What Libraries and Information Professionals Can Learn from Project and Knowledge Management

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ABSTRACT

Few professions have seen as rapid change over the past several decades as the field of library and information science (LIS), due mainly to information technologies. Computers not only provide the backbone of today's libraries and information agencies but they are also changing in fundamental ways how these organizations operate. Dennis Lee et. al. in their article "Critical Skills and Knowledge Requirements of IS Professionals" (1995) espouse the view that these changes in information technologies and their use create different demands on and new expectations for the jobs of information professionals in such organizations as libraries and other information environments. Employers, educators as well as students have raised concerns regarding the knowledge and skills that are required for information professionals to function effectively in these changing environments, as well as how university and corporate training must be revised to meet the changing needs. Two areas useful for building the needed skill sets are knowledge management (KM) and project management (PM). The purpose of this paper is to investigate the application of KM and PM practices best suited to meet the challenges confronting librarians and information professionals in today's workplace. Four broad categories of critical KM and PM knowledge/skills will be examined. 1) technical knowledge; 2) administrative knowledge 3) social knowledge; and 4) system knowledge.

KEYWORDS: Project Management; Knowledge Management; Knowledge Workers; Information Professionals; ITC competencies; LIS Education; Library and Information Science.

1. BACKGROUND

The authors identify three forces driving changes in libraries and information agencies: the changing technologies, the changing environment, and the changing role of information and technology management in these organizations. Librarians and information professionals face a basic challenge to assimilate the ever increasing amount of new knowledge in the field. Few technologies in human history have advanced as rapidly as information and communications technology (ICT). These rapid changes have been accompanied by changes in peripheral technologies for input, output, processing, and storage as well as for software development methodologies. Dealing with the complexities and uncertainties associated with these new technologies presents many complex issues, not the least of which are managing their smooth adoption and operation in the storage, retrieval, and dissemination of information.

The challenges of ICT implementation extend beyond solving technical problems. Sherly Kay (1989, p. 66) notes that as environments become increasingly competitive, individuals facing more stringent pressure for resource allocation must search for more cost-effective ways to apply computer technologies to solve information needs. They must also demonstrate to upper management that ICT investments will provide commensurate returns. As noted by Thomas Davenport and James Short, in most cases the effective application of information technologies for competitive operational advantage requires that business processes be reengineered (Davenport & Short, 1990). The same perspective is presented by Michael Hammer (1990) These views imply that it is no longer adequate for IT professionals who are responsible for design and

implementation to be competent only in technologies; they must also have an in-depth understanding of operations and needs. In addition, this focus on process reengineering requires that information professionals develop interpersonal and management skills in order to work with their functional peers in defining new ways to conduct business.

Dennis Livingston points out (1989) that with the trend toward computer-integrated operations and the burden to link and integrate the many disparate systems, the requirements for technology management must play a cross-functional, liaison role within the organization. Douglas Farwell et al. (1992) propose that there must be a radical shift in the role of the information professional from being the proprietor of information systems and products to being a service provider to end users. This role also requires that the information professional deploy strategies for sharing information. Kaufmann (2007) notes that a major challenge for the new information professional is to attend to problems that are traced to barriers in the organizational culture which attribute to the lack of information sharing (2007). One of the most important goals of KM is to foment knowledge sharing in organizations or to create "knowledge assets" which include an organization's recorded information and human talent (Dalkir, 2005)

The above noted focuses affect all levels of information technology-based professions, that is, those responsible for information processing within an organization, e.g. Chief Information Officer (CIO), information technology management, and computer operations manager. But it is our contention that these same issues are equally important for the information studies professional, that is, those responsible for information services within an organization, e.g. information manager, Chief Knowledge Officer (CKO), librarian, and competitive intelligence professional. The discussion and review of pertinent KM and PM literature addresses the major questions among librarians, other information professionals and educators regarding the effective education of graduates to deal with new demands placed on them in the workplace.

2. PROJECT MANAGEMENT SKILLS AND BEHAVIORIAL COMPETENCIES

The highest-ranked Information Technology project success factor is having a competent project manager (Jiang, et al., 1996; Pinto & Slevin, 1987). Good IT project managers know that if they are to get the job done, they must possess or develop both technical and behavioral skills. Although there are several views on the critical skill needs of IT project managers, there is little question about the importance of selecting a project manager who is technically, interpersonally, and administratively skilled (Frame, 1994; Pinto & Kharbanda, 1996; Reich, 1991).

