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# **Using Information Technology To Support Memory And Learning In Organizations**

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## **Introduction**

Information systems can be constructed to assemble and enhance organizational memory. The use of information technologies to support organizational memory and assist in intelligence analysis and decision making has been examined by several authors (e.g., Stein and Zwass, 1995; Conklin, 1996; Huyhn et al. 1995; Chen et al. 1992; Ackerman, 1994; Walsh and Ungson, 1991; Huber, 1990). Information systems could be used to turn stored information (i.e., organizational memory) from media rich systems into actionable organizational knowledge. A system could be employed to conduct mixed-initiative searches whereby information gathering and navigation choices are made jointly by the user and the system. Such systems could make extensive use an organizations knowledge to affect shared understanding and learning. The following passages present overviews of memory, organizational memory, epistemology and learning, organizational learning and inquiry, and the role of information technology in supporting these cognitive structures in organizations.

## **Memory**

Memory is "the power or process of reproducing or recalling what has been learned and retained, especially through associative mechanisms" (Webster's New Collegiate Dictionary 1975). One way to distinguish among different types of memory is to classify them as episodic, semantic, or procedural (Ashcraft, 1994). Individual memory reflects knowledge of events you have personally experienced (episodic memory) as well as factual knowledge (semantic memory), such as the fact that Columbus discovered America in 1492. Procedural memory contains the skills you have learned to use, such as reading or hitting a baseball

Schank (1995) describes memory as a place where we store and process knowledge, dynamically changing what we know. He asserts that a critical component of large memory is the organizational structure which provides its superstructure, offering places to hang all the different pieces of knowledge it contains. Researchers believe that memories contain a number of different types of organizational structures which categorize and interrelate individual events for recall at a later date. This structure gives access to more specific information. Memory strategies depend, in part, on the structures which organize memory so that knowledge can be located when it is needed. Structured memories use generalizations to provide expectations, store theories under construction, and organize experiences so they can be recalled when relevant (Schank, 1982). Constant searches for old information serve to prepare individuals for understanding and predicting events by comparing one experience to another. As new knowledge perturbs the system, it finds a place in memory in relation to what is already there.

Stored knowledge and experiences must be accessible in order to be useful. Memory influences an individual's behavior by providing insight for solving problems and making decisions. Researchers believe that acquisition, retention, and retrieval of knowledge and experience influence subsequent individual behavior (Anderson, 1980). Attempting to understand the general workings of human memory, its association with collective memory, and the factors which make it more accessible will help in creating a model for an "automated" memory system. Such a system could assist users in remembering and applying knowledge in order to create efficiencies and increases in productivity.

## **Organizational Memory**

Organizational memory is a generic concept used to describe saving, representing, and sharing corporate knowledge. It supports cooperation in a multiple task and multiple user environment. The concept includes technical, functional, and social aspects of the work, the worker, and the workplace (Durstewitz, 1994). Organizational memory includes that which can be conveyed by the written record (e.g., corporate manuals, databases, filing systems, etc.) (Ackerman, 1996). Walsh and Ungson (1991) refer to organizational memory as stored information from an organization's history that can be brought to bear on present decisions. By their definition, organizational memory provides information that reduces transaction costs, contributes to effective and efficient decision making, and is a basis for power within organizations.

Organizational memory is both connected and retentive. If memory exists but is unconnected, it does little to aid the organization. Likewise, if memory is easily lost, it cannot be considered very useful. Temporal information and poor retention would result in a system which is less robust and less likely to be relied upon. Stein and Zwass (1995) recognize this point. They indicate that organizational memory relies on knowledge that is spatially distributed throughout the processes, individuals, and artifacts of the organization and beyond its boundaries.

Researchers and practitioners recognize organizational memory as an important factor in the success of an organization's operations and its responsiveness to the changes and challenges of its environment (e.g., Stein, 1995; Chen et al., 1992; Huber, 1991). One such change occurs when employees leave the organization. Personnel turnover can have a significant influence on organizational memory since much of the memory is situated in the minds of individuals (Stein and Zwass, 1995). While new workers challenge old assumptions and introduce new world views, the knowledge and experience of former employees is equally important in understanding the context and circumstances which contribute to organizational memory. Establishing mechanisms to capture information held by individuals while they are employed by the organization and incorporating it in an automated information system could prove to be especially valuable to organizations. Such a system could relate the collective experiences of individuals thereby providing background knowledge for understanding organizational policy, procedures, culture, and practices.

