Two Steps to IT Transparency: A Practitioner's Approach for a Knowledge Based Analysis of Existing IT Landscapes in SME

Holger Kohl [1], Ronald Orth [2], Johanna Haunschild [1], Hans Georg Schmieg [2]
[1] Technische Universität Berlin,
Department Sustainable Corporate Development
[2] Fraunhofer Institute for Production Systems and Design Technology IPK, Berlin, Department Business Excellence Methods, Division Corporate Management

Structured Abstract

Purpose – The purpose of this paper is to show how knowledge intensive information technology (IT) applications within an organisation can be identified and analysed to achieve two corporate goals: First, an optimisation of the corporate IT landscape that avoids inefficiencies or redundancies. Second the implementation of a knowledge management (KM) system that is aligned with the corporate IT infrastructure.

Design/methodology/approach – Methodically, the approach can be described as a practical two-step procedure. In the first step the knowledge intensive IT systems are identified through a questionnaire that is performed in the IT department of the organisation. Based on the expertise of the IT management adequate information concerning benefits and utilization of the applications and the description of technical conditions can be determined. On the basis of the work of the first step, selected user groups (key-user, admin-user, heads of departments, etc.) are surveyed on a broader base through semi-structured interviews. The focus here is to determine the application within its processes and to identify the importance in the fulfilment of the daily tasks as well as the capabilities in knowledge management. Therefore the survey covers the main questions regarding the classification of KM and provides a solid foundation for optimisations regarding the IT infrastructure. The two-step approach also provides the flexibility to identify future processes concerning an appropriate KM system and to identify practical adaptions of the existing IT landscape.

Originality/value – The suggestion of a newly developed method to identify and assess knowledge intensive IT systems – what includes hard- and software – within an organisation. The results of the method can be used to develop recommendations to improve the conceivably of already existing KM or to originate an organisational KM as well as to enhance the existing IT landscape. This includes in particular the consideration of the processes in which knowledge is generated, stored, used and shared.

Practical implications – The identification, utilization and harmonization of KM intensive systems can be a substantial advantage during the implementation or enhancement process of KM for two reasons: First, the important and implicitly for KM purposes used systems are identified and evaluated before the inception of the organisational KM. Second, the knowledge management orientation of the approach allows reducing both, the complexity and the variety of IT applications within an organisation.

Keywords – Knowledge Management implementation, Identification of IT applications, Assessment of IT applications , IT optimisation, IT analysis

Paper type – Practical Paper

1 Introduction

„Now that total information is possible, it requires management discipline not to ask for information. The effort of limiting information will be greater than the effort to generate information.“ (Zuboff 1988, p. 357)

The identification of IT systems as well as the individual roles of these systems within KM are an essential part of KM implementation. Furthermore, the identification and evaluation as well as the deduction of recommendations for the optimization of KM and IT are prerequisite to deal with the advanced requirements of knowledge workers professional life. Through the increasing information dynamics in the context of organisations the management of knowledge has become a business key task (Aier & Schönherr, 2007). Especially Web 2.0 applications play a decisive role. They enable the users to simultaneously share their knowledge through formal and informal channels. Therefore users face an increased importance of software systems, an increased amount of 1506 knowledge as well as an increased demand for the handling of knowledge. Consequently intuitive systems that are easy to operate as well as trainings and mentoring for complex systems are fundamental essentials to establish acceptance in users minds and hence in corporate culture. The approach in this paper shows how to identify and assess IT systems with respect to their KM-potential what contributes indirectly also to manage IT.

After more than a quarter of a century of increasing attention in KM, the state of research can be regarded as advanced (Jasimuddin, 2006). However the links between KM and IT are recognized by academia since the inception of KM-science and from practitioners' point of view regarded as a fundamental requirement (Hislop, 2002).

Hardware and IT infrastructure are not considered in detail within the following consideration of IT landscape. These are just considered as a framework for existing software solutions, but not taken into a closer consideration. Hence, the following practical approach is limited primarily to IT applications and therefore covers only a part within an implementation process of KM.

