Knowledge Organization or Information Organization? A Key Component of Knowledge Management Activities

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Abstract
This paper focuses on the various bibliographic and information retrieval tools and techniques used for information organization, a key activity in a knowledge management process. The paper begins with the existing debate on the very concept of knowledge management, and looks at some recent papers and arguments on this issue. It then briefly discusses how some projects over the past decade or so have used various traditional bibliographic organization tools for providing access to electronic resources. This follows examples of some sophistical information organization techniques used by some speciality search engines. It is argued that these tools and techniques, although are quite useful, cannot be used as such in a knowledge management environment. A generic model of information access in a knowledge management environment is then proposed, and new areas of research, especially in the context of information organization are discussed.

Introduction
Since the mid-nineties there has been a steady growth in the literature on the concept of knowledge management. Hundreds of books have been published, and thousands of papers have appeared in journals and conferences. Although this is predominantly a management concept and is meant for business organizations, the field of knowledge management has attracted experts from many different fields including business and management sciences, information and library studies, computer science and artificial intelligence, and so on. Consequently many different definitions and interpretations of knowledge management exist. One of the most commonly used connotations of knowledge management is that it is a process of capturing and making an organization's collective expertise anywhere in the business – on paper, documents and databases, or in people's heads. Simply speaking knowledge management is concerned with managing both recorded (i.e. explicit) and tacit knowledge. By analyzing 16 different definitions of knowledge management, Awad and Ghaziri (2004) outline the following characteristics of knowledge management:

- KM deals with knowledge from external as well as internal sources including documents and databases
- KM systems embed and store knowledge in business processes, products and services
- KM systems' objective is to promote growth, transfer and share of knowledge within the organization
- KM systems aim to assess on a regular basis the knowledge assets of an organization and its impact.

Arguing for the novelty of the concept of KM and the corresponding tools and techniques, Awad and Ghaziri argue that the goal of KM is 'to present a balanced view of how computer technology captures, distributes, and shares knowledge in the organization by linking human experts and documented knowledge in an integrated KM system' (Awad and Ghaziri, 2004, p. 3).

However, many researchers believe that knowledge management is yet another management fad that will fade away as time passes (see for example, Blair, 2002). There are counter arguments too. By using bibliometric analysis techniques, Ponzi and Koenig (2002) suggest that new management concepts like total quality management (TQM), business process re-engineering (BPR), etc., usually reveal themselves as fads or fashions within approximately five years after having gained some initial momentum. By applying the same general rule of thumb they suggest that the popular concept of knowledge management has initially survived. Nevertheless, many senior information researchers argue that knowledge cannot be managed and what a KM system purports to do is nothing but information management (see for example Wilson, 2002). These issues are discussed in the following section.

Knowledge or Information Management?

Many researchers believe that managing knowledge is an impossible proposition, since knowledge can only reside in the minds of people and the minute it leaves the human mind, it is information (Hawamdeh, 2002). Tom Wilson, one of the most senior and respected researchers and academics in information management, distinguishes knowledge and information by arguing that knowledge is what we know and therefore it resides in human minds, and when we intend to express that knowledge (i.e., what we know) some form of messages have to be created for the purpose of communication. Such messages constitute information, and collections of messages constitute information resources of various kinds – ranging from more formal information resources such as books and journal articles to more informal resources like e-mail messages and minutes of meetings, etc. After critically analyzing (1) the terminological differences between information and knowledge, (2) a set of papers, vis-à-vis their source journals, on KM published between 1986 and 2002, (3) views shared, and solutions provided, by a set of consultancy firms in the field of KM, and (4) views of Business schools, Wilson concludes that KM rests on two foundations: (1) management of information and (2) effective management of work practices. He further stresses that the second foundation of KM is rather based on an "utopian idea of organizational culture in which the benefits of information exchange are shared by all, where individuals are given autonomy in the development of their expertise, and where 'communities' within the organization can determine how that expertise will be used" (Wilson, 2002). Thus according to Wilson the goal of a knowledge management system is to manage information for achieving the objectives of an organization.