Researchers and practitioners suspect that a great

majority of project managers are weak on certain required skills, and their weakness contributes to the problems encountered on many projects (Drucker, 1980; Peters, 1987, 1992). Various sources of conflict for project teams and users can arise during the project development. If project managers are aware of the various alternatives they can employ, there is a real opportunity to not only defuse conflict, but also to learn valuable lesson from the conflict episode (Pinto & Kharbanda, 1995). Thus, how project managers perceive their environment, respond to events, and interact with others influence the outcome of projects (Kliem & Anderson, 1996).

As the use of project management techniques became an increasingly well-accepted, more and more companies provided technical training for their IT project managers in methodologies such as planning, work breakdown structure, scheduling, estimating, scope definition, and project control systems (Spinner, 1992; Ward, 1995). A remaining challenge for IT project managers is to develop communication, negotiation, interpersonal, and administrative skills to complement their technical skills (Frame, 1994; Handy, 1989; Reich, 1991).

IT researchers define many behavioral skills need by IT system analysts (Cheney & Lyons, 1980; Green, 1989; Watson, et al., 1990). Of these studies, the most comprehensive analysis of behavioral skills based on extensive pilot research was Green's (1989) work involving 18 behavioral skills, the top three of which are interviewing, directing, and managing. Frame (1994) believes that these skills, not related to any particular type of system development, apply to any project development regardless of environment.

3. KNOWLEDGE MANAGEMENT PRACTICES AND APPLICATIONS

Knowledge management has proven to be a very complex concept. Throughout the years many people have attempted to define it, and as a result, there are almost as many definitions as knowledge management theorists. Ikujiro Nonaka and Hirotaka Takeuchi approached the definition of knowledge management parting from the definition of the concept "knowledge" itself. According to Ichijo they defined knowledge as "justified true belief" Nonaka and Takeuchi's model of knowledge synthesis is shaped as a spiral in order to highlight the non linearity, and, therefore, the great complexity of the process. They relied heavily on the studies of philosopher Michael Polanyi, who studied human knowledge and the process of learning during the 1960s, in order to categorize knowledge into two types: Tacit and Explicit.

According to Nonaka and Takeuchi, explicit knowledge is that which "can be expressed in words, numbers, or sound, and shared in the form of data, scientific formulas, visuals, audiotapes, product

specifications, or manuals. Explicit knowledge can be readily transmitted to individuals formally and systematically." They define tacit knowledge as "highly personal and hard to formalize, making it difficult to communicate or share with others … deeply rooted in an individual's actions and bodily experience, as well as in the ideals, values, or emotions that they embrace" (Nonaka & Takeuchi 2004). At the same time they emphasize that knowledge is neither purely tacit nor explicit, but both. The knowledge synthesis spiral moves through different phases: socialization, externalization, combination and internalization. According to this theory, sharing and creating tacit knowledge is done through direct experience (socialization) or by articulating tacit knowledge through dialogue and reflection (externalization), but at the same time by systematizing and applying explicit knowledge and information (combination) and by learning and acquiring new tacit knowledge in practice (internalization) as well.

From these principles, many knowledge management definitions have been proposed, for example:
"The deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation. This value is achieved through the promotion of creating, sharing, and applying knowledge as well as through the feeding of valuable lessons learned and best practices into corporate memory in order to foster continued organizational learning." (Dalkir 2005)
"the use of knowledge assets –both explicit and tacit- in an organization, in terms of process, products, services, information repositories, customers and personnel" (Durham 2004) "the capture, maintenance, and sharing of knowledge to help people do their jobs better and add value to work." (Borbely 2004)

According to Kuhlen, knowledge management originated as a reaction to the concepts of knowledge society that emerged during the 70s, with the studies of Bell, Drucker, Porat and Masuda, among others. These authors proposed that a country's gross national product was more highly dependent on the production, distribution, and use of information and knowledge, rather than on its natural resources and physical capital. At this point, organizations began to focus more on their employee knowledge as they became an organization's most important asset. Parting from this point of view, it makes sense that if knowledge and information are an organization's most important assets, to the point that they are decisive factors in an organization's success, they should be managed just as its other assets. Moreover, employees were identified as the most important carriers of information in organizations, more important than information machinery and systems (Kuhlen 2004). But, at the same time, the information resources available to the organization in the form of its employee knowledge could not be managed in the same ways as other organizational assets. However, the organization could foment knowledge creation and exchange programs from which it could greatly benefit.

Today organizations are still looking for ways to improve their products and services in order to gain competitive advantage. According to Hubert and O'Dell, Knowledge Management is a systematic process to: identify important knowledge, create a space and system for people to share what they know and create new knowledge, capture, collect and manage best practices and useful information in a form that other people can use it in the future, and, transfer information, knowledge, and best practices to others who can use it (Hubert & O'Dell 2004).

