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Networks, Digital Libraries and Knowledge Management: Trends & Developments

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Abstract

The work culture in libraries has changed due to the growth of computer networks and the World Wide Web. The growth of interest in knowledge management (KM) has essentially been contemporary with that of intranets/extranets. It is no longer sufficient for libraries to depend solely on having sufficient access to internal and external information resources but to efficiently exploit what the system actually knows—not only what it owns. The successful implementation of KM is that people will share what they know and reuse the know how of others; from this perspective, paper examines the changing role and core competencies required for information professionals specially as a chief knowledge officer (CKO). It also focuses on the vision, strategy and appropriate mind set required for successful implementation without which knowledge management can become an empty slogan.

1. INTRODUCTION

Knowledge management (KM) has rapidly moved beyond the stage of a fad and has established itself as a key part of many library's knowledge strategy. The concept of knowledge-based economy has generated tremendous interest now-a-days. A library's status is no longer defined by the collection it housed, it is extended to include online and seamless access to information resources. The right amount of information at the right time has long since been an important factor for all kinds of libraries. But only to focus on storage and systematization is insufficient in today's highly competitive age. Information must also be quality controlled according to the actual needs of the users and incorporated into the relevant databases. KM encompasses an overarching strategy aimed at exposing and taking advantage of an organization's information, experience and expertise to serve patrons better and respond quickly to their changing information needs. As more and more information becomes available because institutions are increasingly competing to demonstrate who has made available the most comprehensive range of information in right time to right users. There is no doubt that KM has become increasingly important for the libraries to fulfill the users demand.

There has been a spate of workshop sessions and even full-fledged workshops, magazine articles and journal papers on KM in the country over the past few years. Information retrieval and document management software have been retagged and promoted as KM tools. Conferences that previously went under the banner of information management have now become KM conferences.

The 69th IFLA general conference and council to be held in Berlin, Germany during August 2003 has included KM as a sub-theme. Today's large and varied information repositories present challenges for both users and suppliers. The increasingly

widespread idea of 'digital libraries' implies that users can get all the information they need right at their desks, whether it's from multimedia databases, distributed web resources, or traditional libraries. Librarians and libraries are now struggling to find a place amidst tradition and change while dealing with users' growing and changing needs as well as information access, storage and retrieval.

Efficiency, accuracy and consistency can all be improved through effective KM because it enables distributed teams to publish, search, apply and share information across organisational, geographic and political boundaries.

2. CHARACTERISTICS & BASIC FRAMEWORK

KM is defined by one consulting firm as a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving and sharing all of an enterprise's information assets. KM encompasses a very broad range of perspectives. In particular, it deals with the complexities and nuances of human intellectual process, including tacit knowledge, learning and innovating processes, communication cultures, values and intangible assets. It also recognizes the subjective, interpretive and dynamic nature of knowledge and the same time embraces the dramatic developments in information technology and seeks to bring their benefits effectively to the organization.

Ioana Rus and Mikael Lindvall mentioned "KM is unique because it focuses on the individual as an expert and as the bearer of important knowledge that he or she can systematically share with an organisation. KM supports not only the know-how of a company, but also the know where, know who, know what, know when and know why."[7]

2.1 Knowledge Management System

It is a value added intranet with facilities to search and identify captured knowledge or identify experts who have knowledge in the area users are looking for. The KM system also helps to establish contact with the expert and to have a dialogue with them. It captures and makes available the transcripts of such discussion whether they have on chat or e-mail. The approach in building KM system would vary in different libraries.

2.1.1 Knowledge Architecture

In their book, Wayne Applehans & associates[18] mentioned the term 'Knowledge Architecture'. They said knowledge architecture represents organisation's formal recognition that it has important experience and expertise which it must preserve and use to its advantage. It encompasses three components:

- People
- Content
- Technology

Knowledge architecture brings these components together into a powerful working relationship. KM is making practical use of knowledge to accomplish any organizational objective through the structuring of people, technology and knowledge content.

