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Senior Managers' Understandings of Knowledge Management in the Context of Enterprise Systems

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Abstract

Employing an interpretative method, three conceptions of knowledge management have been identified among senior managers who are 'immersed' in ERP. Managers understand knowledge management as: (1) change management for implementing and maintaining an ERP system; (2) corporate information management based on and beyond an ERP system; (3) the integration of change management and corporate information management by means of an ERP system. The results may inform further research, such as case studies, higher education and practice.

Introduction

This study aims to better understand the range of conceptions of 'knowledge management' held by senior managers. The context of the study is Enterprise Resource Planning Systems or ERP. In other words, the study aims to identify conceptions of knowledge management held by senior managers who are 'immersed' in ERP.

The study is foundational to a parent project "Cooperative ERP Life-cycle Knowledge Management" (Gable, Scott, Davenport 1998), which aims to improve ERP life-cycle support through improved knowledge management. This involves the development of a framework that spans inter- and intra-organisational roles and structures, knowledge management technologies and curricula and syllabi for training.

An objective of the parent project is, "To better understand what the three key players [vendor, consultant, client] can do individually and cooperatively about ERP knowledge". This raises the question, "What key cultural and behavioural issues must be addressed in order to make more effective use of ERP knowledge within and across the three?" (Gable, Scott, Davenport 1998). Explicating senior managers' understandings of knowledge management represents the identification of one of these "cultural and behavioural issues".

The parent project further proposes that "knowledge management can be better rationalised across the three key players through cooperation" and that "knowledge management projects are more likely to succeed when they change motivational practices". Identification of understandings of knowledge management helps to validate these propositions, in that: (1) Cooperation requires communication and this is facilitated by the awareness of differing underlying conceptions that have been empirically established. (2) Change of practices can only be expected when they are preceded and accompanied by a change in conceptions. However, conceptions first must be made explicit, before they can be discussed and changed. In this context, the results of this study, in making these conceptions communicable are a prerequisite for conceptual change.

The Study Context: Enterprise Resource Planning Systems

The thematisation of understandings of knowledge management in the Enterprise Resource Planning systems environment is important: (1) Inarguably, ERP systems are the prevailing form of business computing for many large corporations and many government organisations (Gable 1998). (2) ERP systems themselves, due to their scale and breadth, require significant structures for information management and, considerable expertise for their implementation, operation and maintenance. (3) ERP software is constantly evolving, striving to integrate higher business functions, which could be regarded as bearing strong affinity towards knowledge management related activities.

The information systems management literature on ERP systems, though still emerging (Gable, Rosemann 1999), does give already some indication of the pertinence of knowledge management for these systems. Senior managers must address a range of critical success factors in the implementation of an ERP system, including: managing expertise, such as training and reskilling of the workforce (both systems personnel and end users); retention of staff who are simultaneously experts in both business processes and technology; and ensuring skills transfer from external consultants to in-

house staff (Sumner 1999). It has also been emphasised that managing consultants, i.e., identifying consultants' competence, devoting competent staff to the project team and staff training are crucial for introducing the ERP solution into a company (Bingi, Sharma and Godla, 1999). In addition, it has been argued, that 'cultural' elements (which could well be regarded as pre-conditions for knowledge management), such as the sharing of information and established communication and teamwork practices, are vital for the successful operation of advanced ERP solutions (e.g. Supply Chain Management, Stefanou 1999). Due to ERP complexity, a great deal of competence is required to maintain it throughout its life-cycle; thus, competence centres have been proposed as "[...] a focal point for retention of technical and business knowledge [...] and to] provide for enduser training (initial and advanced) and support for ongoing business process improvement" (Eriksen, Axline and Markus 1999). Further consideration is given to strategic options in relation to information technology open to firms beyond the implementation of enterprise systems. Holland et al. (1999) suggest that the first step to achieve competitive advantage through IT is Supply Chain Management, which might then move on to software that is commonly associated with Knowledge Management, such as decision support systems (Holsapple, Sena 1999). It would thus appear that organisational knowledge in relation to enterprise systems is an important issue for the IS community.

A Priori Assumptions about Knowledge Management

Knowledge management is "a term which has now come to be used to describe everything from organizational learning efforts to database management tools" (Ruggles 1998). Thus, when researching how knowledge management is conceived of in the workworld, the issue arises that this phenomenon itself is apparently rather elusive. Yet, a definition or consensus has not been achieved; it rather can be legitimately assumed that published discourses on knowledge management have already impacted on managers' understandings, and that these understandings are based both on theoretical considerations and on a range of practical activities such as planning, implementing, negotiating, etc.