4. IMPORTANCE OF KNOWLEDGE MANAGEMENT IN LIBRARIES AND INFORMATION CENTERS

Libraries have experienced many changes throughout the years. They have automated their systems in order to respond to the expectations and needs of their clients, needs that grow more complex and sophisticated every day. For example, it is estimated that 99% of today's college students use e-mail and 59% use instant messaging (Kaufman 2007). This has had its influence in the trend of up-to-the-minute information, which has greatly influenced the way academic libraries provide their services and the formats in which their materials are available. Most academic libraries today offer reference services through e-mail and instant messaging in addition to the more traditional phone and face-to-face options. Their collections are increasingly becoming digitized or electronic in order to allow patrons to access its contents at their convenience. In most cases, this service involves remote access from any location instead of having to visit the library in order to use the physical materials.

Libraries today function in a fast-paced technological world in which they cannot afford to lag behind, and where learning what is new is essential. The failure to learn, in this environment, often means failure to survive (Choo, 1995). Changes must be assimilated, and a strategy to tackle new problems must be prepared quickly, without forgetting about the client's convenience. New services must be easy to use, fast, and adaptable not only to the client needs but also to their time and location preferences. Another important factor affecting libraries today is the loss of clients to web search engines. In their study of college student search patterns, Griffiths and Brophy found that these students prefer to find information via a search engine than through academic resources available through their library. The main reasons cited for this choice were the ease of use and speed with which information can be found in these search engines. The same study also found that students tend to sacrifice quality of results in order to save time and effort (Griffiths & Brophy 2005).

Knowledge management recognizes the challenges that technology presents for the management of today's organizations, especially for information organizations. One of the main reasons that organizations today need to respond fast to change is the fact that technology has accelerated the turnaround time of response. For information organizations this has represented a challenge to be able to provide information for their clienteles as fast as possible as well as processing materials faster and more efficiently than before. This has come to the point that some authors refer to it as up-to-the-second information for some library environments such as academic libraries (, 2004). In such an environment an employee has to react and provide useful information with barely any time to digest the information that is coming in. More experienced employees are more familiar with the materials available and the best search strategies that can be used in order to find them, than new employees who are still getting used to the collections and the resources available. Another aspect of rapid changing technology for libraries is the change to more digital collections instead of physical collections housed in the library. These allow for easier, more convenient access but they also create problems when the library personnel need new skill sets to deal with the technology; especially when it fails as well as with searching techniques. It has also been suggested that emerging technologies will change the profession and the environment to the point that libraries and librarians are more likely to be dealing with value-added services such as publishing and technology development (Kaufman, 2007).

In the field of information science the advent of technology has created problems of information overload. One of the functions of knowledge management is to filter information, in a way that can make data more manageable for the people that have to deal with it (Dalkir, 2005). For all the challenges that the rapid technology changes of the last few decades have created for information organizations it has also provided some advantages. In the organizational environment the new technologies have created opportunities for one-on-one collaboration among employees and even professionals across different organizations and fields. E-mail, blogs, electronic discussion lists, chat rooms and web sites have contributed with the dissemination of valuable information as well as the exchange of ideas and techniques that have made the collaboration among certain groups possible; this trend is especially relevant because these kinds of exchanges would not have been possible just a few years ago (Kaufman, 2007). This takes especial significance when research has shown that knowledge workers prefer to contact other people in order to find, retrieve, and make use of information (Dalkir, 2005) instead of working in isolation. People are the most valued resources in organizations. They provide richer and more satisfying communication about an issue because they filter, summarize and highlight the most salient elements of information as well as addressing the most ambiguous aspects of information (Choo, 1995).

Managing an organization in today's volatile market has proven difficult. Most libraries are focusing on proving their relevance and demonstrating their value in the so called "information society" Because of the volatility and breadth of the information environment, organizations need to learn enough of their current condition in order to modify their future operations and respond to the changes in a timely way (Choo, 1995). Some of the failures to assimilate the rapid technological changes in libraries, for example, can be attributed to the technology employed, but in most cases these failures can be traced to barriers in the organizational culture and problems of information sharing (Kaufman 2007). One of the most important goals of knowledge management is to foment knowledge sharing in organizations or to create "knowledge assets" which, according to Dalkir, include "an organization's recorded information and human talent" (Dalkir 2005).