Managing knowledge means blending each of the components into a cohesive unit whose main purpose is to understand the important content necessary to meet objectives, the key people who are the supplier and user of the content and the technologies appropriate to meet the KM objective. (Figure 1)

2.2 Knowledge Base

Developing knowledge base for libraries requires encapsulation of knowledge into databases and effectively putting it into information format. There are several ways in which conventional databases of libraries can be made more useful through addition of more 'knowledge base' ingredients:

- Adding contextual information to individual entries (where was this information used?)
- Validating the quality of the information (commentary should be added by users on its relevance, accuracy and helpfulness)
- Providing clear navigation aids (users be able to navigate quickly to areas of interest)
- Using a thesaurus of terms

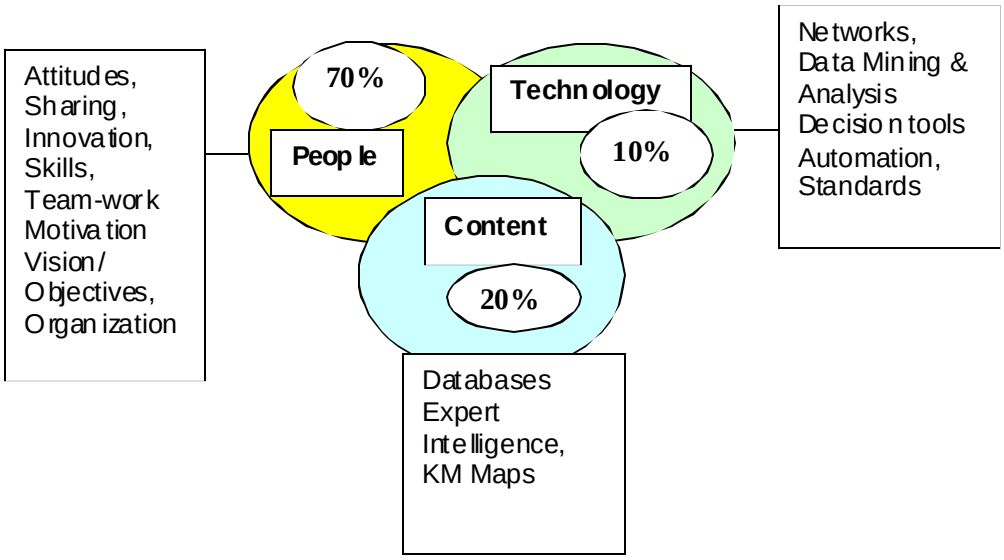

Figure 1. Components of a library KM system

- User oriented information provision, for example, Siemens has an engineering problem database which the user accesses via a hierarchical problem tree
- Giving details of originators. Users can contact contributors directly, e.g. via e-mail, hypertext links or 'click for conversation' icons that automatically dial the contributor's telephone
- Offering an expert database with pointers to people and information on the location of experts and expertise.

Addition of multimedia material, e.g., a visual demonstration of an entry, such as a team at work. Bharat Petroleum uses video clips to illustrate oil rig practice and for interviews with experts.

3. TECHNOLOGIES FOR KNOWLEDGE MANAGEMENT

The concept of KM would be less powerful for organisations without knowledge oriented technologies. Technology's most valuable role in KM is extending the reach and enhancing the speed of knowledge transfer. Knowledge engineering, digital networks, the internet and intranets are not KM but only enabling technologies for managing knowledge. KM technology enables users to simultaneously access internet sites, databases, intranets and other internal/external resources as if the information existed in a single location.

Improved collaborative technologies enhance person-to-person communication, thus helping in the development of knowledge across organisational and geographical boundaries. Groupware such as Lotus Notes and the wide spread adoption of intranets and extranets have helped this process.