Information Organization: A key activity

Whatever view we may take, i.e., whether we agree to call it KM or an improved version of IM, the central component of such systems is information, and the success of the overall system will largely depend on how efficiently we can organize, and provide access to, all the different varieties of information that are required for the day-to-day business operations as well as for making strategic business decisions.

Information or knowledge management is essentially a four-step process that includes capturing, organizing, refining and disseminating information. The process begins with the capturing of information relevant to the activities and interests of people in an organization. Such information may be available in a variety of sources, forms and formats. Once information is captured, it needs to be organized using a number of techniques that include cataloguing and indexing, retrieving, filtering, ranking, and so on. Efficiency of an information access system depends largely on the proper organization of information.

Over the years, information science researchers and practitioners have developed and used various techniques for organizing information resources of different types. However, off late, with the introduction of information and communication technologies several sophisticated systems have been developed for organization of information. In the following sections, we review some projects and services that have used information science tools and techniques for organizing electronic information resources.

However, although such systems have been proved to be quite successful for organizing, and for providing better access to, various types of electronic information resources, they are not suitable for a typical knowledge management environment. After discussing the various reasons for this, the paper proposes the generic outline of an information management system, suitable for a corporate knowledge management environment. Areas of further research in the organization and access of electronic information to suit the proposed KM environment are also discussed.

Various approaches to Information Organization

Libraries and information services have a long history of using various tools for organizing information resources. Of these the two most important types of tools are (1) classification schemes like Dewey Decimal Classification, Universal Decimal Classification, Library of Congress Classification, Bibliographic Classification, Colon Classification, etc. that have been primarily used to organize information resources on the libraries' shelves, and (2) subject heading lists like the Library of Congress Subject Headings which have been used to develop subject indexes to library catalogues.

Online database systems have made extensive use of vocabulary control tools like thesauri to build subject indexes to the collections. The introduction of graphical user interfaces, and more recently web interfaces, have made it very easy to design and provide thesaurus interfaces to large online databases. Figure 1 shows a screenshot of the thesaurus interface of the NCBI service that allows users to select terms from MeSH (Medical Subject Headings) to search online health information resources.

Over the past decade or so, several research projects have taken place, and information services have been developed, where electronic information resources have been organized using traditional library tools like classification schemes and subject heading lists. Table 1 shows examples of some such projects.

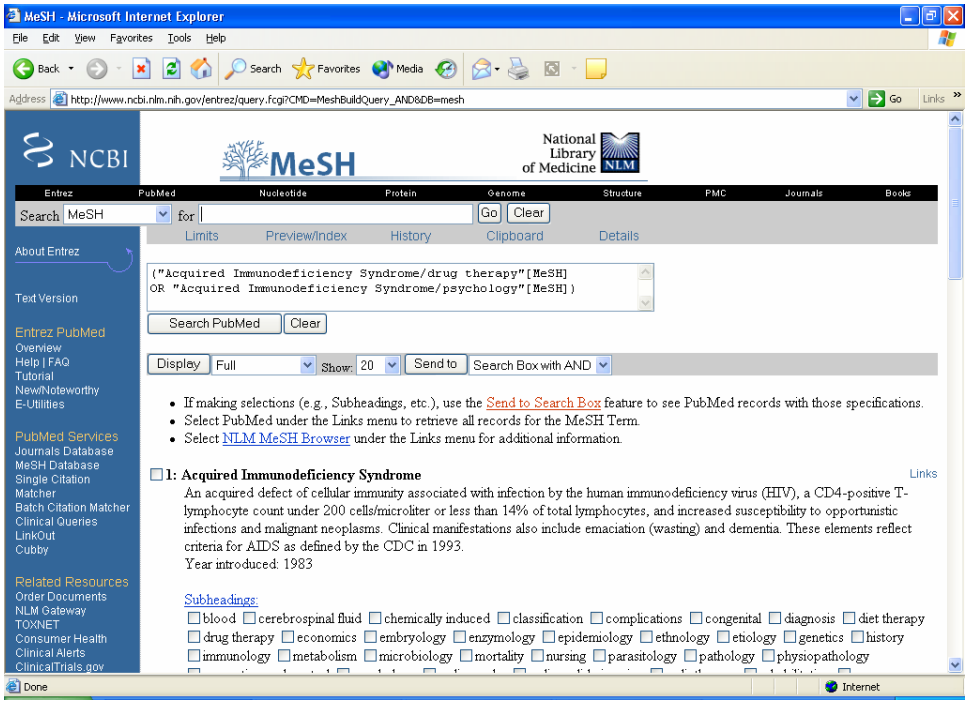

Figure 1: Search Interface of NCBI that allows users to select terms from MeSH online

