Knowledge Management: Soft Approaches and Hard Applications for Organisational Learning

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Abstract

Organisational learning is a central component of knowledge management. Huber (1991) identified many weaknesses and gaps in research in organisational learning, in particular difficulties in identifying and disseminating organisational knowledge to other people within the organisation who have need for that knowledge. Soft approaches have been proposed to support organisational learning as a part of knowledge management (Cavaleri, 1994, Travis *et al*, 1996). Harder technologies can be used to support these soft approaches as well as other aspects of organisational learning. This paper describes work on using soft systems methodology (SSM), group support systems (GSS), and digital library technologies to support organisational learning. In particular, we address the twin problems that organisational personnel don't know what knowledge to capture at the time it is created nor who needs or might need that information in the future. These problems argue against a *knowledge push* approach to dissemination and suggest a *knowledge pull* approach, where knowledge is retrieved when needed. To address these difficulties, we propose combining soft approaches with technological support as means to both capture and disseminate organisational knowledge effectively, in order to provide the best leverage to the learning organisation.

1. Introduction Businesses are increasingly concerned with managing their knowledge in such a way that the organisation may exist as a *learning organisation*. In order to survive, if not thrive, organisations attempt to learn and adapt to changing marketplaces, industrial relationships, social conditions, and other environmental concerns. We believe that this is becoming increasingly difficult due to several factors. The main factors into the 21st century might be:

a) the increasing rate of change in the environment and hence the increasing need for rapid response and change,
b) the evolution of the organisational world-view in an attempt to respond to change and in order to operate strategically in a dynamic marketplace and
c) the growth of technological complexity that pervades organisational forms and structures.

This paper discusses ways of improving organisational learning in the context of knowledge management. Managers need to address and support characteristics of effective learning as an integral part of their overall planning and management of the learning organisation. Otherwise, there is reason to believe that organisations may well acquire knowledge but not learn from their experiences, or conversely they may be involved in learning processes that are not effective.

The major suggestion for effective learning expressed in this paper, is in knowing how to switch from pure (theoretical) knowledge about change, knowledge management and learning into practical, applied methods that facilitate understanding and awareness about the results

associated with acquisition and dissemination of knowledge. We suggest that using adaptive approaches would best facilitate awareness and learning to create a basis for insight and choice. We further suggest that using technologies such as a GSS and digital library technologies would support the processes associated with organisational memory, learning, and their management.

2. Knowledge Management and Organisational Learning In this section we discuss the concepts of knowledge management, the learning organisation and double-loop learning appropriate to knowledge management. We examine different perspectives of knowledge management and recommend an enriched world-view beyond the acquisition, provision, storage and dissemination of new information.

2.1 Data, Information, and Knowledge We make a distinction between data, information and knowledge. We understand *data* to be useless unless attributed with meaning and use, *information* as data with value, purpose, organisation and evaluation, and *knowledge* as a state attained when we use information to make informed decisions. Gupta (1998) states that for *information* to become *knowledge*, humans must make **comparisons** of situations, weigh up the **consequences** of using information for decisions and actions, consider **connections** (how one piece of knowledge relates to another) and **communicate** other people's perspectives about the information (herein after referred to as the four Cs).

2.2 Knowledge Management We define knowledge management as "The management of the acquisition, evaluation, preservation, dissemination, assimilation, and use of knowledge within an organisation." Its fundamental goal is to improve organisational learning. Gupta (1998) further suggests that knowledge management must encompass strategies for choosing, capturing, and sharing knowledge. This involves making decisions about what value is to be provided to whom. Gupta (1998) states that value creation should be a core activity of knowledge management.

2.3 Learning Organisations There is some disagreement about what organisational learning and the learning organisation mean. We present three slightly differing definitions:

> "*…an organization learns if any of its units acquires knowledge that it recognizes as potentially useful to the organisation.*" (Huber, 1991, p. 89)

"*A learning organization is an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights*" (Garvin, 1993, p. 18)

Learning organisations are "*… organizations where people continually expand their capacity to create the results they truly desire, where new and expansive sets of thinking are nurtured, where collective aspiration is set free and where people are continually learning how to learn together.*" (Senge 1990, p. 3)

Huber (1991) identified four major areas of organisational learning. These are:

(i) *Knowledge Acquisition*: "The process by which knowledge is obtained."

(ii) *Information Distribution*: "The process by which information from different sources is shared and thereby leads to new information or understanding."

(iii) *Information Interpretation*: "The process by which distributed information is given one or more commonly understood interpretations."