In the first chapter, the underlying theory will be described in detail. The second part will be the presentation of the developed two-steps approach, containing an evaluation of the first and the second layer of the model. The consequent procedure for the deduction measures including specific recommendations for actions as well as a prototypical practical implementation will be discussed in the following chapter. The last chapter will be a conclusion including possibilities for future improvement as well as limitations of the concept.

2 Theoretical background

In consideration of interdisciplinary and department-spanning cooperation, in particular for knowledge transfer, an approach to identify and assess the IT systems and applications is mandatory. The technical classification of IT systems forms the basis of the research approach.

The theoretical foundation of the practical analysis is based on several science areas: business administration, computer science and sociology (Broßmann & Mödinger, 2011). In the following different models concerning KM and classification of IT systems will be introduced and summarized. These are the Fraunhofer KM reference model (Heisig, 2005), the framework of Bredehorst (Bredehorst, et al., 2013), the architecture for integrated knowledge management according to Riempp (Riempp, 2005) and the criteria to evaluate KM suggested by Buder and Städler (2006).

Fraunhofer reference model for Knowledge Management

The figure 1 shows a model that is based on the Fraunhofer KM model. It was developed in 2005 and forms the basis for KM implementation (Heisig, 2005).

The considered KM core activities are to generate knowledge, to apply knowledge, to store knowledge and to distribute knowledge along the business processes and the domains of knowledge. The domains of knowledge are prerequisites and have to be defined within the implementation of KM. The main domains are the following: Knowledge about customers, knowledge about markets, knowledge of products, technical knowledge and knowledge about methods, knowledge about the organisation, knowledge about partners, knowledge about laws and standards and knowledge about patents (Mertins & Orth, 2009).

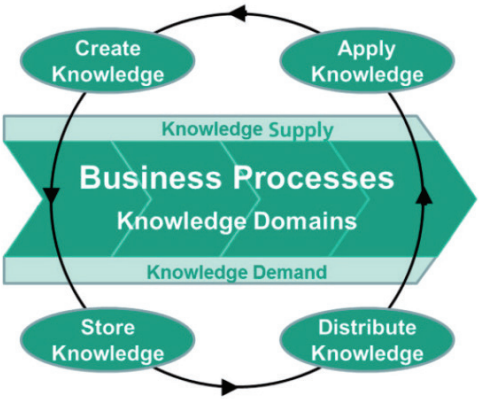

Figure 1: KM implementation model based on the Fraunhofer reference model for Knowledge Management of the KM (Heisig, 2005).

Architecture for integrated Knowledge Management

Riempp presented in 2005 his approach of the „architecture for integrated knowledge management", which considers the importance of IT applications.

The integrated information system is organized in five key areas (or pillars). The first key area (1) **transaction** summarizes the completion of tasks such as reservations, payments, inventory changes, orders, confirmations of orders, etc. within the business and support processes. Today, they are usually provided by ERP, SCM and CRM systems. Such functions are not part of KM in the strict sense, but they should be considered in an integrated view, as for the preparation and implementation of the transactions of knowledge is necessary and may result from the execution of new knowledge. The pillar (2) **content** includes all functions for management of digital information objects and their descriptive context (e.g. creating, sharing, publishing, revising, archiving). The third key area named (3) **competence**. The individuals with their competences use content and competence profiles to detect in virtual and / or physical spaces their mutual knowledge to prepare, execute and evaluate tasks, furthermore to exchange, develop and apply knowledge. The associated functions are located in the (4) **collaboration** pillar.

Finally, the area (5) **orientation** comprises all those functions that are alike required in all other pillars, such as search, navigation and administration (e.g. maintenance of user profiles and permissions, authentication, personalization, access protection).

In the case of many users, peripheral content and numerous spaces for collaboration, a system is needed to obtain clarity and comfort of usage. Therefore a regulatory framework is required that ideally uses a consistent taxonomy or ontology.

Finally, the culture of an organisation is determining the elements of software architecture, purpose and framework conditions. If in an organisation, the direct exchange of knowledge is prerequisite, the pillar collaboration is the most important one and can be carried out by correspondingly powerful community management systems (Riempp, 2005).