Table 1: Examples of Projects Using Bibliographic Tools for Organizing Electronic Information Resources

Project	Tools used
Biome (www.biome.ac.uk)	NLM Subject headings and MeSH
BUBL (www.bubl.ac.uk)	Dewey Decimal Classification
CyberDewey (www.anthus.com/cyberdewey/cyberdewey.html)	Dewey Decimal Classification
CyberStacks (www.public.istate.edu/~cyberstacks/)	Library of Congress Subject Headings
EELS (http://eels.lub.lu.se)	Engineering Information classification scheme
EEVL (www.eevl.ac.uk)	Engineering Information classification scheme
Infomine (http://infomine.ucr.edu)	Library of Congress Subject Headings
Renrdaus (www.renardus.org)	Dewey Decimal Classification
Scorpion (http://orc.rsch.oclc.org)	Dewey Decimal Classification
Scout Report (http://scout.wisc.edu/Reports/ScoutReport/Current/)	Library of Congress Classification and Library of Congress Subject Headings
SOSIG (www.sosig.ac.uk)	Humanities and Social Science Electronic Thesaurus

While some of these were research projects designed to test the suitability of the bibliographic tools for organizing electronic information resources, others have sustained as services. Figures 2, 3 and 4 show the screenshots of three such services. BUBL Link is a service managed by the Centre for Digital Library Research (CDLR) at the University of Strathclyde. It provides access to a number selected Internet resources through search and browse facilities. In the browse mode

users can access the resources by Dewey class numbers (see Figure 2). Users can also search by Dewey index terms.

