

Knowledge Management and the Dynamic Nature of Knowledge

Claire McInerney

Rutgers, the State University of New Jersey, School of Communication, Information and Library Studies, Department of Library and Information Science, 4 Huntington St., New Brunswick, NJ 08901. E-mail: clairemc@scils.rutgers.edu

Knowledge management (KM) or knowledge sharing in organizations is based on an understanding of knowledge creation and knowledge transfer. In implementation, KM is an effort to benefit from the knowledge that resides in an organization by using it to achieve the organization's mission. The transfer of tacit or implicit knowledge to explicit and accessible formats, the goal of many KM projects, is challenging, controversial, and endowed with ongoing management issues. This article argues that effective knowledge management in many disciplinary contexts must be based on understanding the dynamic nature of knowledge itself. The article critiques some current thinking in the KM literature and concludes with a view towards knowledge management programs built around knowledge as a dynamic process.

Introduction

Knowledge is to be acquired by a corresponding experience (Henry David Thoreau, 1949).

Knowledge management (KM) describes both a business practice and an emerging theoretical field of study. The desire to share knowledge is something so natural that it seems strange that knowledge management has emerged as something newly invented by corporations. Clearly, the thinking about KM *has* resided in commerce and industry, and that is where most of the writing on the topic has been published, but recently the literature of knowledge management has begun to cross boundaries, and scholars in many disciplines have shown an intense interest in the creation of knowledge and its value and power when it can be shared across the organization. Because knowledge management theory is still developing, it is especially appropriate for those in the information and technology professions to examine KM and offer analytical frameworks that can guide thoughtful and humane knowledge practices.

The intention of this article is to show how the heart of knowledge management is related to the dynamic nature of knowledge. To this end some of the key ideas about knowledge and knowledge management will be explored. The first part of the paper analyzes the dynamic nature of knowledge. It goes on to show how an understanding of knowledge itself is key to effective knowledge management. A critique of some problematic aspects of knowledge management follows. In conclusion, implications for solid and enduring KM programs are tied to the analysis of the nature of knowledge and knowledge artifacts presented earlier in the article.

The Dynamic Nature of Knowledge

Information and library science, information systems, computer science, engineering, communication, cognitive science, and organizational science have all laid claim to some aspect of knowledge management (Borghoff & Pareschi, 1998; Dienes & Perner, 1999; DiMattia & Oder, 1997; Dutta, 1997; Koenig, 1996; Parikh, 2001; Streng, 1999; Zack, 1999). Despite their differences, the practitioners of these disciplines have a common interest in knowledge and knowledge sharing; consequently, it is reasonable that the study of knowledge management should begin with the study of knowledge itself. Knowledge is the awareness of what one knows through study, reasoning, experience or association, or through various other types of learning. It is "acquaintance with or understanding of a science, art, or technique" (*Merriam Webster's Collegiate Dictionary*, 2002). The Oxford English Dictionary presents the word "knowledge" as meaning "acknowledging . . . recognizing . . . inquiring . . . being aware . . . understanding . . . cognizance . . . intelligence . . . information acquired through study, and learning." The verb forms used in defining knowledge show how knowledge is a result of a varied set of processes, processes that also demonstrate the active nature of knowledge. Unlike static information that can be held in databases and on paper, knowledge is based in

sentient beings, or emanates from them, and thus, it is always changing with the human experience. Within organizations where work depends on personal interactions with others, knowledge has both an active and a social dimension (Brown & Duiquid, 2000). As Chief Information Officer K. Sbarcea (2001) says metaphorically,

Knowledge is carried, flows, transfers and is digested by personal relationships over time. It has an active social life which means that knowledge is always changing and in a state of flux . . . Knowledge is steeped in context and richness.

If one accepts the truism that knowledge is power, one could even say that knowledge is dynamic because of the energy and change inherent in its very nature.

The etymology of the word “dynamic” can be traced to the Greek *dynamis*, meaning power and *dynamikos*, powerful, and *dynasthai*, to be able (Merriam-Webster, 2002). Our current usage of the word is an adjective that modifies a term when we want to indicate change, energy, forcefulness, and productivity. It is even used as a term referring to random-access memory that requires periodic refreshment in order that data may be retained (Merriam-Webster, 2002). Knowledge is appropriately dynamic because it is constantly changing through experience and learning. It is a powerful force that can be used to overcome barriers, influence decision making, and generally “enable” and refresh individuals and organizations so that they can accomplish goals and complete work successfully (Stewart, 2001).

Traditionally, in information theory, knowledge has been distinguished by its place on a hierarchical ladder that locates data on the bottom rung, the next belonging to information, then knowledge, and finally wisdom at the top (Broadbent, 1998; Cleveland, 1982; Haeckel & Nolan, 1993; Streng, 1999). In examining the nature of knowledge, however, it is not so easy to place it within strict “rungs” or isolated taxonomy levels. “Knowledge” is not merely an object that can be “placed,” nor should it be confused with representations of knowledge in documents, databases, etc., but it can be seen as a collection of processes that allow learning to occur and knowing to be internalized. Knowledge requires knowers, so its processes are intertwined with human activity and experience. Can we separate information and knowledge by identifying information as something in fixed form like a document, a book, or a videotape and knowledge as a constantly evolving condition? That delineation may be too simplistic if we take into account how scholars have defined information and knowledge. Broadbent (1998) writes that “knowledge is enriched information with insights into its context” (p. 24) showing how information and knowledge are closely associated and how they are used to define each other. Looking at knowledge from a managerial viewpoint, Broadbent views knowledge as that which someone knows, and she says that it becomes *organizational knowledge* when there are processes in place to transform tacit knowledge to explicit knowledge, allowing others in the organization to use it for decision making.