Type of organisation and appropriate IT applications

Figure 2 shows the different types of organisations and their allocation to different IT systems. Accordingly, hierarchical organized companies should prefer to use ERPsystems for the management of structured information. For companies that are organized as a network, rather collaborative IT systems, for example Wikis or blogs are more effectively for an optimal support of all important work flows.

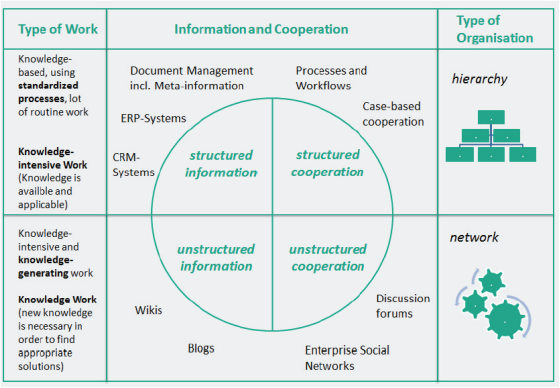

Figure 2: Type of Work and Software-Solutions based on Bredehorst, et al. 2013.

Assessment of Knowledge Management and IT applications

Buder and Städler (2006) suggested assessing KM and IT applications with the following appropriate criteria:

1) **appropriate functionality:** Role configuration, easy to use selection mechanisms (important from unimportant information), supporting the crossdivisional communication, functionality should be appropriate to the handling.

2) **simple and intuitive handling:** Permanent use is achieved by simple and intuitive handling, supporting usage habits (push- vs. pull- approaches), identification of different types of knowledge.

3) **high system availability:** Permanent availability and rapid relief to system failures, simple configuration and hence to provide trainings to have many experts is useful.

4) **appropriate degree of integration:** Isolated application brings only short-term benefits and long-term lead to a uncontrolled growth of diverse and parallel used IT solutions.

5) **trainings:** Non-usage can also be attributed to a lack of knowledge in handling; optimal use can only be achieved by sufficient knowledge of the software and its logic (Buder & Städler, 2006).

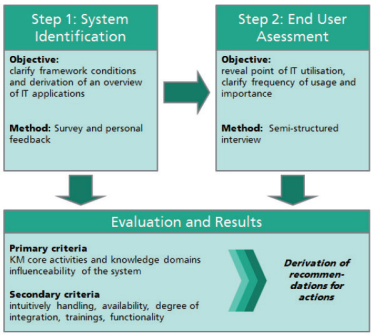

Figure 3: Two-step approach

3 Two steps to IT transparency: A practitioner's approach for a knowledge analysis of existing IT landscapes in SME

The suggested two steps approach focuses the practitioners. Hence, it tries to combine the above-mentioned theoretical foundations and enables to draw qualitative and quantitative results and subsequently allow to get an overview and an assessment of used IT and KM. The procedure itself is a two-step approach, which makes it possible to involve the opinion of all participants in process of identification and assessment of KM and the IT systems. This led to a high level of recognition with the outcomes of the assessment by most of the participating staff. The reminder of this chapter describes the two step approach in detail. The above presented models show the variety of possible methods, which can be used. The following practical approach is based on the Fraunhofer KM reference model with the focused elements to generate knowledge, to

apply knowledge, to store knowledge and to distribute knowledge along the business processes and the domains of knowledge. The „Architecture for integrated knowledge management“ as well as the classification of types of organisations in connection with allocation of IT applications are considered to be the theoretical framework and are the basis for the general structure of IT systems. The criteria (1) appropriate functionality, (2) simple and intuitive handling, (3) high system availability, (4) appropriate degree of integration and (5) trainings, are part of the subsequent evaluation process. Figure 3 shows the methodology of the used two-step-approach:

Step 1: The IT Department survey

The first phase starts with a survey carried out in the IT department, more precisely the IT responsible person of the organisation. This means a questionnaire carried to reflects the IT infrastructure, the systematic in the networks and the handling of soft- and hardware to get a comprehensive overview of the organisational IT landscape. The focus is on the framework and the borders of the total infrastructure of the IT landscape. Besides on overview over the used and potentially available software is attained by this first questionnaire. It is not possible to reveal all soft- and hardware that is used in this first step; however fundamental questions regarding structures within the IT become clear, for instance:

- How are the administration rights distributed within the organisation?
- How is the software-order-process structured?
- What software is available and what was the acquired purpose?
- What are the standard software packages in the organisation?
- How is the supply of hardware-components structured?