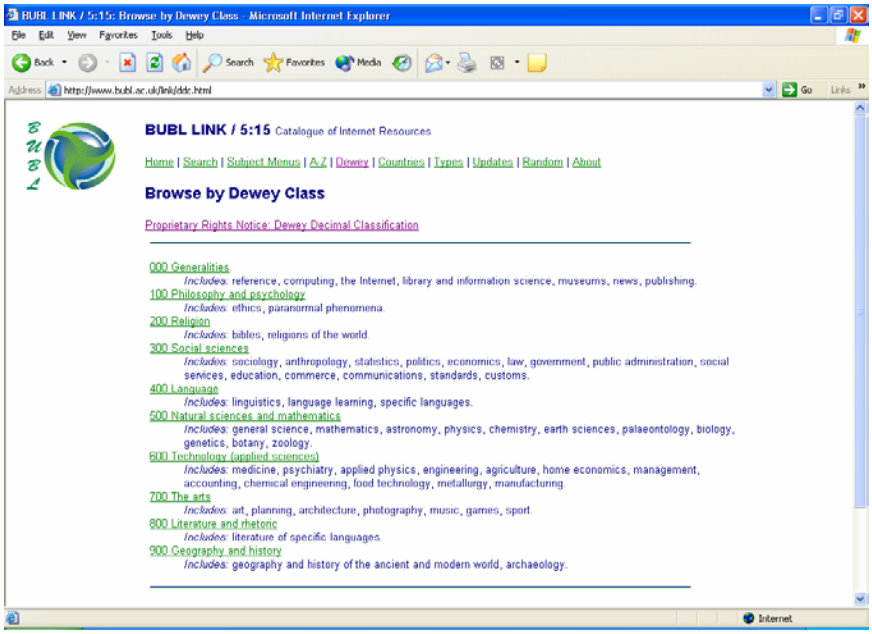

Figure 2: BUBL Link Screen showing the Browsing facility by Dewey Class

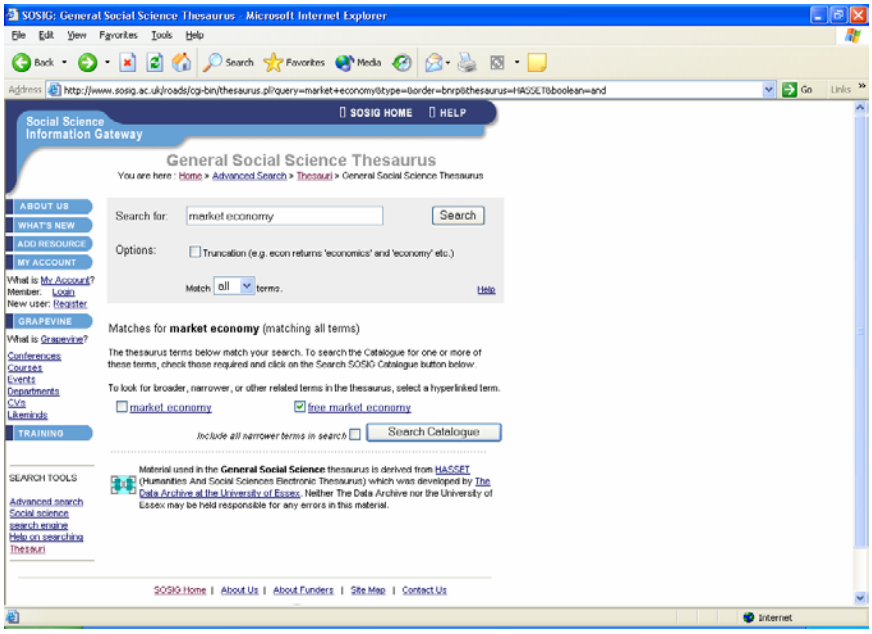

Figure 3: SOSIG Search Screen that allows users to search using a thesaurus

SOSIG, the subject gateway to electronic resources in different areas of social sciences, has a thesaurus interface that allows users to search the service by selecting terms from the social

science thesaurus (Figure 3). OMNI, a health science information gateway, allows users to search the service by using either NLM (National Library of Medicine) thesaurus or MeSH (Figure 4).