Buckland (1991) sees information as a somewhat ambiguous term, but by identifying how information is used, he clarifies the different aspects of information and provides a window into the shared landscape of information and knowledge. Buckland (1991) divides information into three principal epistemological units: information as process, information as knowledge, and information as thing. One characteristic of information as knowledge, he says, is that it is intangible. Consequently, “Knowledge, belief, and opinion are personal, subjective, and conceptual. Therefore, to communicate them, they have to be expressed, described, or represented in some physical way, as a signal, text, or communication” (p. 2). Here Buckland brings into focus the understanding that communicating knowledge is primarily a process, but in order to “capture” and share knowledge conveniently, its representations are often placed into a storage and retrieval system. The items or “things” that represent the knowledge in these systems are known as knowledge artifacts (Seiner, 2000) or knowledge units (Zack, 1999). As an information scientist Buckland makes a solid case for the interdependency of information and knowledge and the distinction between things and processes.

As we have seen, then, knowledge is related to action or process. Davenport and Prusak (1998) contend that one reason knowledge is more valuable than data or information is that it is closer to *action*. In this frame of reference, action means the decisions or movement undertaken as a result of the knowledge available. For Davenport and Prusak, managerial theorists, knowledge is comprised of a person’s experience, truth, judgment, and rules of thumb, but in all cases, the idea is that knowledge reflects an active nature.

In their frequently cited work *Working Knowledge*, Davenport and Prusak (1998) define knowledge as

... a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms (p. 5).

This definition of knowledge brings together the activity of knowing as well as the artifacts that represent knowledge, and it emphasizes the dynamics of routines, processes, and practices, further reinforcing the notion that knowledge is by its nature a force in motion. Knowledge is dynamic, not only in individuals, but also in organizational knowledge where there must be movement for knowledge to be transferred or shared.

Dynamic Knowledge and Knowledge Management

Knowledge is acquired actively and dynamically through sensory stimulation, listening to and observing others, read-

TABLE 1. Characteristics of tacit and explicit knowledge.^a

Implicit or tacit knowledge	Explicit knowledge
Subconscious	Formally articulated
Perceived	Elucidated
Unaware	Aware
Difficult to articulate or unspoken	Fixed
Experienced based	Codified
Transferred through conversation	Documented (written, taped, recorded, digitized, etc.)
Embedded in stories and narratives	Stored in repositories (databases, files, etc.)
Escapes observation	Can be viewed or heard
Held within self	Shared with others
Personal	Organizational
Insights and understandings	Pushed or pulled
Judgments	Reports, lessons learned
Assumptions	

“We can know more than we can tell” (Polanyi, 1983, p. 4).

^a Adapted from Polayni (1962, 1983) and Baumard (2001).

ing, being aware of feelings, life experience, and all the processes related to learning. It is this dynamic nature of knowledge that leads to the question of how something in flux, in movement and action, can be managed. In a knowledge management program it is the knowledge artifact, or the thing, that is managed, not knowledge itself, and the knowledge representation must reflect the action of knowledge acquisition. For example, if records of the lessons that people learn in the course of a project are collected, subtleties of efforts with clients or colleagues must be captured and reported along with a write up of conclusions. In addition, there must be an ongoing effort to keep the “lessons learned” archive current and complete, so there must be an active endeavor to acquire the latest thinking and successful results from project groups. Of course, much can be learned from less than successful projects too, but these lessons are harder to come by, because individuals seldom want their names connected to failures.

Seeing the difference between a knowledge artifact and knowledge itself is critical to a discussion of knowledge management. For example, after a project has been completed, those who worked on the project might create a report on the lessons learned throughout the course of the work. Or the same group might join together and create a video presentation that summarizes the main aspects of the project that were valuable in gaining knowledge. The report and the video presentation would be artifacts representing the knowledge gained by some that could benefit others as well. Eventually, these knowledge artifacts would comprise a collection of materials that could be codified and placed in a repository for access by everyone in the organization.

Tacit Knowledge and Explicit Knowledge

Artifacts as explicit expressions of knowledge are still dependent on the human attributes embodied in the personal knowledge of a knower. Michael Polanyi (1958) has created an exhaustive catalog of knowledge categories in his signa-

ture project *Personal Knowledge*, a work that consumed him for nearly 9 years (p. ix). Polanyi maps out an intellectual landscape that begins with Ptolemy and proceeds to the 20th century showing how the art of personal knowing is indispensable in disciplinary scholarship, even in what we think of as the exact sciences. A physical chemist himself, Polanyi argues that without personal involvement in understanding, knowledge has little value. Polanyi applauds the personal knowledge that comes from intellectual passion and he praises the social value of intellectual honesty and truth in knowledge development. Other authors often invoke his work, but practically speaking, all of Polanyi’s intricate categories are seldom differentiated in organizational knowledge management. Polanyi’s greatest contribution to understanding knowledge is his explication of tacit (internal) and explicit (external) knowledge. In his essays published in 1969 as *Knowledge and Being*, Polanyi emphasizes the importance of tacit knowledge, and he says, “The ideal of a strictly explicit knowledge is indeed self-contradictory. Deprived of their tacit co-efficients, all spoken words, all formulae, all maps and graphs are strictly meaningless,” (p. 195). Admittedly, Polanyi’s view is a somewhat sanitized version of knowledge (Prichard, 2000), but because he was an early theorist of tacit/explicit knowledge, his framework has proven useful to others. See Table 1 for a list of characteristics for tacit and explicit knowledge.