Due to the fact that this has been an interpretative investigation and any interpretation is not without presupposition, inherent pre-understanding needs to be made explicit. This will help to avoid compromising the outcomes through a range of hidden assumptions. The basic assumptions guiding the identification of understandings of knowledge management were as follows. There is:

- i. a technology/human resource polarity implied within the idea of knowledge management (Swan, Scarbrorough, Preston 1999)

- ii. a need to delimit the emerging field of knowledge management, both as an area of scholarly enquiry and as a business practice, from the established activity of information management (e.g. Essers, Schreinemakers 1996)

Information management and knowledge management may however be regarded as connected activities, since the management of explication and re-interpretation processes (=knowledge management) actually presupposes the management of processes of knowledge transfer (=information management), while knowledge transfer would have no end or purpose in itself, if knowledge transferred would not be re-contextualised (Capurro; Nohr 1999).

The Phenomenographic Approach

Querying ways in which ways senior managers in ERP contexts understand knowledge management, requires an approach that allows for thematising and interpreting the lived experiences of the participants. Thus, this research has borrowed strongly from an approach based on phenomenological principles, known as phenomenography, (Marton & Booth 1997, Uljens 1993, Sandberg 1994). Phenomenography has been used in relation to Information Systems e.g., to explore how the concept of information systems is understood by practitioners, academics and students (Cope, Horan, Garner 1997), or to investigate what different conceptions of a Geographical Information System can be identified among appliers, software developers and academics (Gerber, Buzer, Worth, Bruce 1992). In human resource management, phenomenography has rendered descriptions of the competence of automobile engineers (Sandberg 1994) and clerical-administrative workers (Gerber, Velde 1996).

As the name suggests, the business of phenomenography is to describe phenomena. The phenomenon in question here has been the understanding of knowledge management by senior managers. This phenomenon consists of the varying conceptions of knowledge management as disclosed from the pool of interview data. "Phenomenography is simply an attempt to capture critical differences in how we experience the world and how we learn to experience the world" (Marton 1995). Its phenomenological positing of the structure of awareness is made up of the correlation between the conceived meanings and the conceiving acts. With regards to managers' understandings, meanings of knowledge management are arrived at through varying ways of conceiving; the phenomenographic method refers to this dynamic as the structural and referential aspects of experience (Marton 1995). Conceptions are differentiated in that they are established within horizons. The concept of 'external horizons' is commonly used in phenomenography to refer to the way in which the object of focal awareness is delimited from the context. The internal horizon, on the other hand, represents how

something is structured in itself; how parts are delimited from and related to each other and the whole (Marton 1994). These presuppositions shape how the interpretative model is applied, and what the outcomes of the research process are: varying understandings are presented as descriptive categories that are differentiated by their complexity.

The data analysis is performed in an iterative fashion on all transcripts as a single source of data. The first step is to ask 'what meaning is attributed to knowledge management?', leading to preliminary or conjectural categories. The second step consists of finding what particular perspective on knowledge management is implied in the participants' statements. The third step involves drawing together the preliminary categories and the different perspectives taken, in order to determine the constitution of the varying understandings through different perspectives. This is accompanied by checking the categories against each other as well as against the original source of data. The process continues until a conclusive view of the totality of understandings within the group investigated has emerged. This conclusive view shows the different conceptions in their interrelatedness, and is often called the *outcome space*; that is, a synopsis of the phenomenon encountered (Marton and Booth 1997).

Scope, Participants and Data Collection

The project proposal for "Cooperative ERP Life-cycle Knowledge Management" had identified three main actors within the ERP domain: vendor, implementation partner (consultant) and client company. Thus, participants (interviewees) were selected in equal proportions, that is two, from each of the three groups. Interviewees were affiliated with two TopFive¹ ERP vendors, two Big5² consulting companies, and two major government agencies. Participants had been involved with ERP systems from two to nine years, while their direct and practical involvement with knowledge management varied depending on the employing organisation's emphasis in this area.

Data from the field were collected in the form of semi-structured interviews with individual participants. Due to the closeness of the interviewed managers to the topic in question a rigid interview protocol was not required. The conversations were introduced with the request "From your experience, what is knowledge management", and

¹ the top five ERP vendors, as of this writing, are widely recognised as including: SAP, Peoplesoft, ORACLE, Baan and JD Edwards

² though mergers between consulting companies have varied from country to country, the Big5 consulting companies are widely recognised as Andersen Consulting, PricewaterhouseCoopers, Ernst & Young, Deloitte Touche Tomatsu, and KPMG

the interviewer(s) through further questioning subsequently ensured that the participant's elaborations were close to the topic and dealt with it exhaustively. The interviews varied in duration between 45 and 75 minutes and were tape-recorded and transcribed verbatim. Transcripts generated in this way constituted the material on which the analysis has been performed.