3.1 Intranet and Extranet

Fundamentally intranets/extranets are phenomenally powerful tools to streamline library services. Information disseminated on an intranet enables a high degree of coherence for the entire library because communications are consistent. By giving information seekers and information providers the ability to access time critical information, intranets improve the decision making process by empowering individuals with the knowledge necessary for faster and better informed decision making. Intranets allow the centralization of information which makes it easier to maintain and keeps data up-to-date. The extranet further extends the intranet by allowing other libraries on sister organisations to gain access to selected internal data. Both intranet and extranet provide a facility where people can publish information electronically on library web pages. It is accessible by

anyone in the organisation who has access to the net. It also contains information on the work being conducted within individual sections and often includes details of current projects, results of previous projects and some times 'home pages of individuals involved in the project. Intranets and extranets fit into the bigger picture of KM.

There is increased emphasis on the intranet as a collaboration tool that lets users exchange information through discussion groups and other features. (Figure 2)

3.2 Groupware

Groupware is essentially a software system that enables users to share information. It has been defined as a technology that communicates and organises unpredictable information. Groupware is not just an extension of traditional library automation system, but its applications are designed to support group-work which require a different methodology to understand the tacit, invisible aspects of work practices. Some Groupware applications are described here.

Communication—Groupware applications to support synchronous communication includes video conferencing, shared screens/ applications, media spaces and chat. Synchronous application links separate screen and people who interact with each other at the same time. Applications to support asynchronous communication include e-mail perhaps the most widely used groupware application.

Meetings—Groupware applications to support meetings include software that captures and organises ideas for brainstorming, summarizing and reporting.

Information sharing— this application include discussion databases, bulletin boards and electronic news groups where documents and their responses are often grouped together under a single keyword making it easier to follow the discussion. Shared e-mail folder, like Microsoft Exchange or web pages built with Netscape, allow people to pull the information they want. Multiple users can thus share a single piece of information. Online discussion make it easier to share information with a number of colleagues simultaneously. The online conference is another type of knowledge sharing event. Applications for publishing documents have sometimes also been called groupware.

Coordinating work processes— commonly referred to as workflow systems. Workflow system may also include decision support component.

An intranet provides an ideal platform on which to deploy groupware application. Most groupware applications are now provided as part of an intranet and web-based systems, it is principally designed to benefit and reward the group rather than the individual.

4. KNOWLEDGE MANAGEMENT AND DIGITAL LIBRARIES

Digital revolution has transformed the intellectual function of traditional libraries.

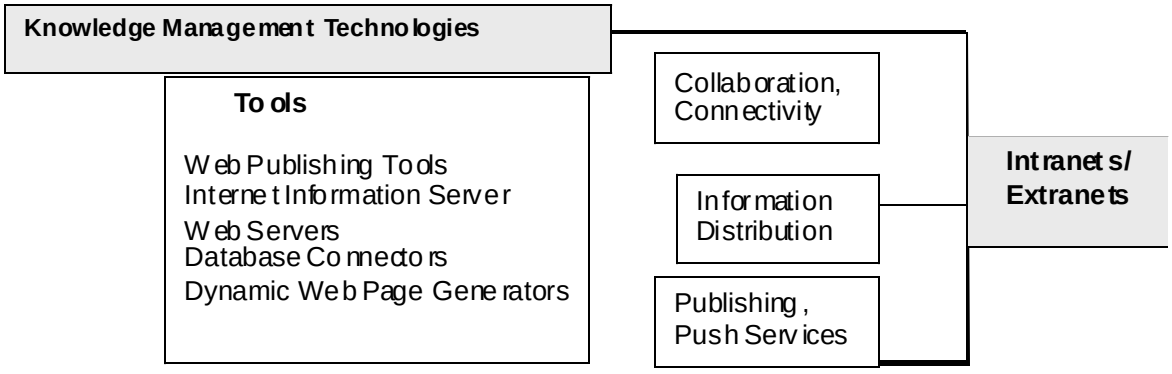

Figure 2. Intranets and Extranets in KM

Digital libraries are providing the base for a set of distributed activities. It is also providing a one stop solution for speedy delivery in a reliable fashion.