Walsh and Ungson (1991) posit some advantages of cultivating and expressly maintaining organizational memories. They include the honing of core competencies, increased organizational learning, increased autonomy, integration of organizational actors, and lower transaction costs. Additional advantages are provided by management's ability to consolidate corporate-wide technologies and production skills into competencies that empower individuals and businesses to adapt quickly to changing opportunities (Pralhad and Hamel, 1990). Recollection of past events using an automated information system helps users understand the context of activities and learn how the organization has operated under past circumstances. Thus, they are better able to conduct themselves and make decisions in the context of the provided knowledge. Users would be expected to reduce decisions which "recreate the wheel." Unpleasant historical lessons are repeated less often. These benefits assume that information contained in organizational memory is valid. Human biases may influence the interpretation of what is stored and presented (Paradice and Courtney, 1986). Validating the contents of organizational memory is an important area for further research.

## **Epistemology and learning**

An organization's knowledge comes in part from the organization's employees. Each individual can be a prime source of information (Ackerman, 1996). "Individuals have private knowledge that can be a basis for organizational knowledge ... Knowledge of the organization is shared knowledge among organizational members" (von Krogh et al., 1994 p.59). That individuals have private knowledge can be an advantage for organizations, because knowledge from various sources contributes to meaning (White, 1990). Ultimately, knowledge is the assimilation and utilization of some kind of integrated learning system to support "actionable learning" (Nevis et al., 1995). Information technologies such as the Internet, local area networks and distributed databases can be used to establish the integrated learning system. Intra-

organizational information could help organizations develop better recollections of past events thereby generating more informed decisions.

Learning occurs by improving actions through better knowledge and understanding (Foil and Lyles, 1985), encoding inferences from history into routines that guide behavior (Levitt and March 1988), and developing insights, knowledge, and associations between past actions, the effectiveness of those actions, and future actions (Fiol and Lyles, 1985). It involves the understanding of reasons beyond immediate events. Notably, learning is facilitated by structure and organization (Mayhew, 1992; von Krogh, 1994). Walsh and Ungson (1991) maintain that cultivating and expressly maintaining memory increases learning. DiBella (1995) notes that discovery and affirmation may encourage learners to employ trial and error experimentation or searching mechanisms in order to gain new knowledge. However, learning typically occurs in response to problems or needs which must be overcome in order to succeed.

### **Organizational Learning**

Organizational learning is the development of new knowledge and insights that have the potential to influence behavior (e.g., Fiol & Lyles, 1985; Huber, 1991; Slater and Narver, 1995). Organizational learning occurs when associations, cognitive systems, and memories are shared by members of an organization. Learning by organizations relies on the people and groups as agents for the transfer of knowledge. Over time, what is learned is built into the structure, culture, and memory of the organization. Lessons (i.e., knowledge) remain within the organization even though individuals may change. Shanks (1995) theorizes that organizational learning improves performance, enhances value, improves mental models, facilitates effective analysis, forges commitment, and opens senses to the real world.

DiBella (1995) makes a case for understanding learning organizations using normative, developmental, and capability perspectives. The normative view supports the notion that learning is a collective activity that only takes place under a certain set of circumstances. The developmental perspective considers evolutionary changes and learning through on-going interpretations of experience. This is consistent with models presented by Nevis et al. (1995) and Huber (1991) which decompose learning into knowledge acquisition and assimilation, dissemination and sharing, and utilization. Another view describes developmental learning as movement from rote memorization to understanding of concepts, integration of ideas, and finally synthesis of new ideas (Dalton and Thompson, 1986). A capability perspective posits that there is no one best way for organizations to learn. According to this perspective, learning processes are embedded in organizational structure and culture. Learning occurs through self-discovery and reaffirmation. As new models are presented to a learning system, it considers where they fit and revises its world view accordingly.

### **The Role of Information Technology**

Growing information requirements magnify the need for sharing and disseminating information (Huynh et al., 1995). Information technologies contribute to the possibility of automated organizational memory systems in two ways, either by making recorded knowledge retrievable or by making individuals with knowledge accessible (Ackerman, 1996). An organization's past knowledge, explicitly dispersed through a variety of retention facilities (e.g., network servers, distributed databases, intranets, etc.) can make an organization more accessible to its members. Stein and Zwass (1995) suggest that the increasing use of information systems such as communication and coordination media can leave an extensive record of processes ("through what sequence of events?"), rationale ("why?"), context ("under what circumstances?"), and outcomes ("how well did it work?"). The availability of advanced information technologies increases the communicating and decision making options for potential users.

An organizational memory supported by information technology provides some advantages since the contents that are stored in information systems are explicit, can be modified promptly, and shared as necessary. Changes can be propagated through the use of information technology. Information systems

should be designed to augment the interaction between a knowledge seeker and information providers. Such systems would lead to higher levels of organizational effectiveness and learning.

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