Data Analysis: A Collective View of Knowledge Management as Experienced in the Context of Enterprise Systems

Understandings are purposefully analysed by taking into account the dynamics of the relation between what is understood (in other words, the meaning) and which particular focus is taken in the act of conceiving of, or understanding something. Consequently, in presenting the results of the analysis: (1) the experienced meanings of knowledge management will be summarised; (2) the different potential ways of understanding knowledge management will be presented and, finally, this will be synthesised in (3) the constitution of different experienced meanings of knowledge management through particular foci.

In accordance with the phenomenographic approach, the phenomenon to be disclosed was how managers in the ERP context understood knowledge management. The primary task was thus to identify different understandings, but not to determine which particular category of understanding could be attributed to one or another of the participant subgroups, namely vendor, implementation partner, or client. The latter would imply conducting a survey to determine the distribution of the categories among the participants' subgroups. It was however not within the scope of this study to conduct such an analysis in quantitative terms. Also, though the sample size was sufficient for an interpretative investigation, it was insufficient to provide reliable statistics. Rather, while analysing the transcripts, the question of who made a particular statement was considered not to be relevant at all. For example, a participant could have elaborated on the topic in such a way that his views on knowledge management might be assigned to more than one of the categories established.

Meanings of Knowledge Management

The data analysis has yielded three distinct categories describing how senior managers understand knowledge management in relation to ERP systems.

√Category 1: Knowledge management is seen as **change management** for implementing and maintaining an ERP system;

√Category 2: Knowledge management is seen as **corporate information management** based on and beyond an ERP system;

∀Category 3: Knowledge management is seen as **integrating change management and corporate information management** by means of an ERP system.

Category (1) signifies basically an activity for the ERP system, while in category (2) knowledge management is understood as something that can be a) **separate** from, b) **embedded** in, or c) an **extension** of the ERP. Category (3) represents the consolidation of (1) and (2) into a whole, in that both the “activities for the system” as well as “business activities with the system” are subsumed as knowledge management. This allows for viewing these categories in a hierarchical way: categories one and two are situated at the base level, while the integrative view of category three encompasses both, which makes it in some aspects relatively more complex and thus ‘superior’ in comparison to the preceding ones. This ‘superiority’ should however not be regarded as the result of a more complex understanding of knowledge management as such. Rather, the complexity within this category is grounded in the claim that the ERP system itself caters for the management of the complete range of knowledge within a company as far as it has been objectified, i.e. represented in documents or otherwise. Table 1 gives a graphical representation of what the phenomenographic method refers to as *outcome space*, i.e. the interrelatedness of the identified categories of understanding. The thick border delimits the disclosed understandings from all potential understandings; grey shading on both sides of the box for category three is meant to indicate that this category does not encompass all aspects of categories one and two.

Table 1: The experienced meaning of knowledge management in the context of ERP systems

<i>knowledge management in the context of ERP systems is seen as ...</i>	potential understanding	
	<div style="border: 2px solid black; padding: 5px; margin: 5px auto; width: 80%;"> <div style="text-align: center; margin-bottom: 5px;">3</div> <div style="text-align: center; margin-bottom: 5px;">integrating change management and information management with an ERP system</div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center; width: 45%;"> <div style="text-align: center; margin-bottom: 5px;">1</div> <div style="text-align: center; margin-bottom: 5px;">change management for implementing and maintaining an ERP system</div> </div> <div style="text-align: center; width: 45%;"> <div style="text-align: center; margin-bottom: 5px;">2</div> <div style="text-align: center; margin-bottom: 5px;">corporate information management based on and beyond an ERP system</div> </div> </div> </div>	
	potential understanding	

The term *corporate information management* has been used in the verbalisation of categories two and three because: (1) the word knowledge has been applied by the participants interchangeably with information, or has been used rather rarely; (2) activities that are commonly named in the literature to draw a clear distinction between information management and knowledge management, and in particular the ‘creation of new knowledge’

(Nonaka et al.1995), had not been referred to by the participants. Hence, what the literature regards as the innovative aspect of knowledge management, had not been identified as an intended meaning.

The Constitution of Understandings of Knowledge Management in the ERP Context

From the data, it could be derived that the ways of experiencing knowledge management in the ERP context are determined by the varying configuration of a range of foci that are assumed when engaging and reflecting upon this activity. A set of dimensions that are common to the different experienced meanings of knowledge management could be identified:

- i. **Temporal:** denotes in which phase of the system life cycle the knowledge management activity takes place. For the purpose of this study the distinction was made between two phases: specification-configuration-implementation, and command-control-operation.
- ii. **Social:** denotes what categories of people are primarily involved in knowledge management. A differentiation has been made between the grouping of experts and power users on one side, and a wide range of actors, such as managers, operators and customers on the other
- iii. **Topical:** denotes what is the object of knowledge management, where and about what information is collected and made available again. The objects of knowledge management can for this purpose be broadly delimited as the system, the business (both processes and data) and the business environment
- iv. **Dynamic:** denotes the state of information that is prevalent in or preferred for knowledge management. For this context, a distinction between various modes of information transfer has been made. eg., via documents, training and coaching, and the immediate readiness of information for reference and decision making.
- v. **Instrumental:** denotes technological and formal aspects of knowledge management, eg, the use of information technology such as databases, or so-called templates and decision rules.