The first phase allows a classification of the IT systems, for instance exchange platforms, general communication software, process management related software or software that is used for project management. Furthermore, the possibilities of influence reveal: Which systems can be altered and which are prescribed from forces outside of the organisation, like hierarchically superior corporate parents?

This first phase is prerequisite and covers all functions in order to get a first impression for each of the systems, the interaction between soft- and hardware structure and the IT landscape as a whole.

Step 2: The IT end user survey

In the second phase the users are surveyed. The applied method is a semi-structured guided interview with maximum two people per interview. The users get questions to the following thematic topics: (1) collection of relevant IT systems (2) evaluation of the usage of specific IT systems (3) evaluation of the content of the IT systems (4) personal evaluation and additional notes.

The selection of users can be made in different ways. First, the users are picked along the value generating processes. A second option is to choose the users according to organisational units like departments. A third alternative would be to pick a group of users that are representative for the whole organisation (Doppler, et al., 1998). When regarding large organisations that employ a large number of people it is not possible to survey every employee in an appropriate timeframe. The semi-structured interviews are conducted for each department or process. Overall, there is some evidence that the involvement of the employees increases the acceptance for newly implemented management instruments (Pawlowsky & Gözalan, 2012).

All picked users get the prepared list from the first phase. They were asked to add relevant systems that are not already on the list but are used in their day to day business as well as to delete systems that are not used. Afterwards, the users are asked specific questions to every system. The questions concern the frequency of usage, the user group within the department or unit, the general usage of the system, core task of the software and main usage.

Because the interviews are semi-structured, the approach leaves open space for additional issues regarding the general proceeding in the processes. This information can be used for further assessment in the evaluation process which subsequently takes place after finalization of the second step. The questions of the survey in detail are:

- Collection of relevant IT systems: add or delete software systems from the prepared list of the first step.
- Evaluation of the usage of specific IT systems: Who is using the software within the department or within the process? How often is the system used? Are you or your department knowledge provider or knowledge recipient (related to single modules within the software)?
- Evaluation of the content: What is the purpose of the system? For which purpose are you using the system? Which kinds of domains of knowledge are covered from the system? How up-to-date are the knowledge contents?
- Personal evaluation and additional notes: Any suggestion for improvement (content- and technical-related)? How the system should (not) be used ?

The query should enable to obtain the users point, unbiased by the framework and potential influence. To figure out the knowledge relevant processes a special focus of the query is on the criteria of the KM reference model. Therefore the crucial core questions are: Where and when is the knowledge generated, where and when is it stored, where and when is it distributed and where and when is it applied?

4 Evaluation and Results

The assessment is based on the two steps model. Initially a general overview of the IT systems is prepared. This overview contains the modules and functions of the systems as well as their detailed descriptions. The descriptions contain the key task of the system, the task within the respective organisation as well as the purchase reason for the system.

In general the second step digs deeper in detail and includes the representation of users per process or organisational unit. Therefore also the frequency of usage within different processes or organisational units reveals. This allows an assessment of the relevance of the IT system in different user groups. The evaluation is splitted in qualitative and quantitative criteria. The quantitative assessment is archived through the statements of the users. These are sub summarized for each unit as well as for the whole organisation, which enables to get an overview of the relevant systems and their meaning in an overall context.