Polanyi’s bifurcation of tacit knowledge and explicit knowledge is a division seen throughout the seminal KM literature (Broadbent, 1998; Davenport & Prusak, 1998; Dienes & Perner, 1999; Nonaka & Takeuchi, 1995, Whitley, 2000, etc.). Tacit knowledge, sometimes known as implicit knowledge, is unspoken and hidden. It is the expertise and assumptions that individuals develop over the years that may never have been recorded or documented. The neighborhood auto mechanic, for example, may have a great deal of tacit knowledge about fixing cars and trucks, but this knowledge is only accessible to others if the me-

chanic chooses to teach it, to take on an apprentice, to write a book about it, or to “fix” the knowledge in some usable format. Necessarily, this tacit knowledge is subjective and personal, but it can be shared to some extent, and passing on the knowledge is a process that can be helpful to others and ultimately valuable to the organization so that it can carry on and complete its work successfully. By “fixing” the knowledge or attempting to represent it in a format such as a manual, a step-by-step video guide, or a graphic schematic, a knowledge artifact is created.

Explicit knowledge is knowledge that has been explained, recorded, or documented. When tacit knowledge has not been represented and made explicit in an organization, there could be lost opportunities in performance, opportunities that other organizations may exploit for their own purposes. Michael Zack (1999) explains that

Potentially explicable knowledge that has not been articulated represents a lost opportunity to efficiently share and leverage that knowledge. If competitors have articulated and routinized the integration and application of similar knowledge, then they may obtain a competitive advantage (p. 47).

This advantageous use of knowledge in the marketplace is usually referred to as using the organization’s “intellectual capital” (Koenig, 1996; Stewart, 1998, 2001). Some businesses have captured knowledge previously thought to be intuitive or simply “business know-how,” and have made financial gains this way. The legendary Mrs. Fields, for example, created a decision support system with her knowledge of the retail bakery business to guide even inexperienced managers in being able to plan a day’s baking and sales and thereby minimizing waste and maximizing sales for her company. The program was intended to represent knowledge about how weather, school holidays, months of the year, days of the week, and other factors affect the amount of baked goods to prepare and sell. The quality of the cookies has remained high and close to the taste and texture of the original product that Mrs. Fields baked and sold in her small shop in Palo Alto in the early days of her business (Schember, 1991). On the other hand a technology research group—International Data Corporation—has reported that poorly managed knowledge has cost the Fortune 500 approximately \$12 billion a year (Stewart, 2001).

Problematic Aspects of Knowledge Management

Knowledge Originates and Resides in the Mind

Although Davenport and Prusak (1998) and others write about knowledge processes operating in the mind, in such phrases as “knowledge originates . . . in the minds of knowers,” this concept is problematic because it restricts knowledge to being exclusively an intellectual activity. Knowledge goes beyond mind activity; it is based on sensory experience and physical activity, as well as mindful cognition. As D.H. Lawrence (1928, 1980) said, “Real knowledge

comes out of the whole corpus of consciousness . . . the mind can only analyze and rationalize.” Knowing involves the whole person, as mind and body; emotion, cognition, and physicality together create what is known. In one of the central essays of *Managing Knowledge*, a critical look at knowledge management, Craig Prichard (2000) argues that the body needs to be put back into knowledge management. He alludes to KM literature that recommends that conversation is the key to sharing knowledge (Davenport & Prusak, 1998), and he cites other writings from business that indicate that people to people communication and face-to-face meetings are necessary to stimulate innovation through knowledge. In many of these cases Prichard maintains, the emphasis on physicality is obvious, but it is not acknowledged. He goes on to say that the importance of tacit knowledge, as Polyani and others have shown, proves that the body cannot be separated from the mind in KM frameworks if we want meaningful knowledge sharing. Feminist authors also see the difficulty in separating mind and body when conceptualizing knowledge. Allison Jaggar (1989) exposes the myth of “dispassionate investigation” in scientific research, and shows that embodied emotion is necessary not only for knowledge acquisition, but for human survival itself. In western culture, Jaggar points out, people have been encouraged to “control” or “suppress” their emotions, and therefore, they may not be consciously aware of their emotions or their importance in knowing. Jaggar says.

But lack of awareness of emotions certainly does not mean that emotions are not present subconsciously or unconsciously or that subterranean emotions do not exert a continuing influence on people’s articulated values and observations, thoughts, and actions (p. 155).

Jaggar goes on to argue that we should rethink the relationship between knowledge and emotion suggesting that new conceptual models should be constructed to show how reason and emotion are necessary to each other. Emotions, so closely associated with our physical selves, are interconnected with how we think and know.

Let me offer several common examples of the mind-body connection in the knowledge process. One who senses that a situation is dangerous or has a feeling upon entering a room that there is tension and difficulty in a meeting, operates through a combination of human capabilities: intuition, emotion, and experience. A knowledgeable chef knows when the soufflé is ruined by sensing a slight “overdone” scent as she removes the pan from the oven. Years of experience in the kitchen, smelling foods cooking and observing the finished product leads her to this conclusion. A dancer knows when he has executed a move successfully with grace and strength through the kinesthetic memory that he has gained by years of practice. His knowledge has an intellectual dimension, but it is primarily body knowledge. Speaking of the knowledge alluded to here as simply “residing in the mind” or “originating in the mind” denies the physical aspect and other facets of human experience.