Libraries are being digitised and patrons demand is growing the concept of content management has been adapted to the library world. More libraries are providing virtual references via the web. (Figure 3)

5. CORE COMPETENCIES FOR KNOWLEDGE MANAGER

The greatest challenge for the information manager today is to create an organisation that can share knowledge. Quality library services are imperative in knowledge society as it inspires the knowledge workers to be innovative, viz. think globally and design locally. Today information professionals have more opportunities to expand from their traditional role to organise the digital content, especially of getting and filtering available information which the Information professionals are expected to be elevated from managing the corporate information centre to managing corporate knowledge and become chief knowledge officers (CKO) and with greater responsibilities. These aspirations arising out of a belief that information professionals are best suited for the CKO's job since they already have the basic skills and attitude for such a job.

The expertise of information professionals in searching for and providing access to explicit knowledge in the form of documents; their skills in understanding clients needs; their knowledge of information sources; and their skills in organising information and developing databases have been core competencies used by organisations. From a KM perspective, these skills are useful in helping professionals internalize explicit knowledge and also in facilitating the combination mode of knowledge conversion. New competencies are required to be developed to cope with the increasing emphasis on KM and several professional bodies such as ALA (American Library Association) and SLA (Special Library Association) have come up with recommendations for this purpose.

"The core of the professional expertise of information professionals may be said to arise from a unique confluence of expertise in three areas, viz. knowledge of information sources, knowledge of users and knowledge of the application of information technologies for the benefit of users and for the management of information resources"[9]

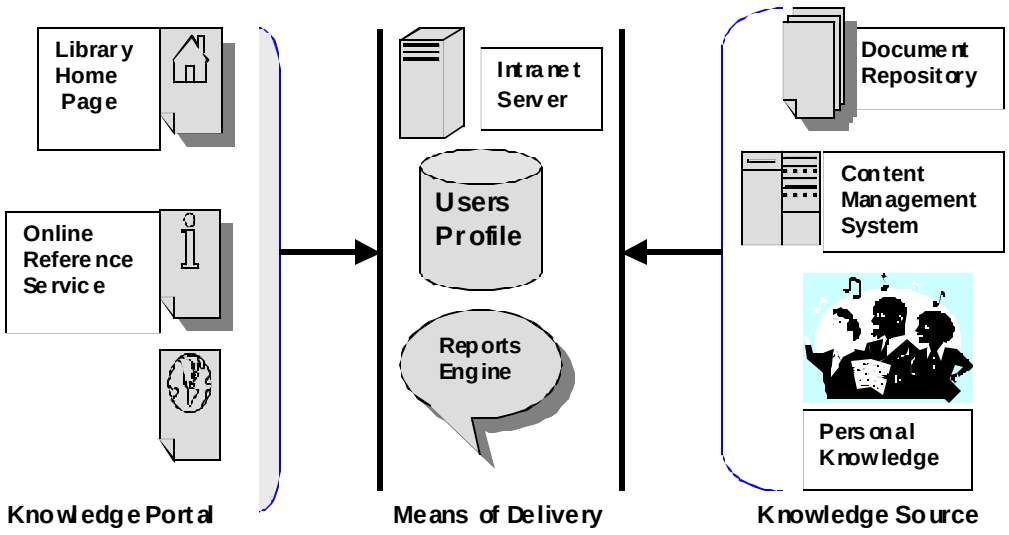

Figure 3. Architecture of a library KM system

5.1 Job Description of Chief Knowledge Officer (CKO)

- Create a successful KM infrastructure in the face of technical, cultural and logistical barriers
- Distribute content, employing personalization techniques that meet the needs of user communities within and across organisational boundaries
- Identify high priority content, capture and manipulate it
- Put in place the organisation that will manage knowledge that satisfies customers, increases profits and decreases costs
- Understand users of the KM system
- Ensure that the knowledge architecture is funded, designed, built and administered properly.

6. CURRENT PROBLEMS AND POSSIBLE SOLUTIONS

A common problem in most KM programs is that individuals do not share their knowledge. Libraries need to apply levers of organisational change over a period of time. The real–world experience suggests that technology can offset or even overcome some cultural disinclination towards KM.