The quantitative assessment required more attention and a closer consideration. A classification of the IT systems is made according to the KM core activities and knowledge domains (Heisig, 2005). Therefore all IT systems are classified as either knowledge supplying or knowledge demanding. Besides, the influence of the organisation on the IT system is clarified. Questions like: “Has our organisation an influence on the content or the technical configuration of the system?” or “How are the administration rights distributed within the organisation?”, are treated by first stage results. The systems that are classified as “externally administrated” or even “no influence on content or configuration” are not immediately excluded from the evaluation, however they are not in the focus for the deduction of specific measures. This due to the fact that suggested measures cannot be implemented.

After that, the assignment of organisation specific knowledge domains to each system is made. This allows by implication also the identification of uncovered knowledge domains. Also the personal opinion of the staff regarding each system will be considered in detail. This item is evaluated on the IT system level, no restriction regarding the group of users or the department has been made. Therefore the results are aggregated for each evaluated system. This led to an overview of suggestions of each system without regarding a functional assignment.

After summarization and analysis of the two stages, the relevance and importance of IT systems can be identified. The analysis shows the usage of the IT systems and furthermore the usage of the IT systems within single process steps. Furthermore, the approach allows considering the IT landscape within an organisation, hence the consideration of the factor of influence in content or technical configuration is

important for deriving recommendations. Besides a pure review of IT systems, the assessment of the content and their factors of importance will be considered. The knowledge domains within an organisation as well as the generation, application, storage, distribution and usage of knowledge are covered by the evaluation. The detection of uncovered knowledge domains can show a lack of possibilities to manage knowledge that is relevant for organisational success.

The following questions are the basis to assess the IT systems with high relevance and frequency of use:

- Which contents are used? And for what purpose?
- How important is the content in regard to the usage of the users?
- Which domains of knowledge are covered? Which are uncovered?

Depending on the importance and relevance of the contents within the system, the following criteria are under consideration: (1) adequate functionality, (2) simple and intuitive handling, (3) high system availability (4) adequate level of integration, (5) training. The following questions are the basis to assess the IT systems with high relevance and frequency of use:

- What contents are taught in trainings? Are there enough training sessions? (or not at all)
- Is a contact person in case of technology and/or content related issues available?
- Are there interfaces available to avoid redundancies?
- How vulnerable is the system for failures? How is the rapidity to correct failures?
- Does the system allow an intuitive usage/handling? And why (not)?

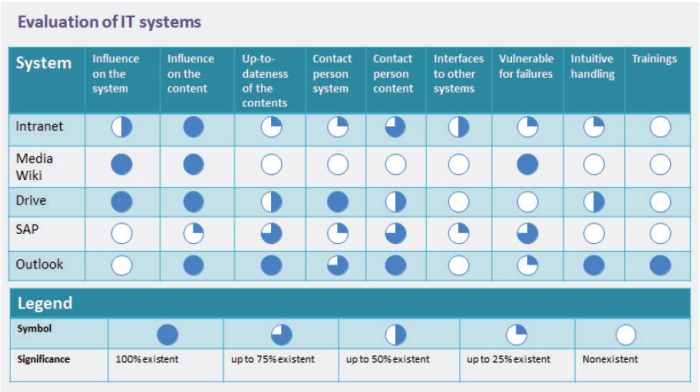

Figure 4: Evaluation of IT systems

The following figure 4 shows the used evaluation and assessment method. Consequently recommendations are derived from the evaluation above, which should lead to an improvement for the user. Findings may be the need for trainings, redundancies in various systems, contact persons do not exist. Derived recommendations are therefrom: to offer sufficient training to the employees, to provide interfaces to avoid redundancies, to train experts.

5 Practical implementation and experiences

The procedure described above has already been tested in a research organisation. It has taken place in combination with the implementetion of KM. The organisation is strongly embedded in predetermined conditions, which is characterized by rigid structures within the IT landscape. Therefore, the technical scope-of-action was limited to a minimum; content-related redesigning was also rather not possible in most of the systems.

Initially, the framework of the IT infrastructure was clarified with the IT manager. Subsequently individual employees of each department were interviewed to the IT systems which were identified by the first phase. The evaluation of the results has led to identification of weaknesses in the intuitive handling of the systems, which could be solved by concrete derived recommendations. This was particularly the improvement of the intranet as the general organisation internal information platform. Other recommendations were made on systems that were under the influence and structured by single users, rather than by organisational requirements.