Separating the mind, body, and spirit in defining knowledge and recognizing only the intellectual dimension ignores essential aspects of human nature and presents a fractured picture of knowledge. "The distinction between mind and body is an artificial dichotomy, a discrimination which is unquestionably based far more on the peculiarity of intellectual understanding than on the nature of thing," according to Jung (1933). As far as knowledge management is concerned, it is at least more honest and perhaps more useful to the understanding of knowledge to recognize the wholeness of human experience. Whether intuition, cleverness, savvy knowing, and the expertise that combines different kinds of knowledge can be taught or captured in a knowledge management program is debatable. Admitting that all knowledge cannot be managed may help the credibility of KM in the information professions, because it is the idea of managing embedded human knowledge that seems the most objectionable to skeptics and critics of knowledge management endeavors.

The Technological Imperative

To avoid repetitive tasks, we have become accustomed to delegating the tedium of work to computers. Calculating, sorting records, spell checking, word processing, etc., have all become such routine computing processes that it may be tempting to think of "knowledge management" as a set of processes that happen through a suite of software applications. It is common to see advertising offering a software package as the "KM solution" for an organization. Sbarcea (2001) points to both the hegemony of computers and a general techno-utopian orientation that views data as real knowledge. The idea that data storage, telecommunication, retrieval, and accessibility equal viable knowledge management is a false assumption, Sbarcea maintains. Although technology developments may have made many aspects of knowledge sharing possible (Dutta, 1998; Stewart, 2001), it is a mistake to equate knowledge management with a technology tool. Knowledge sharing must rely on the human intelligence, energy, and the will to cooperate and use knowledge in collaborative endeavors. Technology can help, but the active nature of knowledge means that human intervention is a constant requirement for KM programs to be successful.

Knowledge as a Social Value

Although Nonaka and Takeuchi (1995) state that a total tacit-explicit split is an imperfect division of knowledge, it is a useful way to understand how the knowledge moves from the personal to the organizational (Borghoff & Parschi, 1998; Hansen, Nohria, & Tierney, 1999; Sbarcea, 2001; Zack, 1999). "Organizational knowledge" in the context of the knowledge management literature means what is commonly known within a group of people associated with the organization (Nonaka & Takeuchi, 1995). Another term for the commonly known is "collective knowledge," a

phrase that Baumard (2001) uses to differentiate individual knowledge from knowledge shared among members of a social entity.

Within an organization or among specialized groups across organizations, "communities of practice" form (Baumard, 2001; Lave & Wegner, 1991), characterized by situated learning where groups of people engaged in similar work (e.g., a department or division) master the knowledge necessary to solve the kinds of problems usually encountered in the work setting. By necessity, there is a certain level of trust among community of practice members, trust that is critical to the relationships that allow individuals to confer with each other in the development of new knowledge and the sharing of tacit knowledge. Because new members learn and acquire knowledge through participating in everyday activity with colleagues, communities of practice act somewhat as apprenticeships, where knowledge is acquired through observation and activity in a work environment (VonKrogh, Ichijo & Nonaka, 2000).

Dixon sees organizational knowledge as "common knowledge" (DeCagna, 2000), and her view of knowledge in organizations is tied to competitive advantage:

Common knowledge is the organization's most important knowledge. It is the knowledge asset that makes it competitive in the marketplace. It is knowledge the organization creates from the experience of carrying out its own tasks and projects. It is unique to that organization, whereas much of the other knowledge an organization has is learned out of books, knowledge that its engineers learned in school, and so forth. But when people actually do a task, they learn what it takes, what equipment works best, where you run into problems, what can be done about those problems, and what knowledge is the "common knowledge" of the organization (Dixon in DeCagna, 2000, p. 25).

Dixon's words echo those of Henry David Thoreau (1949) cited at the beginning of this article: "knowledge is to be acquired by a corresponding experience." It is the experience of those in the organization that creates the knowledge that, if used and shared, gives one organization advantages over another. Knowledge of employees as a competitive advantage is clearly the reason it has received the attention of business theorists and executives (Fryer, 1999; Koenig, 1996; Oxbrow & Abell, 1998; Tucker, 1998; Zack, 1999). That knowledge has a value to make the difference between an effective and successful organization and one that is merely mediocre may be the defining new idea in knowledge management from a business perspective (Stewart, 1998, 2001). The view that individual and organizational knowledge is a commodity or asset is expressed in the term "intellectual capital." But knowledge is so intimately human we might question the right of a company to use it for a firm's advantage. If the knowledge were developed through experience in the organization, through learning programs, conferences, meetings, and other learning opportunities, then it does seem appropriate to use what has become organizational knowledge as an asset. There is a

fine line, though, separating knowledge exploitation of what is so intimately a part of a person and legitimate shared knowledge endeavors.

Knowledge can also be a disadvantage to the organization if it is wrong or if it is inhibiting, or if it is not used for the fulfillment of the organization's mission. A key executive or group of executives, for example, might know that the organization is conducting business in an illegal or unsavory fashion. Their knowledge might eventually lead to an inability to act enthusiastically or act all together, and, consequently, this executive knowledge might eventually cause the company damage or bring about its demise. Furthermore, knowledge can be seen as a cultural product (Bonaventura, 1998). It is not only individual experiences that create knowledge; it is the networks of people who meet and work with each other that often cause knowledge to migrate and be created. People use knowledge in exchange for favors, to gain esteem, and to move up the ladder of promotion and financial gain within an organization. In this way knowledge can be seen as an asset that is traded. Research has shown that the rewards for sharing knowledge in some large companies are based on worldwide online communication "boards" where answering many questions gives an employee a high listing as a knowledge expert, and these listings are recorded favorably on performance reviews and used for promotion and salary increases (McInerney, 1999).