The problem is that the more valuable this information is, the less likely it is to be shared among employees; therefore, the organization is in a dangerous position if an employee decides to leave or is no longer able to work. Today's organizations are mostly global; that is, they are multinational, multicultural, and multilingual. They are also doing more, faster, and with less people. When these factors combine with a trend towards higher employee turnover rates, either because employees are moving to other organizations or because they are retiring, we can see a perfect storm brewing. In the case of libraries, this situation is exacerbated by the shifting demographics. In 1998, almost 40% of librarians in North America were between 45-54 years old. According to this information, around 83,000 of librarians working in 1998 will be eligible for retirement around the year 2010 (Curran, 2003). These estimates only count the number eligible for retirement, it does not include the number that will retire early, move to other professions, or die before reaching the age of retirement. The loss of experience and expertise can be devastating for the profession as a whole. However, the principles of knowledge management can be applied to prevent episodes of "reinventing the wheel" - that is, one unit investing a significant amount of resources in order to solve problems another unit has already dealt with. In a world of limited resources, too many of these episodes can easily put an organization out of business or render a unit's services useless or ineffective.

The field of knowledge management is mainly concerned with the ways humans create and share knowledge. One of its principles is that knowledge starts with the individual and its main concern is how to make personal knowledge available to others (Dalkir, 2005). Tacit knowledge is particularly hard to share since it is highly personal and part of the individual. The general

consensus is that the transfer of tacit knowledge is a shared experience; that it depends on an interaction between an individual and others (Kim, 2000). Tacit knowledge is what ensures the right things are done in order for the organization to attain its objectives; this is what Choo refers to as task effectiveness. Tacit knowledge is deeply rooted in action and it involves the simultaneous engagement of mind and body when performing a task. Transferring tacit knowledge is done through tradition and shared experience (Choo, 1995).

The technology available today represents the perfect tool in order to manage and coordinate knowledge sharing. But the technology by itself is not the answer to better knowledge sharing; it is only the medium. Some of the biggest challenges knowledge management faces are to develop the "effective management of content, facilitate collaborations, help knowledge workers connect and find experts, and help the organization to learn and make decisions based on complete, valid and well interpreted data, information and knowledge (Dalkir 2005). Managers also have to move away from the mentality of "If you build it they will come" That is, the organization not only needs to have the technology tools that facilitate knowledge sharing but also needs to create the appropriate environment for ideas to flow and for cooperation to blossom. Employees need to see how sharing information can benefit them in order to start sharing their knowledge and expertise with others. This is where they need to be reminded what knowledge management can help the organization and the employee accomplish.

5. METHODS OF CAPTURING KNOWLEDGE

Some of the most common methods to accumulate employee knowledge include: fomenting the creation of communities of practice, storytelling, and creating a corporate database. A community of practice is defined as a "relatively small group of people who together develop shared values and perspectives that give meaning and purpose to their communal work within any one organization" (Stopford in Dierkes, 2001). These communities of practice have been linked to the learning and innovation processes within organizations, parting from the constructionist epistemology, or the idea that society is constituted in the interpretative practices of its members (Gherardi & Nicolini, 2001). These groups have always existed in organizations; employees getting together for lunch and discussing their work or exchanging ideas at the water cooler is not a new phenomenon. Recently the trend has been toward organizations realizing the importance of these groups and of the ideas that flow informally among individuals. The truth is that technology has modified the way these groups interact. It might be that today the individuals meet in a corporate chat room or through a social networking tool, even through e-mail, instead of in front of the water cooler. Technology allowed the creation of communities of practice that extend to professionals in different organizations (e.g. academic librarians) or even different units of the same organization. However they are formed, and in whatever way their interaction takes place, the importance of the tips exchanged and the ideas that are generated has begun to be recognized and appreciated by organizations.

Another method used in knowledge management that has proven to be especially effective for capturing tacit knowledge is storytelling. When used as a knowledge management tool, the story should be an organizational story. An organizational story is defined as "a detailed narrative of management actions, employee interactions and other intraoganizational [sic.] events that are communicated informally within the organization" (Dalkir 2005). It can also be defined as "a detailed narrative of past management actions, employee interactions, or other key events that have occurred and that have been communicated informally" (Swap et al. in Dalkir 2005). Stories are great tools to communicate the organizational culture, as well as a great medium to communicate valuable tacit knowledge. This is especially true since a story, once told, is expected to be repeated throughout the organization. According to Connell, stories are rich in tacit knowledge, and through retelling, this knowledge can be stored (Connell in Schwartz 2006). One problem that arises with storytelling that organizations need to be aware of is the danger of the stories distracting the efforts away from creating new knowledge while directing attention to the past. This happens when, according to Kazuo Ichijo, the stories told "might highlight the differences between new knowledge and that which already exists, thereby making the new knowledge seem less legitimate" (Ichijo in Nonaka & Takeuchi 2004).