These different foci on the activity of knowledge management allow developing a precise specification of the categories characterising conceptions, summarised in table 2. All categories have in common that they refer to information technology and rules for managing information/knowledge; in explaining how the three conceptions are constituted, only the distinguishing dimensions will be discussed.

Table 2 - The constitution of understandings of knowledge management through different ways of engaging in it*

		The External Horizon		
		What does knowledge management "mean" in relation to the ERP system?		
The Internal Horizon		change management for implementing and maintaining an ERP system	corporate information management based on and beyond an ERP system	integrating change management and information management with an ERP
Life cycle phase (temporal)	specification, configuration, implementation			
	command, control, information			
People (social, organization)	experts, power users			
	managers, operators, customers, etc.			
Context (topical)	system			
	business			
	environment			
Information state (dynamic)	transfer			
	transparency			
Technology (instrumental)	databases			
	rules, models			

*grey shading indicates which aspect of a constituent is an element of the internal horizon of the category; lighter grey under category indicates its technological emphasis.

Category 1: Knowledge Management as Change Management for Implementing and Maintaining an ERP System

Knowledge management in this understanding is temporally bound to the life cycle phase usually referred to as implementation. Experts from both sides, consultants from the implementation partner and business/IT savvy staff from the client company collaborate to interpret systems and business structures to make the software work for the company. Knowledge transfer takes place in different forms such as training, coaching, and explicating project phases to the client personnel. Eventually, all decisions and configurations are well documented and delivered to the client for future reference when system maintenance and enhancement has to be applied to the system. Another aspect of knowledge management applies to the experts within the implementation partner only. These experts exchange their experiences of problems encountered and solved through their own communication (nominated specialists) and storage structures (worldwide accessible databases).

Category 2: Knowledge Management as Corporate Information Management Based on and Beyond an ERP System

In this understanding, knowledge management is something originally independent of the ERP system, and if related to the ERP, then it pertains to the operation phase of the system life cycle (not implementation). Knowledge management encompasses the entire range of business functions as far as they are related to information and its management. This implies that a wide range of people is involved in providing and using information, from operators to executives and from suppliers to customers. The ERP system as such is not an object of interest for knowledge management in this category. Knowledge/information is neither imparted nor sought, but must be immediately available (transparent) to warrant efficient functioning of operations, and optimal decision-making.

Category 3: Knowledge Management as Integrating Change Management and Corporate Information Management by Means of an ERP System

This understanding of knowledge management is dominated by the vision that all information requirements, be they in relation to running and maintaining the ERP

system, or in relation to the operation and management of the business, must be responded to by a unitary technical device. This is guided by the expectation that the centralisation of information storage increases the efficiency and realises the benefits or competitive advantage that is usually put forward as an argument for implementing knowledge management principles. In this category both preceding views of knowledge management appear to be consolidated into one.

Conclusion

The three different categories of understanding suggest that knowledge management is perceived as relating qualitatively different to the business. In category 1, knowledge management is a fundamental requirement to enable the change that comes with the implementation of an ERP and to adapt it to changing circumstances over its lifetime. In category 2, knowledge management is seen as being autonomous from the system, thus subject to business objectives, e.g., towards more efficiency or the enhancement of products and services. Or, to give it a point, in category 1 knowledge management is instrumental to the system, while in category 2 the system is (or may be) instrumental to the business objectives that are sought through knowledge management. In category 3, system requirements and business objectives tend to be consolidated within a technological construct.

The explication of three distinct understandings will inform further research by removing ambiguity and uncertainty from communication between researchers and partners, and within the research team. In direct relation to the 'parent' project, the results may help in identifying a key cultural and behavioural issue, that is diverging perspectives on knowledge management in the ERP context among developers, consultants and client companies. For example, the conceptions described here may help researchers devise items of a survey questionnaire aiming at determining the distribution of and varying emphases on these conceptions among the three 'demographic' groups. Additional research could extend into other ERP-related areas, such as third-party software vendors, or into various industry backgrounds of users.

The study has been exploratory, and might be extended through additional interviews in a second round. This could serve to further confirm the described understandings, through the identification of the same conceptions.

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