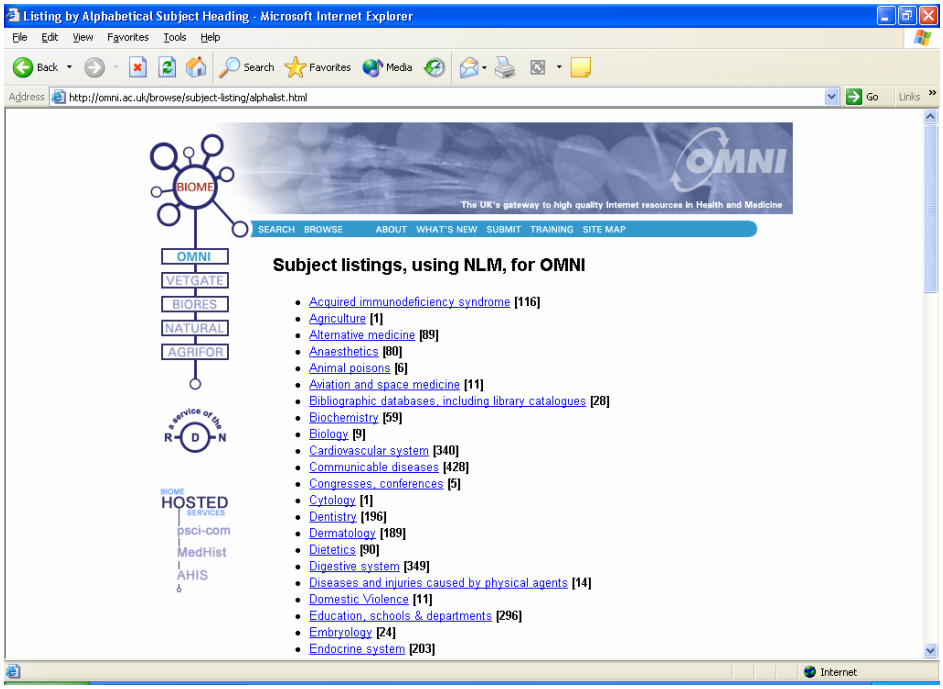

Figure 4: OMNI Search Screen that allows users to search using the NLM thesaurus

Information Organization in some Speciality Search Engines

So far we have seen the use of some bibliographic tools in organizing electronic information resources. However, many advanced information retrieval and expert systems and artificial intelligence techniques have been used in designing systems for providing improved access to electronic information. In this section we shall look at three speciality search engines that use advanced techniques for organizing information. AskJeeves (www.askjeeves.com), a meta search engine, uses a unique techniques for organizing internet information. As shown in Figure 5, once a user asks a question, AskJeeves does not only come up with the results, but also brings up a number of concepts that are related to the given search concept, and each of those links to a specific set of web resources (see the right side of the screen in Figure 5).

Vivisimo (***www.vivisimo.com***), another search engine uses clustering techniques to show results not only on the searched concept, but also on the related concepts. As shown in Figure 6, a typical search on vivisimo shows the results on the screen, while on the left side of the screen the user can see a set of clustered concepts, each linked to a set of web resources.

Kartoo (***http://www.kartoo.com***), another search engine provides similar results but uses unique visualization techniques. As shown in Figure 7, a Kartoo search produces a visual display of results, where the user can take the cursor on any node to see its links with the other nodes in the visual map. The user can also see various related concepts on the sides of the screen, and can select terms from there to modify the search.