Libby Ralph stated "Success has come not through the implementation of 'one stop' tool solutions, but through creating an environment in which knowledge sharing and

Table 1 Potential upsides and possible limitations of KM technology

Management functions	Potential upside	Possible limitations
Planning	Captures organizational knowledge and lessons that are often learned and make available for use in an organised and systematic manner	Hard to capture lessoned learned
Organising	Determines patterns of organisation that work best based on domain knowledge.	Users might require an organisation that doesn't adhere to preferred patterns
Staffing	Make it easy to identify people with the skills knowledge required to fill open slots in the organisational structure	An individuals ability to fit into a team is something that only the people with whom he will work can fully evaluate
Directing	– Make it easy to deduce leadership & teamwork abilities – Identifies & streamlines optimal communication patterns in the organization – Exploits lessons learned relative to past experience	Leadership and teamwork are qualities that need to be developed not inferred
Controlling	Creates benchmarks to compare performance	Benchmarks might be misleading because they might be based on norms instead of specifics
Facilitating	Identifies linkages between work processes and highlights techniques that improve efficiency and effectiveness.	Good knowledge manager can facilitate problem solving because they anticipate problems and bring in experts to work on them

Source: Adapted from Donald J. Reifer. IEEE Software, 2002, May/June 2002, 15.

innovation thrives, and by tackling cultural or organizational and communication issues. These KM solutions are not packaged, but continually evolve."[11]

6.1 Developing Knowledge Sharing Culture

Although new technology makes sharing easier than ever, organisational cultures might not promote it. Some cultures even overly encourage individualism and ban cooperative work. Lack of a knowledge culture has been cited as one of the obstacle of successful KM. If libraries do not foster a sharing culture, users including subject specialist feel possessive about their knowledge and won't be forthcoming in sharing it. In scientific and technological libraries, the scientists and engineers might not be willing to share negative experiences and lessons learned based on failure because of their negative connotation; So although KM's purpose is to avoid similar mistakes, users might fear that such information could be used against them.

A very high proportion of knowledge will always remain tacit. Library system managers can encourage the full exploitation of tacit knowledge by paying attention to the environment they are creating, by encouraging respect for different thinking styles by understanding the distinction between intelligent failures and stupid mistakes.

The KM solution therefore majors not on the building and access of knowledge repositories, but on creating the cultural environment and the communication channels (both facilitated and informal) that will encourage knowledge sharing between individuals. To change an organization's culture leaders need to undertake two studies: a cultural assessment and a knowledge audit.

6.1.1 Reward Systems/Incentives for Knowledge Sharing

There must be incentives and demonstration of faith which will encourage knowledge-sharing orientation across the organisation.

In Infosys "when a person submits a document to the knowledge shop (K-Shop), it is reviewed by experts selected from people knowledge map. If it is acceptable, K-Shop publishes it; the reviewer and author are rewarded with knowledge currency unit (KCU)"[1]. The user of the document is encouraged to contribute cash or other gifts to KCU for the benefits gained.

Sharing of best practices—many companies save millions of dollars by taking existing knowledge and applying it to similar situation elsewhere.

6.2 Organisational Infrastructure

A knowledge sharing culture needs following information technology infrastructure:

- A distinct virtual space for knowledge exchange
- Content publishing tools that can be managed locally
- Group communications tools appropriate to the culture
- Technical support and tools for local reconfiguration of the interface
- Application integration for ease of use.

6.3 Training

Training and education programs emphasizing KM and explaining the proper implementation tools are of obvious importance. It is realized that most educational programs are pitched too high or too low and are delivered in class-rooms which may not be the way many people learn.

7. CONCLUDING REMARKS

There are a few basic changes that pose challenges to modern libraries towards acquiring and managing larger and larger bodies of knowledge are: globalization, decentralization, customization and acceleration. Modern libraries are dependent on technology, which is highly diversified in their product and services they offer. These factors make decision making extremely difficult. These problems can be overcome with the effective utilisation of traditional resources (manpower, materials and money)

as well as information and knowledge resources. That's where the role of Knowledge managers comes into play. KM is a buzzword turned business phenomenon, may be just the push our profession needs to grab a piece of the spotlight for all our hard work.

