results took one hour each.

Evaluation method was running interviews and data analysis preparations have been different for each framework. FISDD framework case studies have been done in a way of open interviews, where interviewees have to provide an explanatory answer to each question. The results are in a form of a subjective evaluation performed by the analyzer. On the other hand, COBIT 5 KM questionnaire was prepared in a form of closed interviews (with possible answers), where researchers were looking for the existence of defined activities with possible options (for answer): yes, no and last option partially. To evaluate the answers, and make also comparison between companies, researchers have converted their short answers to numeric values. During the next step a numeric transformation has been done: yes – 2 points; partially – 1 point; and no – 0 point. Sub questions have been added and divided by the number of sub questions, the result was the value of specific question / management practice activities. Table 1 presents the results for COBIT 5 framework for selected two processes – Manage Human resources and Knowledge management for both companies.

Table 1: Results of COBIT 5 KM questionnaire

		Company INT		**Company NAT**	
Management practices	**Activities**	**1,34**	**Partially**	**0,71**	**Partially**
APO07 Manage Human Resources		**1,55**	**Yes**	**0,84**	**Partially**
APO07.01	Maintain adequate and appropriate staffing	2,00	Yes	1,20	Partially
APO07.02	Identify key IT personnel.	1,25	Partially	1,00	Partially
APO07.03	Maintain the skills and competencies of personnel	1,29	Partially	0,71	Partially
APO07.04	Evaluate employee job performance	1,50	Partially	0,63	Partially
APO07.05	Plan and track the usage of IT and business human resources	1,75	Yes	0,75	Partially
APO07.06	Manage contract staff	1,50	Partially	0,75	Partially
BAI08 Manage Knowledge		**1,10**	**Partially**	**0,55**	**Partially**
BAI08.01	Nurture and facilitate a knowledge-sharing culture	2,00	Yes	0,60	Partially
BAI08.02	Identify and classify sources of information	0,75	Partially	0,75	Partially
BAI08.03	Organize and contextualise information into knowledge	1,25	Partially	0,75	Partially
BAI08.04	Use and share knowledge.	1,00	Partially	0,67	Partially
BAI08.05	Evaluate and retire information.	0,50	No	0,00	No

The pros and cons of both frameworks are presented and explained in the Contribution section. Further work and planned extensions of the case studies are presented in the Conclusion section.

Contribution

Our explanatory study has outlined several issues and has answered to both the research questions. Hypothesis H1: With FISDD you can identify explicit knowledge and also tacit knowledge in the observed organization and its ICT activities, was correct. With FISDD IS status KM questionnaire, you are able to identify explicit knowledge within the organization The evaluation scale is similar to Capability Maturity Level: Initial (chaotic, ad hoc, individual heroics); Repeatable; Defined; Managed and Optimizing. Analysis from FISDD shown that the score for Company INT is Repeatable and the same score for Company B. With FISDD you are able to identify some basic information about Intellectual Capital within observed organization. Skyrme (2003, p. 3) mentioned "If you're not keeping score, you're only practicing". He continues that in order to keep score you need to develop a measurement system using measures, appropriate to each business unit. Stewart (1998) describes meaningful measurements for intellectual capital, which can be divided into three categories: human capital, structural capital and relationship capital. None of the defined categories are integrated in FISDD framework or to COBIT 5.

H2: With COBIT 5 you can assess the level of KM in the observed organization and its ICT, was correct. Table 2 shown the results. Research analysis has shown that with this framework, it is not possible to evaluate level of knowledge, either tacit or explicit and it is not possible to evaluate intellectual capital (associated with employees) within the organization. COBIT does not integrate any widely used human capital methods such as Human capital readiness, Human capital index and human capital monitor, which was presented in the critical review of knowledge and knowledge management done by Ragab and Arisha (2013). ISACA, with the COBIT 5 framework defines for each process stakeholder (either external or internal), with their own roles and associated responsibility levels, a RACI matrix – who is responsible, accountable, consulted and informed for each process (ISACA, 2012). According to the ISACA definition for process Manage human resources chief information officer is accountable for all management practices. Process Mange knowledge is more complicated and role of accountability for this management practice is divided into different positions – business executives, chief information officer and business process owners (ISACA, 2012a). ISACA within COBIT 5 does not appoint a chief knowledge officer to lead company's knowledge efforts, which is lack of responsibility appointments, as this role might be one of the important responsibility roles in the future.

Although COBIT 5 has abovementioned cons, it has also some pros, with these processes and usage of COBIT 5 enabling processes management practice activities you are able to very effectively evaluate the level of KM.

On other hand FISDD is more oriented to knowledge identification. ISACA with Enabling Process are not in the position to measure the process, the same is with FISDD framework where

KM level is subjective definition. Another dimension of influence of organization performance - trust is not supported in FISDD or in COBIT 5 framework.

The contribution of this paper is to inform scholars, researchers and others interested about the vast possibilities to use FISDD and COBIT 5 frameworks in order to identify knowledge and the level of knowledge management in an organization.

Conclusion

This article investigates two questions. First one: Is it possible to identify explicit knowledge and also tacit knowledge in the observed organization? And second one: Is it possible to assess the level of KM in the observed organization with COBIT 5 framework? Both of the research questions have been partially confirmed, but as explained with FISDD, the knowledge can be somehow evaluated. On the other hand, with COBIT 5 the KM evaluation can be effectively performed. As mentioned ISACA has published several documents – COBIT 5 professional guides which could better evaluate knowledge issues in the observed organization. Further research should involve COBIT 5 other documents (enabler guidance and professional guidance) (ISACA, 2012, p. 11) and a document Process Assessment Model (PAM): Using COBIT 5, which was announced in 2013. With these documents and guides, researchers will evaluate, knowledge, knowledge management and even knowledge management system within observed organization and give the appropriate information about this domain in observed organization. Additionally, further researches are planned for FISDD, as well. The main challenge is to define how to integrate values of knowledge, and employees´ intellectual capital together with value of knowledge management system into a FISDD decision model.

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