Instead of the constant initiatives to extract knowledge from within the employees to create new explicit knowledge artifacts, it might be more productive for organizations to invest effort in creating a knowledge culture in the organization. "Knowledge culture" means an organization that offers opportunities to create knowledge and one that encourages learning and the sharing of what is known. Encouragement can come in the form of establishing small group meeting rooms, conducting on-site seminars, rewarding those who pursue learning and who teach others what they know, offering informal "water cooler"-type meeting places throughout the workplace, etc. Creating a knowledge culture ensures the continual creation and sharing of knowledge through an environment of trust and dialogue. Trust allows individuals to speak openly without fearing reprisals and without worrying that knowledge shared will be used unethically (Shaw, 1997). Trust is necessary for 21st century organizations in general where authority has given way to self-directed work teams, but it is also necessary in building a knowledge sharing culture (Bonaventura, 1997). In organizations that rely on virtual teams, i.e., work groups who are separated from each other and use technology for interaction, trust is fundamentally necessary because workers do not see each other face to face, and work is completed by individuals who may never meet each other (Jarvenpaa, Knoll, & Leidner, 1998). To share knowledge there has to be a good communication infrastructure, but there also has to be an environment where trust allows the responsible transfer of individual and organizational knowledge.

Implications for Enduring Knowledge Management Programs

The connection between knowledge and organizational learning is inevitable because knowledge is what has been learned (Kofman & Senge, 1993). Organizational learning is about people and how they work together to achieve personal and organizational goals. The work of Peter Senge, Chris Agyris, and others has explored how organizations learn (Agyris 1991, 1993; Senge, 1990a,b; Senge et al., 1999) and the importance of organizational learning in being able to adapt to change and being resilient enough to weather uncertain economic climates. Because knowledge and organizational learning are closely tied (McInerney & Lefevre, 2000), it is doubtful that any organization can succeed in sharing knowledge and managing knowledge artifacts well without a commitment to learning.

Learning and knowledge management are processes that involve change and movement to new levels of cognition and understanding among individuals in an organization. One working definition that we might use for knowledge management incorporates what we know about the theory and practice of KM and its connection to learning. In simple language:

Knowledge management (KM) is an effort to increase useful knowledge within the organization. Ways to do this include encouraging communication, offering opportunities to learn, and promoting the sharing of appropriate knowledge artifacts.

Jesse Shera (1966), who wrote about the organization of knowledge, recognized the dynamic nature of knowledge as well as its relationship to learning. In *Documentation and the Organization of Knowledge* he discusses the universal aspects of knowledge: (a) the dynamic, evolutionary, and functional processes; (b) the static and structural features of phenomena; (c) and the teleological, or purposive, modes of behavior (p. 141).

Shera (1966) states that by understanding knowledge [and for our purposes, a knowledge artifact], a code can be devised that "brings into coincidence the conceptual pattern of a document, or a graphic record, with the conceptual pattern of the person or persons who have recourse to it" (p. 142). Shera saw the coding of representations of knowledge as the catalyst that would make the retrieval of information and knowledge possible. He wrote that the semantics of the code must be able to operate on several levels to match "both oral and graphic representation" of meanings that can be interpreted within cultures or subcultures. One could link Shera's thoughts on coding to efforts in organizing the representations of knowledge artifacts in KM programs. Whatever codification system is devised for repositories of knowledge objects, it must coincide with what was meant by the knowledge expert in language that makes sense to others within the organizational culture.

Human experience does not exist in a vacuum; it happens in social and historical contexts that seldom stand still. In