(iv) *Organisational Memory*: "The means by which knowledge is stored for future use." (Huber, 1991, p. 90)

We further distinguish two different processes for information distribution. The first is distribution at the time that the knowledge is acquired to those who (hopefully) need it. We call this *knowledge push*. The second process is to capture that knowledge into organisational memory, for later retrieval and use, which we call *knowledge pull*.

Huber uses the terms "information" and "knowledge" interchangeably (Huber 1991), which is not in accordance with our definitions above. In our view, one can distribute information, but one cannot distribute knowledge so easily. Knowledge can only be communicated as information, but when receiving information, correct understanding does not necessarily follow. One must supply information with enough of its context and in such an applied way that it can be interpreted and become knowledge to the receiver. *Effective* knowledge management then must allow for the receiver's cognitive processes of *assimilation, awareness, insight,* and *reflection* (before action).

We argue that transforming information into knowledge implies that some thought processes must be engaged to evaluate information considering experience/s, values, contexts and insight. This implies that double-loop learning must be engaged for meaningful knowledge management. Double-loop learning is explained in the following sub-section. Figure 1 (overleaf) illustrates our concept of the organisational learning within a knowledge management framework.

2.4 Double-Loop Learning It is important to understand whether knowledge is contained within a single-loop or a double-loop cyclic learning process. One type of organisational learning...

"...involves the production of matches, or the detection and correction of mismatches without change in the underlying governing policies or values. This is called single-loop learning. A second type, double-loop learning, does require re-examination and change of the governing values. Single-loop learning is usually related to the routine, immediate task. Double-loop learning is related to the non-routine, the long-range outcome" (Argyris 1982).

Figure 1: Knowledge Management and Organisational Learning
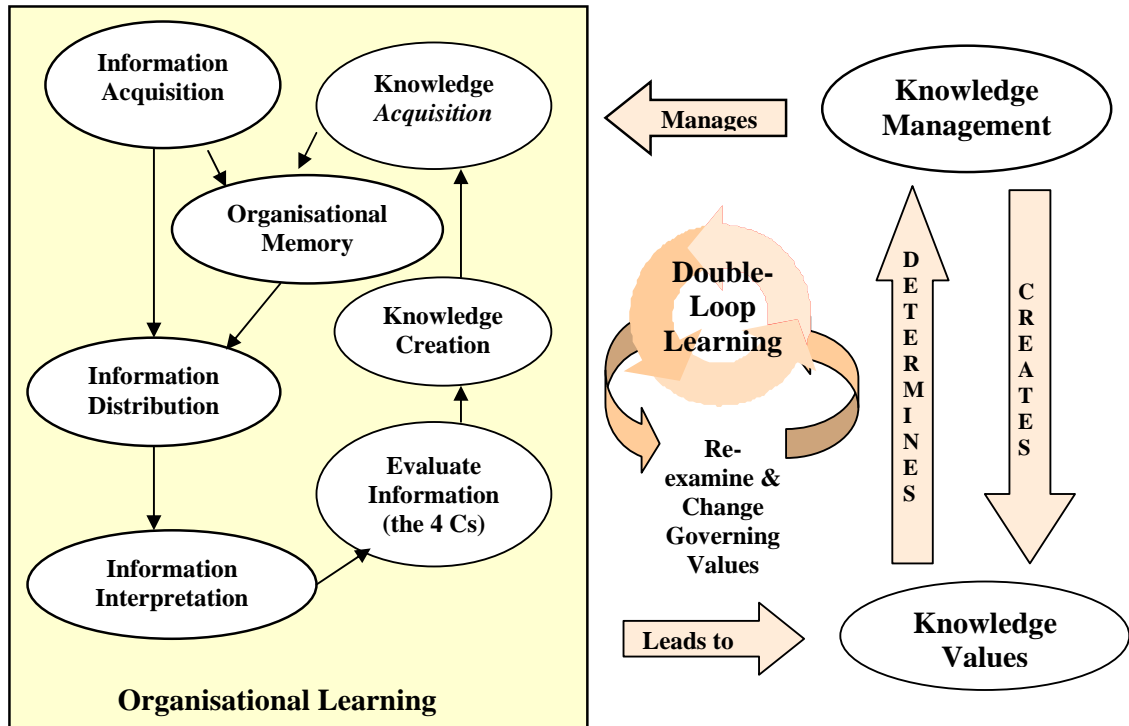
Beyond the inheritance or acquisition of knowledge, the learning process must begin in a way that will then determine whether it is useful or adds sufficient value. When we examine existing values about knowledge, reflective re-examination adds insight and meaning, determining how knowledge is to be used in practice. If knowledge management does not recognise double-loop learning, it is simply maintaining the status quo of an organisation, rather than finding better ways to add value. This also relates to the interpretation of information, the understanding of cause and effect relationships, and alternative *know-hows* (regarding insight about the theory and practice of know-how) modified through choice and experience (after Huber 1991 page 89). How the learning process comes about in the first place relies a great deal on how it is constructed. Knowledge can be acquired, but what happens to it after it is acquired then determines whether it will be useful and meaningful in the context of successful *negotiation* of change.