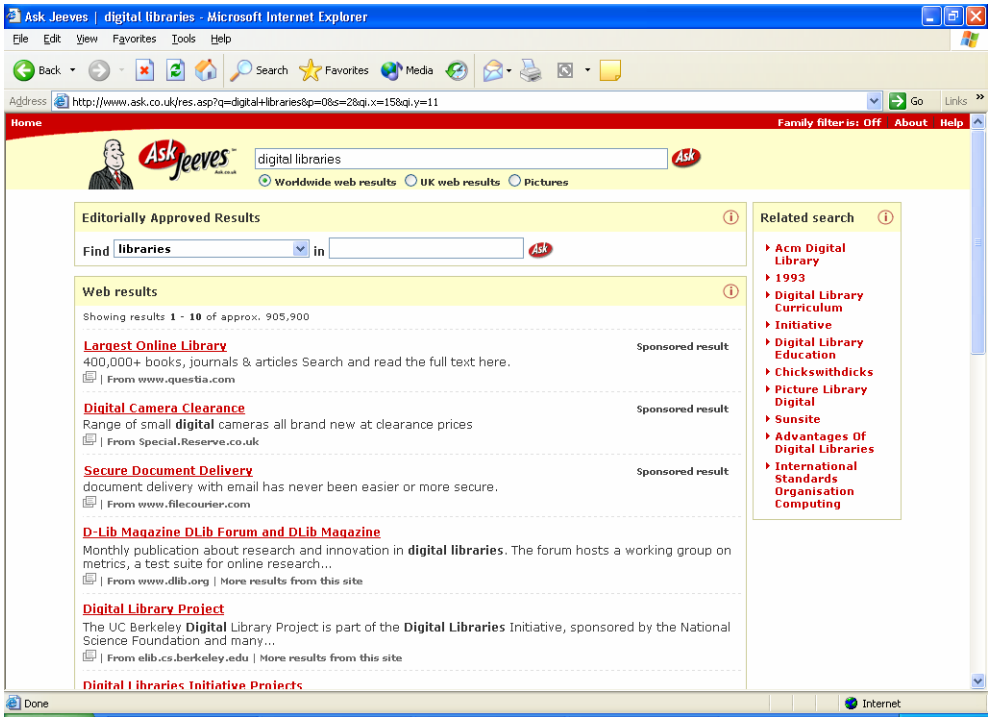

Figure 5: AskJeeves

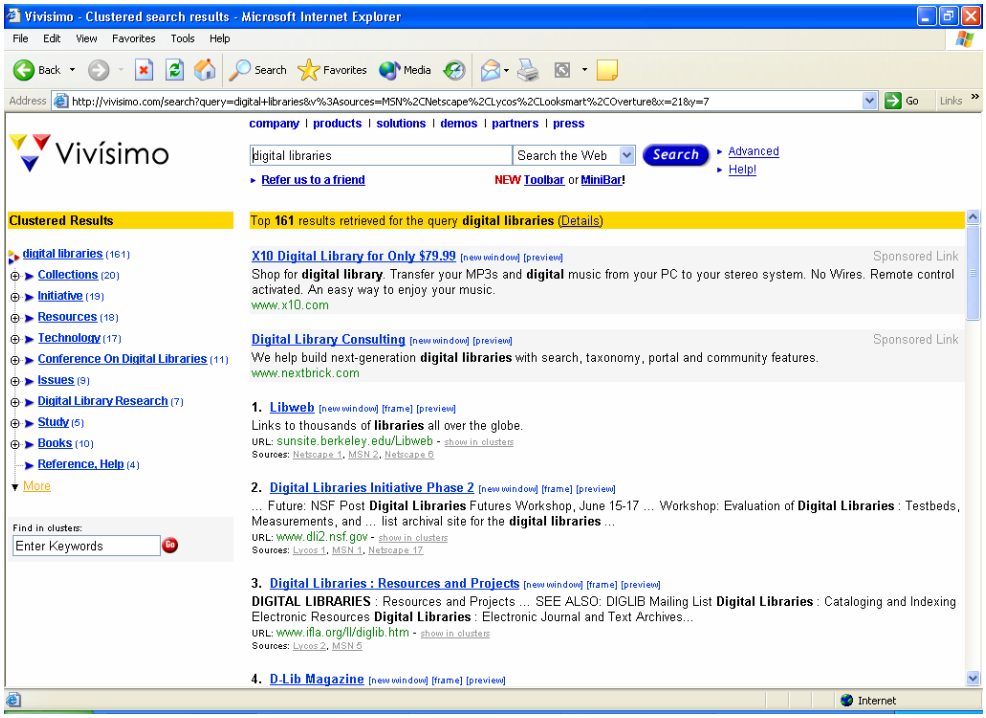

Figure 6: Vivisimo

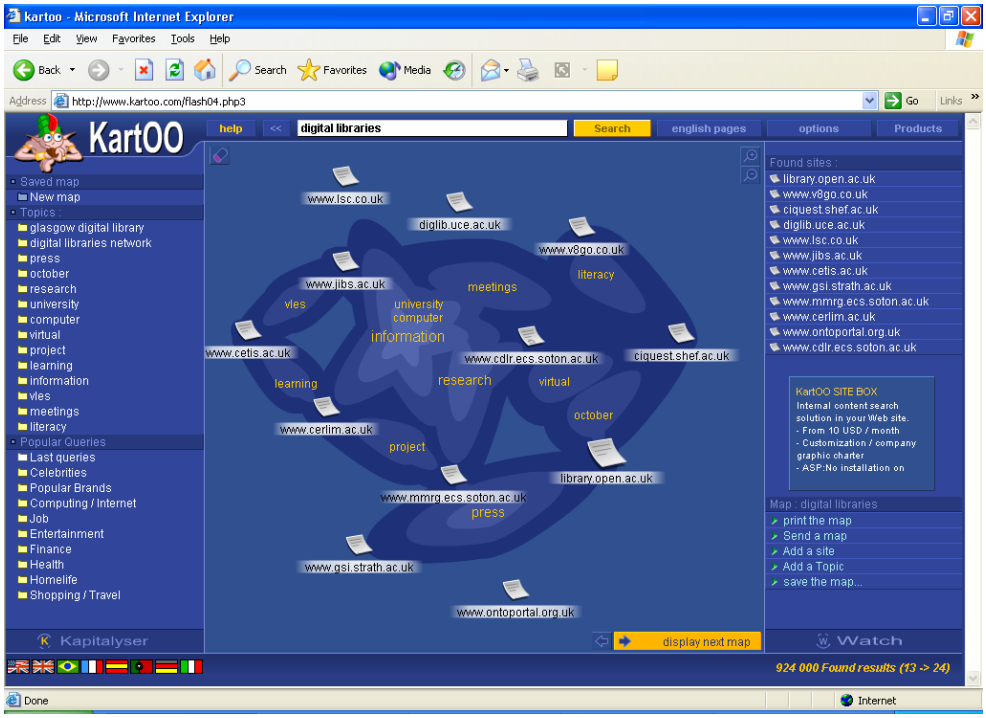

Figure 7: Kartoo

Problems

Although the tools and techniques used for organizing electronic information, as discussed above, produce very good results, they are not free from problems, especially when considered for a knowledge management environment. In the following sections we shall discuss some of these problems.

Variety of information required in a knowledge management environment

Information required for performing the day-to-day operations, and making decisions, in a corporate environment may be available in the form of internal or external databases, and documents ranging from e-mail messages, memos, minutes of meeting to documents available in the restricted as well as the public domain. None of the tools discussed above has been used, at least through the examples given here, have been used to organize information of this variety. Different tools and techniques may be required to organize information available in the form of alphanumeric data as well as textual and multimedia information.

Location of information

The various types of information required in a corporate environment may reside at different locations: on the databases – local as well as remote, on the corporate intranet, on internet, and so on. A great variety of information may also be available through the library site – and while most of the library resources may be accessible remotely, some may be available in the local digital library. In effect, while much of the required information may be located outside the organization,

a framework has to be built for organizing all those varieties of information. This means that some form of metadata or index has to be built for organizing the information, which would let the user access the information no matter where and in whichever format it is available, and under what terms and conditions they can be accessed (obviously a lot of corporate information can only be accessed and used by authorized users).

Corporate Culture and Work Patterns

All the various tools and techniques used for organizing information, discussed earlier in this paper, are designed for the wider audience and for the general information retrieval environment. However, since in a knowledge management environment efforts are made to manage information with particular reference to the people who work for, and contribute to, meeting the overall objectives of the organization. In other words, the information organization and access system should be institutionalized and personalized. This calls for organization of the information resources keeping particularly in view the people who are going to use them, the task or the purpose for which they are going to use them, and the overall organizational framework that controls the work environment and culture.