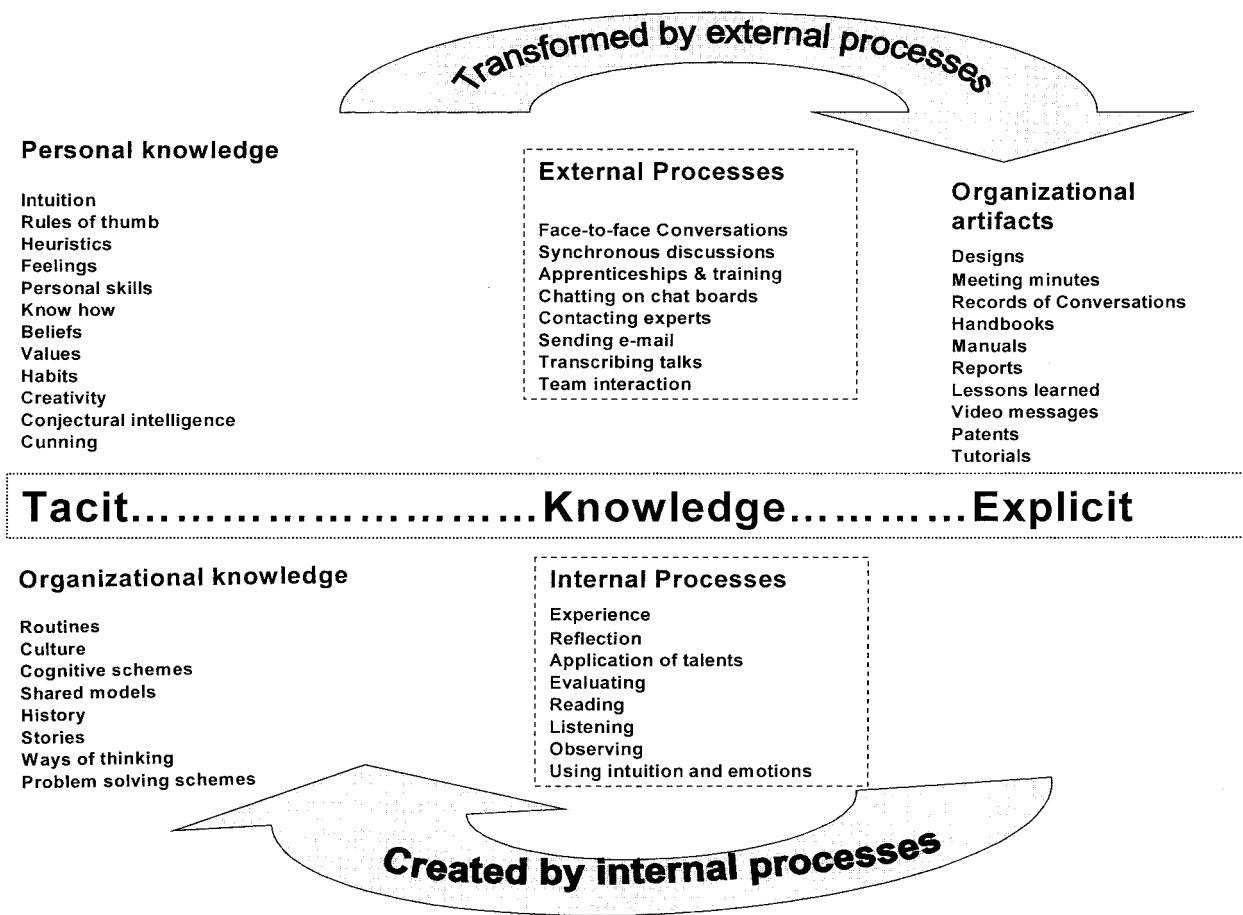


FIG. 1. Tacit-explicit knowledge continuum.

many ways the study of knowledge is the study of psychological, social, biologic, and physical phenomena (Shera, 1973). Shera as a philosopher of library and information science saw the study of intellectual processes in society as a discipline that might rightfully be called “social epistemology.” Just as the discipline of systems analysis is the study of details in relation to the operation of the whole, the discipline of epistemology is the study of how the entire person knows—thinking, feeling, acting, and communicating (Shera, 1973). This view of epistemology affirms what has been discussed earlier in this paper about knowledge relying on the both body and mind.

Having a static collection of knowledge artifacts, codifying them, and placing them in a system is not really enough for knowledge to be used effectively. Continuous knowledge creation, Nonaka and Takeuchi (1995) argue, is what keeps organizations healthy and innovative. The process of dynamic knowledge creation occurs during socialization when internal (tacit) knowledge is made external (explicit). This spiral that operates between internal and external knowledge continually effecting new knowledge among work groups creates the energy and innovation that characterizes an active knowledge-intensive and knowledge-creating organization. What makes the landscape of knowledge management different from the classic view of

the organization of knowledge and the history of information management is that knowledge management is an active process involving the creation of knowledge, the intentional elicitation of knowledge, and the ability to share knowledge artifacts across the organization. See Figure 1 for a graphic representation of a knowledge continuum that illustrates how tacit knowledge and explicit knowledge interact through internal and external processes within and among people in an organization.

Implications for Knowledge Management in Organizations

How does the dynamic nature of knowledge influence a KM program? Here are some principles based on the previous discussion of knowledge that can be applied to sound and enduring KM programs:

1. *What you know is what you've learned.* Organizations committed to sharing knowledge must also be committed to providing a learning environment and must earmark resources that allow and encourage conversation, informal and formal knowledge sharing sessions, and open communication must become a cultural norm. Knowledge is a set of multiple processes and has social dimen-

sions within an organization, and it is very difficult to share without opportunities for people to work together. Special efforts may have to be made for virtual work groups or teams who must accomplish work together, but do not have natural mechanisms for building trust such as face to face conversations.

2. *KM programs evolve and flow as knowledge itself does.* Knowledge management programs can be dynamic and energetic just as knowledge itself is a dynamic force for innovation and creativity. It helps to have someone actively facilitating the knowledge sharing and seeking out where the knowledge exists in an organization, but dynamic knowledge management can happen if an organization has a knowledge culture and is committed to creating knowledge and sharing its artifacts.
3. *It helps if knowledge "stores" have quality criteria.* Repositories that store knowledge artifacts must be kept current, accessible, and coded in such a way as to allow seamless and intuitive accessibility. Because knowledge is dynamic, constantly changing, and evolving, knowledge systems must be robust and flexible enough to take frequent updates from all sectors of the organization. Technological systems sometimes have limitations that can thwart frequent change and flexibility. A viable and useful KM system will be one that reflects an understanding that knowledge is not static, and new artifacts will need to be codified and added to a system frequently. The paths for accessibility must be paved with careful and deliberate coding or indexing that both represent what the knower has to say and the key terms the knowledge seeker will use.
4. *Knowledge management is based on process and things.* Although technology can assist with communication and knowledge artifact storage and transfer, knowledge is created by people and is intimately human. Knowledge management should not be confused with the technology itself, and knowledge should not be confused with knowledge artifacts.

Implications for the Information Professions

The implications that knowledge management presents to the information professions include possible changes in education, different ways of doing work, and a new organizational viewpoint. Collaboration and working harmoniously to maximize knowledge sharing will need practice and effort because the way knowledge is represented and codified may differ dramatically in different disciplines. Rewards for knowledge sharing and establishing best practices reports and lessons learned documents as routine ways of doing business can ease the burdens of locating expertise and knowledge elicitation. In a knowledge-sharing culture all organization members take opportunities to share knowledge among work groups and sometimes with the organization as a whole or with the profession itself. Developing and nurturing work environments of trust may be the best method of ensuring the sharing of knowledge, but that is an issue for long-term organizational development. Because knowledge is dynamic, the one-time establishment of a knowledge management system will not work without re-

freshment, additions, and revisions. An ongoing commitment is necessary if knowledge management is to reflect the processes and power of human knowledge.