3. Difficulties with Organisational Learning Research in knowledge management and organisational learning should address the extant issues. Huber (1991) identified a number of gaps in existing research in organisational learning. In particular, Huber highlighted three important areas that are under-researched:

1. **Information distribution:** "A key aspect of information distribution, namely how organizational units possessing information and units needing this information can find each other quickly and with a high likelihood, was found to be unexplored."
2. **Information interpretation:** "Information interpretation, as an organizational process rather than as an individual process, was found to require empirical work for further advancement."
3. **Organisational memory:** "Organisational memory, as a determinant of organizational learning and decision making, was found to be much in need of systematic investigation." (Huber, 1991, p. 107)

An analysis of these factors reveals a number of causes and practical difficulties.

First, when someone within an organisation acquires some potentially relevant knowledge, it is difficult to know what others within the organisation need (and hence, what information should be distributed to whom). This leads to (1) a failure to capture important information and store it into organisational memory (Huber), (2) disseminating information to people who don't need it (via knowledge push), which in turn leads to (3) inefficiencies and (4) information overload.

Second, it is difficult to know what organisational information is available and from where (people or shared organisational memory). This leads to (1) failure to search within the organisation for the information, (2) inefficiency in searching for the information, (3) not finding information, and (4) inefficiencies of being interrupted by information seekers, either for information that is available elsewhere or for information not held by the person being interrupted.

Third, existing approaches to organisational memory do not adequately facilitate searches. The memory is not organised into ways that allow *ad hoc* searches with a high probability of locating the information. The search for information may need to consult a large variety of systems, with different interfaces and information contained in each. There is also little information about where to find various kinds of information so that one can choose which system to make use of. These inadequacies lead to all of the consequences in the paragraph above this one.

Fourth, it is difficult to understand and interpret obtained information due to the decontextualisation of the information within organisational memory. The lack of context makes it far more difficult to utilise the 4 Cs to add value to information for the process of knowledge creation. This leads to (1) inefficiencies and delays, (2) incorrect interpretations and subsequent incorrect actions, (3) failure to make the right choices and to use information wisely.

These difficulties should be addressed within the practice of knowledge management.

4. Soft Systems Thinking in Relation to Organisational Learning

"Soft systems thinking" is an approach that can be chraracterised as:

> *'Soft' systems thinking is derived from many elements of the interpretive perspective which frame organizational learning as the continuous redefinition of people's beliefs* (Cavaleri, 1994. P. 262)

The emphasis in SSM is on learning rather than goal seeking. It views systems models as being intellectual constructs rather than maps of the actual world, a view in which it is more accurate to define issues than problems. It assumes that situations can better be improved upon when they are explored with systems models rather than through structured engineering methods, and by using language that incorporates and communicates 'issues' and accommodations', rather than problems and solutions, where problems are 'perceived' problems (Checkland, 1985). Using the techniques inherent in SSM enables different perceptions to be expressed and shared, thus enriching the inherently subjective manner in which issues that are perceived and become understood. Solutions are not the end-process of learning; there are no permanent solutions, only improvements involving a continuous series of accommodations. Systems improvements rely on the processes of learning and accommodation and not on optimized outcomes (after Cavaleri, 1994).

Regarding knowledge management, SSM provides an effective approach to challenging and redefining existing knowledge structures. SSM can incorporate any learning technique within the methodology, as long as the ability to learn *how* to learn and to reevaluate the process of learning how to learn is not compromised. Otherwise, a cognitive distortion called "defensive reasoning" will stunt organisational and individual learning (Cavaleri quoting Argyris, 1990). For this reason we suggest that technologies should be a *support to,* rather than the *reason for* learning.

5. GSS Support for Organisational Learning Travis *et al* (1996) suggest the possibility of using a number of different information technologies for supporting organisational learning, including messaging systems, discussion systems, group decision support systems, and cooperative work (process) planning systems. In this section, we focus on Group Support Systems (GSS), which can facilitate knowledge management in two roles: by supporting and enhancing the use of SSM, and hence the organisational learning resulting from SSM, and by supporting knowledge capturing and dissemination. We briefly discuss both of these in turn below.

5.1 Using a GSS to support SSM Nunamaker *et al* (1996) define GSS as "interactive computer-based environments which support concerted and coordinated team effort toward completion of joint tasks." Tasks supported by GSS commonly include meetings and group decision making. Group Support Systems have been proposed as a way to facilitate SSM (Venable *et al*, 1996a, b).