Another method used by organizations to capture their employee tacit knowledge is creating a corporate database. This method includes the creation of documents and manuals by the employees, explaining how to perform a task. This can also be done through a structured interview with the employee. Some of the most important questions to be asked deal with the work performed, procedures, selection criteria for a specific course of action, and suggestions for improving procedures and products, as well as general assessments on diverse subjects. The information gathered by the interviewer can be documented and digitized. It can also be included in a corporate database. This system has its drawbacks; one of them is the fact that the process is labor intensive. It requires a lot of time on the part of the employee being interviewed as well as of the interviewer - and that is without considering the time spent on preparing the questions for the structured interview. After the interview is performed, all the information should be transcribed, which represents a large amount of effort and time invested and poses the challenge of

finding a person to do the transcription. When this step is accomplished, the materials need to be made available for others to use, since that is the idea of gathering the information. This process also requires employee time and a solid technological infrastructure that can support such an endeavor. In addition, after all of these factors are in place, the organization needs to encourage the use of the knowledge gathered, since the existence of good information does not guarantee that employees are going to start automatically taking advantage of it. The organization should also take extra precautions not to overwhelm the employees seeking information; that is, it should avoid creating a system that can result in information overload.

6. METHODS USED IN THE STUDY

Four broad knowledge classes of critical KM and PM competencies categories were examined: 1) technical knowledge; 2) administrative knowledge 3) social knowledge; and 4) system knowledge. Table 1 lists these knowledge classes and competencies along with skill set examples.

Table 1: Classification of KM and PM Competencies and Skills (Structure adapted from Todd, et al., 1995 and TFPL LTD Reports, 2008).

Knowledge Class	Competency Category	Skills Sets Examples
Technical Knowledge	1. Technologies & tool	Information and database systems, knowledge management, data warehousing and mining, document delivery systems, information product production systems, effective KM architecture.
	2. Information Processes	User needs analysis, question negotiation, information evaluation and filtering.
	3. Business	Functional expertise (such as marketing, publicity) and discipline/subject expertise (such as records management.

Knowledge Class	Competency Category	Skills Sets Examples
		ontology design)
Administrative Knowledge	4. Management	General management skills (leadership, directing, coordinating, etc.) identifies value of knowledge and information to the organization and develops knowledge based vision. Fosters a knowledge and information rich culture and ensures that KM competencies of the organization in order to develop individual and organizational capability. Fosters the development of appropriate knowledge and information assets and the adoption of effective KM processes, tools, and standards.
Social Knowledge	5. Interpersonal and Group	Interpersonal skills, verbal and written communication skills, interviewing skills, teaming and group work motivator, generates options for change
	6. Problem Solving	Creative solutions, quantitative skills, analytical modeling, logical capabilities, deductive/inductive reasoning, strategic planning, innovation. Ability to negotiate and identify options.

Knowledge Class	Competency Category	Skill Sets Examples
System Knowledge	7. Development Methodology	Knowledge of system development methodologies, systems approach, information audits. Audits, maps and monitors knowledge and information assets and their use and flows. Develops and supports processes, tools standards for knowledge sharing and capture. Business planning and benchmarking, implementation issues, general development phases, documentation, and analysis design tools/ techniques.

7. SUMMARY AND CONCLUSIONS

This paper has examined in detail the knowledge management and project management literature that relates to knowledge, competencies, and skills and the changing nature of library and information organizational environments. Also it is noted that the changing role of information together with advancing technologies is transitioning organizations from information to knowledge base entities. The knowledge, competencies, and skills identified in a variety of studies and represented in a number of taxonomies have been analyzed in order to develop a classification for LIS professionals. Project management and knowledge management practices are presented in the context of the changing nature of libraries. It is demonstrated that the service mission of libraries can be improved by incorporating KM and PM practices into the routine management of these institutions.

The authors are suggesting that PM and KM practices can have a fundamental impact on the management and mission of libraries. Three examples are offered here (Tang, 2000): 1) Human Resource Management. Nurturing knowledge acquisition of library staff, supporting continuing professional development and empowering staff through shared knowledge is an important objective of knowledge management in libraries. 2) Promotion of Knowledge Innovation.

Knowledge innovation is at the core of a knowledge economy. In collecting, processing, storing, and distributing knowledge and information, libraries represent an indispensable link in the diffusion of the human record and records of scientific investigation. In this role libraries also have custodial intellectual property responsibilities. 3) ITC Leadership in Libraries. Knowledge acquisition is at the start of knowledge management in libraries, but information technologies are what enlarge the scope of knowledge management activities. ITC and its effective utility and management in libraries is at the nexus of every good PM and KM practice.

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