Conclusion

In discussing codified knowledge Zack (1999) reminds us that "as a practical matter, organizations need to manage knowledge both as object *and* process" (p. 2). This is a challenge to be sure, but not an insurmountable challenge. With an understanding of knowledge itself, how to gather and organize knowledge artifacts, and with a commitment to organizational learning, sharing knowledge can become part of an organization's usual way to work, especially in collaborative endeavors. Knowing how to design nimble systems for ease of use can place information managers and systems staff in a position to help make an organization's knowledge more accessible. Although most information managers are not trained as journalists, a reporter's skills of capturing, recording, and reporting new knowledge could be beneficial in the active process of finding out what an organization's members know. The dynamic attributes of knowledge and the subjective nature of knowledge put even more demands on those who would elicit, codify, and transform knowledge into a sharable format.

Some have questioned the efficacy of knowledge management and its robustness and sustainability as an organizational process (Browning, 1999). Having experienced "Business Process Reengineering" and "Total Quality Management," the skeptical and cynical have declared knowledge management to be another float in the parade of ideas to energize workers and the workplace. Thomas Stewart (1998, 2001) explains that although reengineering and quality management are not the coin of the business realm today, these "big ideas" did transform Japanese and American businesses dramatically. The quality movement allowed many businesses to rebuild themselves, Stewart says, and reengineering allowed organizations to see how information technology could minimize paperwork and bureaucracy. Knowledge management is another big idea that may not always retain its current golden cache, but it is bound to continue to influence the way we think about organizational processes and assets. If information professionals and others truly see the value in active knowledge sharing and have the desire for knowledge exchange to be a lasting and meaningful way to work, then the management of knowledge will need to be as dynamic and process-oriented as knowledge itself.

Acknowledgments

The author is grateful to and wishes to thank the anonymous reviewers who read the article and made recommendations for revisions and additions. She would also like to thank her coeditor Ron Day for his careful reading and suggestions.