We postulate that using a GSS to support SSM provides a number of advantages. Firstly, GSS support for anonymous contributions encourages free and open discussion of issues, assumptions, and values, which are key areas in SSM for gaining understanding of different stakeholder positions and consequent actions. Secondly, GSS tools automatically record the different positions, issues, and the relationships between them, providing memory of the SSM process and allowing the group to return to prior activities with less knowledge loss. Thirdly, GSS tools for rating, ranking, and voting facilitate reaching consensus and decision-making by the group about positions to be adopted or selection of a limited number of options for further consideration. Finally, our current work regards the use of distributed GSS to enable the application of SSM in situations where the stakeholders are highly distributed, for example in multi-national corporations, virtual organisations, or the public and society at large.

5.2 GSS support for knowledge dissemination Group support systems can be used for two key aspects of knowledge distribution (1) capturing of knowledge into a shared form of organisational memory (as briefly mentioned above) and (2) allowing retrieval of that information. In particular, GSS allow:

- capturing of decision-making rationale
- capturing of SSM issues, assumptions, etc. and relationships between them
- searching, retrieval and reconstruction of captured knowledge

As noted above, knowledge capture is a natural by-product of using GSS, which eliminates the need for the individual to choose what information to capture and to take time-consuming action to do so. The knowledge stored in a GSS provides a rich description of the situation and context, supporting information interpretation. However, GSS support for locating knowledge previously captured in a GSS is generally lacking, which leads to our next topic, digital library technologies.

6. Digital Library Technologies Support for Organisational Learning Digital library technologies support fast and flexible search for information on an *ad hoc* basis. Some digital library systems offer powerful full-text, structured queries for searches for information in large collections (e.g. Witten *et al*, 1998, NZDL, 1998). Retrieval based on *ad hoc* queries supports information distribution characterised primarily by *knowledge pull*. Some digital library technologies allow searches to remain active, so that new, relevant information is immediately passed on to interested members of the organisation, without waiting for an on-line query, thereby providing *knowledge push* to those who may want it. Research in digital libraries also investigates handing heterogeneous and distributed information sources.

We propose incorporating digital library technologies into GSS, as well as using them as a larger framework encapsulating both GSS and other, more traditional forms of organisational memory. The powerful search and retrieval capabilities would go a long way to improving the weak search and retrieval capabilities of existing GSS. Building a larger framework would enable the integrated search of multiple distributed and/or heterogeneous organisational memory sources.

7. Implications for a Knowledge Management System While we have identified some possible ways of contributing to knowledge management, these need to be integrated with other techniques and technologies into the larger practical procedures and system(s) that are about how knowledge management is put into practice. In particular, possibilities are to:

- Use SSM to guide the practice of knowledge management itself, i.e., as a means for deciding and prioritising the goals and actions to be taken by those actually doing

knowledge management. This would enable double loop learning, leading to true knowledge management, enabling reflection.

- Use GSS and digital library technologies to further improve the knowledge management function itself.

8. Our Current Research We are currently engaged in and are planning a number of research projects to address a number of issues. In particular, we are investigating the use of GSS to support the use of SSM and the possibility of using digital library technology to support searching for information within the records resulting from GSS sessions.

8.1 Research Method Nunamaker *et al* (1991) proposed a framework for systems development in information systems research, which we characterise as a double path research cycle, consisting of conceptual work, system development, and evaluation in action, either experimentally in one cycle or in real organisational situations in the other. Experimental or organisational evaluations in turn give lessons that inform new conceptualisations and initiate further research cycles. In our case, the conceptual work has been in investigating the various technologies and postulating their usefulness for knowledge management, as described in earlier sections.

8.2 The GSS4SSM project The GSS4SSM project is concerned with applying a GSS to support the distributed application of SSM. We have designed and built a web-based system for doing this, which is built around the Discussion*Web* GSS (McQueen, 1996). We recently completed a pilot study (Venable and Travis, 1998) in which a group of 46 final year undergraduate students participated in a large, simulated requirements investigation on a controversial subject regarding environmental problems and issues. The students were assigned fictional roles and role-played diverse stakeholders. We learned a great deal about what is practical or not and have many suggestions for improvements and enhancements. Following further assessment and enhancement of the GSS4SSM system, we plan to apply it in live projects using an action research method.

9. Conclusions and future work SSM, GSS, and digital library technologies offer exciting prospects for improving knowledge management. However, at this point in time they require further, extensive investigation. It will not be until such technologies are tested and put into

practice that their real impacts will become apparent. Further work is also needed to examine the relationships between the ideas presented here and other ways of accomplishing knowledge management.

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