An Interface for Corporate Information Management System

Digital libraries, with the major objective of making digital information – local as well as remote on distributed servers – accessible to every user in the community, can play a key role in knowledge management in any organization. In order to facilitate performance of the day-to-day activities and decision making by its employees, an organization captures all the different types of relevant information including information on local expertise and work culture. Figure 8 shows a general framework for information management in any organization that makes optimum use of digital libraries along with the Intranet and Internet resources through a task-based interface and user-driven information access system. For details of the design of a task-based information access system see Meyyappan, Chowdhury and Foo, 2001a, 2001b, 2001c.

Such an information management environment should enable the users to search for the required information, or get access to a set of information resources recommended automatically by the system based on the user tasks and user characteristics. In other words, the system should be able to personalize the environment based on user characteristics, tasks, choices, etc. The information may come from local as well as remote libraries – hybrid and/or digital, or may come from local Intranet, databases or from the Internet.

In organizing the information, the system incorporates a huge amount of personalization and institutionalization factors. It incorporates the knowledge of the tasks performed by every user, the way the task is performed in terms of the various information resources used to perform the job, and also incorporates the knowledge regarding the rights to access the specific types of information by a given user. Most importantly all these activities are done behind the scene, and the user gets access to the required information upon selection of a task.

The other options available to the user from such an interface are the browse and search facilities that will allow the user to search and/or browse the entire collection. The user can also ask questions, if they want to know about something, or are stuck with a specific task on hand, and so on.