References

- Argyris, C. (1991). Teaching smart people how to learn. *Harvard Business Review*, 69(3), 99–109.
- Argyris, C. (1993). *On organizational learning*. Cambridge, MA: Blackwell Publishers.
- Baumard, P. (2001). *Tacit knowledge in organizations*. London: SAGE Publications.
- Berkman, E. (2001, April). When bad things happen to good ideas. Darwin Online. <http://www.darwinmag.com/read/040101/badthings.html>. Accessed May 5, 2001.
- Bonaventura, M. (1998). The benefits of a knowledge culture? In *Knowledge Management: A new competitive asset*. State of the Art Institute. Washington, DC: Special Libraries Association, 1998.
- Borghoff, U.M., & Pareschi, R. (Eds.). (1998). *Information technology for knowledge management*. Berlin: Springer-Verlag.
- Broadbent, M. (1998, May). The phenomenon of knowledge management: What does it mean to the information profession? *Information Outlook*, 2(5), 23–35.
- Brown, J.S., & Duguid, P. (2000). *The social life of information*. Boston: Harvard Business School Press.
- Browning, J. (1999, September 27). Teaching old dogs new tricks. *New Statesman*, 44(56).
- Buckland, M. (1991, June). Information as thing. *Journal of the American Society of Information Science*, 42(5), 351–360. Accessed September 13, 2001.
- Buckland, M. (1997, September). What is a document? *The Journal of the American Society of Information Science*, 48(9), 804–809.
- Cleveland, H. (1982, December). Information as a resource. *The Futurist*, 34–39.
- Davenport, T.H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston, MA: Harvard Business School Press.
- DeCagna, J. (2000). Exploring common knowledge: An interview with Nancy Dixon. *Information Outlook*, 4(10), 24–28.
- Dienes, Z., & Perner, J. (1999). A theory of implicit and explicit knowledge. *Behavioral and Brain Sciences*, 22(5), 735–808.
- DiMattia, S., & Oder, N. (1997, September 15). Knowledge management: Hope, hype, or harbinger? *Library Journal*, 122(5), 33–36.
- Dutta, S. (1997, February). Strategies for implementing knowledge-based systems. *IEEE Transactions on Engineering Management*, 44(1), 79–90.
- Fryer, B. (1999, September 15). *Intellectual capital*. Inc.
- Haeckel, S.H., & Nolan, R.L. (1993). The role of technology in an information age: Transforming symbols into action. In *The Institute for Information Studies. The Knowledge Economy: The nature of information in the 21st Century*. Queenstown, MD: The Aspen Institute, 1993.
- Hansen, M.T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review*, 77(2), 106–116.
- Jaggar, A.M. (1989). Love and knowledge: Emotion in feminist epistemology. In A.M. Jaggar & S.R. Bordo (Eds.), *Gender/body/knowledge: Feminist reconstructions of being and knowing*. New Brunswick, NJ: Rutgers University Press, 1989.
- Jarvenpaa, S.L., Knoll, K., & Leidner, D.E. (1998, Spring). Is anybody out there: Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, 14(4), 29–64.
- Jung, C. (1933). *Modern man in search of a soul*. New York: Harcourt.
- Koenig, M.E.D. (1996). Intellectual capital and knowledge management. *IFLA Journal*, 22(4), 299–301.
- Kofman, F., & Senge, P.M. (1993). Communities of commitment: The heart of learning organizations. *Organization Dynamics*, 22(2), 5–23.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Lawrence, D.H. (1928, 1980). *Lady Chatterly's lover*. New York: Bantam Books.
- Leonard, D. (1995). *Wellsprings of knowledge: Building and sustaining the sources of innovation*. Boston, MA: Harvard Business School Press.
- McInerney, C., & LeFevre, D. (2000). Knowledge managers: History and challenges. In C. Prichard, R. Hull, M. Chumer, & H. Willmott (Eds.), *Managing knowledge: Critical investigations of work and learning*. London: Macmillan Business.
- McInerney, C.R. (1999). *Data, information, and knowledge in the virtual office: Providing support to remote workers*. Washington, DC: Special Libraries Association.
- Merriam Webster's Collegiate Dictionary. (2002). <http://www.m-w.com/cgi-bin/dictionary>. Accessed January 4, 2002.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Oxbrow, N. (2000). Skills and competencies to succeed in a knowledge economy. *Information Outlook*, 4(10), 18–22.
- Oxbrow, N., & Abell, A. (1998). Putting knowledge to work: What skills and competencies are required? In *Knowledge Management: A new competitive asset*. (1997). State of the Art Institute. Washington, DC: Special Libraries Association.
- Oxford English Dictionary. (2002). <http://dictionary.oed.com>. Accessed January 16, 2002.
- Parikh, M. (2001, September). Knowledge management framework for high-tech research and development, *Engineering Management Journal*, 13(3), 27–33.
- Perner, Z., & Perner, J. (1999). A theory of implicit and explicit knowledge. *Behavioral and Brain Sciences*, 22(5). <http://www.cogsci.soton.ac.uk/bbs/Archive/bbs.dienes.html>. Accessed January 15, 2002.
- Polanyi, M. (1958, 1962). *Personal knowledge: Towards a post-critical philosophy*. Chicago: The University of Chicago Press.
- Polanyi, M. (1969). *Knowing and being: Essays by Michael Polanyi*. London: Routledge.
- Polanyi, M. (1983). *The tacit dimension*. Gloucester, MA: Peter Smith.
- Prichard, C. (2000). Know, learn and share! The knowledge phenomena and the construction of a consumptive-communicative body. In C. Prichard, R. Hull, M. Chumer, & H. Willmott (Eds.), *Managing knowledge: Critical investigations of work and learning*. London: Macmillan Business, 2000.
- Ruggles, R. (1998, Spring). The state of the notion: Knowledge management in practice. *California Management Review*, 40(3).
- Sbarcea, K. (2001, November). The mystery of knowledge management. *New Zealand Management*, 48(10), 33–39.
- Schember, J. (1991). Mrs. Fields' secret weapon. *Personnel Journal*, 70(9), 56–58.
- Seiner, R.S. (2000). Meta data as a knowledge management enabler. *Dbazine.com*. <http://www.dbazine.com/seiner4.html>. Accessed November 12, 2001.
- Senge, P.M. (1990a) *The fifth discipline: The art and practice of the learning organization*. New York: Doubleday.
- Senge, P.M. (1990b). The leader's new work: Building learning organizations. *Sloan Management Review*, 32(1), 7–22.
- Senge, P.M., et al. (1999). *The dance of change*. New York: Currency/Doubleday.
- Shaw, R.B. (1997). *Trust in the balance: Building successful organizations on results, integrity, and concern*. San Francisco: Josey-Bass Publishers.
- Shera, J.H. (1953). *Historians books and libraries: A survey of historical scholarship in relation to library resources, organization, and services*. Cleveland: The Press of Western Reserve University.
- Shera, J.H. (1966). *Documentation and the organization of knowledge*. Hamden, CT: Archon Books.
- Shera, J.H. (1973). *Knowing books and men; Knowing computers, too*. Littleton, CO: Libraries Unlimited.
- Special Libraries Association. (1998). *Knowledge management: A new competitive asset*. State-of-the-Art Institute. Washington, DC: Special Libraries Association.
- Steup, M. (2001). The analysis of knowledge. In E.N. Zalta (Ed.), *The Stanford encyclopedia of philosophy*. Stanford, CA: The Stanford University Metaphysics Research Lab, Center for the Study of Language and Information, 2002. <http://plato.stanford.edu/archives/win2001/entries/knowledge-analysis/>. Accessed December 30, 2001.
- Stewart, T.A. (1998). *Intellectual capital: The new wealth of organizations*. New York: Bantam.

- Stewart, T.A. (2001). *The wealth of knowledge: Intellectual Capital and the twenty-first century organization*. New York: Currency.
- Streng, D.J. (1999). Knowledge Management: An essential framework for corporate library leadership. *Advances in Library Administration and Organization*, 16, 1–30.
- Thoreau, H.D. (1849, 1906). *The writings of Henry David Thoreau*. New York: Houghton Mifflin Company.
- Tucker, A.G. (1998). From information to knowledge: The new competitive asset. In *Knowledge Management: A new competitive asset*. 1997 State of the Art Institute. Washington, DC: Special Libraries Association.
- Von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation*. Oxford: The Oxford University Press.
- Whitley, E.A. (2000, February). Tacit and explicit knowledge: Conceptual confusion around the commodification of knowledge. Presented at the Knowledge Management: Concepts and Controversies Conference, Warwick, England. <http://is.lse.ac.uk/staff/whitley/>. Accessed October 12, 2001.
- Zack, M. (1999, Summer). Managing codified knowledge. *Sloan Management Review*, 40(4), 45–58.