6 Conclusion and Limitations

The method of data collection with integration of end users leads to a high level of identification with the forthcoming changes and the companies` aim to integrate a KM system in their businesses (Czichos, 2014). Besides, the interview oriented and explicitly end-user-integrating procedure is able to broaden the acceptance for existing and new integrated IT systems that are used in KM. Therefore the whole process of KM implementation is more efficient and resource-saving compared to other approaches. The IT landscape within an organisation or – more general all institutions that demand for a generalized IT department – can be often described as various and complex (Aier & Schönherr, 2007). Furthermore, the average user could be assumed to be rarely capable to keep an overview over the wide span of existing systems which are often also very demanding in usage. Besides IT transparency, the approach also leads to an optimization of the handling of IT systems and software structures – given that there is possibility of influence on the evaluated systems.

The practical application has shown that the procedure depends on the size of the company as well as on clear structures within an institution. Although the detection and recording of IT systems by the first and second step leads to the desired results, but is too superficial for a complete transparency of IT infrastructure, therefore more likely to be used for KM. Another limitation is that the method has only been implemented in research institutions in SME size. In another context, regarding for instance size or branch the method could be possibly not applicable without adjustments.

Nevertheless, the procedure in addition to a general inventory of all IT systems provides optimization potentials and possibilities of their subsequent implementation.

References

Aier, S. & Schönherr, M., 2007. Flexibilisierung von Organisations- und IT-Architekturen durch EAI.Enterprise Application Integration. Berlin: GITO-Verlag.

Bredehorst, B., Gross, D. & Frost, I., 2013. Wissensmanagement-Trends 2014–2023: Was Anwender nutzen und Visionäre erwarten, Berlin: Pumacy Technologies, AG.

Broßmann, M. & Mödinger, W., 2011. Praxisguide Wissensmanagement: Qualifizieren in Gegenwart und Zukunft. Planung, Umsetzung und Controlling in Unternehmen. Heidelberg: Springer.

Buder, A. & Städler, M., 2006. Evaluation von IT-Projekten im Wissensmanagement: Eine qualitativ-explorative empirische Studie über Erfahrungen und Schwachstellen. Berlin: Mensch & Buch Verlag.

Czichos, R., 2014. Erfolgsfaktor Change Management. Den Wandel im Unternehmen aktiv gestalten und kommunizieren. Freiburg: Haufe Gruppe. 1517

Doppler, K., Lautenburg, C. & Egert, A., 1998. Change management.. s.l.:Editorial Ariel.

Heisig, P., 2005. Integration von Wissensmanagement in Geschäftsprozesse. Berlin: eureki, Berlin: Berichte aus dem produktionstechnischen Zentrum Berlin.

Hislop, D., 2002. Mission impossible? Communicating and sharing knowledge via information. Journal of Information Technology, pp. 165–177.

Jasimuddin, S. M., 2006. Disciplinary roots of knowledge management: a theoretical review“, International Journal of Organizational Analysis. International Journal of Organizational Analysis, Issue Vol. 14 Iss: 2, pp. 171–180.

Mertins, K. & Orth, R., 2009. Wissensorientierte Analyse und Gestaltung von Geschäftsprozessen. Wissensmanagement im Mittelstand.. Berlin, Heidelberg: Springer .

Mertins, K. & Seidel, H., 2009. Wissensmanagement im Mittelstand. Berlin: Springer Verlag.

Pawlowsky, P. & Gözalan, M., 2012. Vertiefung der Studie Wettbewerbsfaktor Wissensmanagement 2010: Stand der Praxis in der deutschen Wirtschaft, Ergebnisreport, Chemnitz: Technische Universität Chemnitz.

Riempp, G., 2005. Integriertes Wissensmanagement – Strategie, Prozesse und Systeme wirkungsvoll verbinden. HMD – Praxis der Wirtschaftsinformatik, p. 6–19.

Zuboff, S., 1988. In the age of the smart machine. The future of work and power. New York: Basic Books.