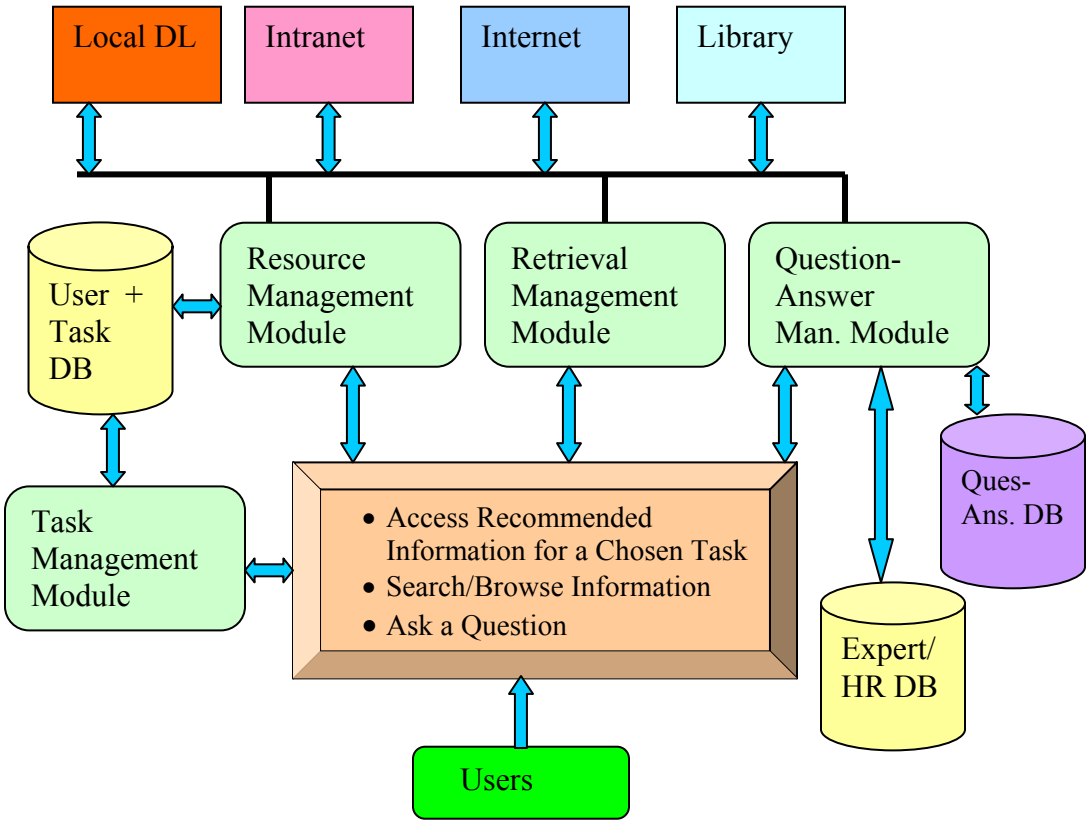

Figure 8: An Information Management System for a Knowledge Management Environment

Further research

The interface proposed here is a generic one that can be improved by adding sophisticated information organization and access facilities at various levels. For example, the various information resources that are deemed (by the system) to be relevant for a given task may be displayed on the user screen in a visual map so that the user gets an idea of the overall knowledge map of the organization vis-à-vis their required information sources. This will particularly allow the users to get an overview of the information resources and work culture of the entire organization. This may also allow the users to review their work patterns given the variety of the various information resources that are available in the organization.

The task-based recommender system as well as the information search interface can be improved by designing appropriate ontology for the given application. A standard information organization tool may not be suitable for the organization, but may form a basis for designing an ontology. An ontology can be defined as a formal, explicit specification of a shared conceptualization Gilchrist, 2003). A typical example of a general ontology is Wordnet (http://www.wordnet.com) that contain over 100,000 words, with lexical and other information, organized in the form of a

taxonomy. However, several domain-specific ontologies have been built over the past few years (for reviews of ontology research see, Ding, 2001; Ding and Foo,2002; and Fensel, 2001). A specially designed ontology may be used not only for organization of information, but may also be used to form and display a visual map of concepts which may allow the user to formulate and modify their queries.

From time to time it may be required to audit the information use patterns and human information behaviour directly by conducting user survey and indirectly by analyzing transaction logs. Such information may be used to review and modify, as necessary, the techniques for organization of the information resources, and to design a better information management system.

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