Tony Hooper mentioned in his article "In the context of the New Economy, libraries are businesses, and need to harness their assets-stakeholders, information and technology to compete and survive… If librarians do not do this, others will and will put libraries out of Business". [10]

REFERENCES

1. Subramanian, Shivam Rama & Gokulakrishnan Jagadeesan. Knowledge management at Infosys. *IEEE Software,* May-June 2002, 53-55.
2. Ghosh, Maitrayee. Knowledge management in the digital age: challenges and opportunities in India. *In* International Conference (Asia-Pacific): Challenges and Opportunities for Libraries and Information Professionals in Knowledge Management, organized by Dept of Library Sciences, Faculty of Humanities, Chaing Mai University, Thailand, 20-22 March 2003, pp. 79-89.
3 Blackmore, Paul. Intranets: Considerations for the information services. *Information Services and Use* , **17**(2), 23.
4. Haridasan, Sudharma. Knowledge management: A new challenge for library professionals. *Iaslic Bulletin,* 1998, **43**(4), 145-47.
5. Teng, Sharon & Hawamdeh, Suliman. Knowledge management in public libraries. *Aslib Proceedings,* 2002, **54**(3), 188-97.
6. Bansal, Alka. Knowledge management: A Review. *DESIDOC Bulletin of Information Technology,* 2000, **20**(4), 3-9.
7. Rus, Ioana & Lindvall, Mikael. Knowledge management in software engineering. *IEEE Software*, May/June 2002, 26-38.
8. Streatfield, David & Wilson, Tom. Deconstructing knowledge management. *Aslib Proceedings,* 1999, **51**(3), 67-71.
9. Wilson, T.D. The nonsense of knowledge management. *Information Research,* 2002, **8**(1), 1-26.
10. Hooper, Tony. Management issues for the virtual library. *The Electronic Library,* 2001, **19**(2), 71-77.
11. Ralph, Libby. Is knowledge management past its sell-by date? *Managing Information* , 2002, 41-42.
12. Rao, Jayashree N. Knowledge management by library and information centres. *University News,* 2002, **40**(44), 5-11.
13. Reifer, Donald J. A little bit of knowledge is a dangerous thing. *IEEE Software,* May/June 2002, 14-15.
14. Figallo, Cliff & Rhine, Nancy. Building the knowledge management network: Best practices, tools and techniques for putting conversation to work. Wiley–Dreamtech India Pvt. Ltd, New-Delhi. 2002
15. Haravu, L.J. Lectures on knowledge management: Paradigms, challenges and opportunities. Sarada Ranganathan Endowment for library Science, Bangalore. 2002.
16. Skyrme, David J. Knowledge networking: Creating the collaborative enterprise. Butterworth-Heinemann. Oxford, 1999.
17. Callaghan, James. Inside intranets and extranets: Knowledge management and the struggle for power. Palgrave Hampshire. 2002.
18. Applehans, Wayne; Globe, Alden & Laugero, Greg. Managing knowledge: A practical web based approach. Addison Wesley, Massachusetts.1999.
19. Ehrlich, Kate. Designing groupware applications: A work-centered design approach. *I n* Knowledge, Groupware and the Internet, *edited by* David E. Smith. Butterworth-Heinemann, USA. 2000. 137-70.

20. Hawkins, Brian. Libraries, knowledge management and higher education in an electronic environment. http://www.alia.org.au/conferences/alia2000/pr…/brian.hawkins.htm (7/12/2002)

21. Honeycutt, Jerry. Knowledge management strategies. Prentice Hall of India, New Delhi. 2001. 239.

22. The knowledge management homepage http://www.bus.utexas.edu/kman

23. *Knowledge Management Magazine* http://kmmag.com

24. WWW Virtual library on knowledge management http://www.brient.com/km/

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