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Teknologi Maklumat
Di Perpustakaan
3 - 5 Ogos 2010



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Sesi 1 : Perpustakaan Elektronik dan Digital
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COMPUTER-BASED LIBRARY OR COMPUTER-BASED LEARNING?

Oleh / By

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COMPUTER-BASED LIBRARY OR COMPUTER-BASED LEARNING?

Abstract:

Traditionally, libraries have played the role of repository of published information resources and, more recently, gateway to online subscription databases. The library online catalogue and digital library interface serve an intermediary function to help users locate information resources available through the library. With competition from Web search engines and Web portals of various kinds available for free, the library has to step up to play a more active role as guide and coach to help users make use of information resources for learning or to accomplish particular tasks. It is no longer sufficient for computer-based library systems to provide just search and access functions. They must provide the functionality and environment to support learning and become computer-based learning systems. This paper examines the kind of learning support that can be incorporated in library online catalogues and digital libraries, including 1) enhanced support for information browsing and synthesis through linking by shared metadata, references and concepts; 2) visualization of related information; 3) adoption of Library 2.0 and social technologies; 4) adoption of Library 3.0 technologies including intelligent processing and text mining.

INTRODUCTION

The roles of libraries have shifted over the past century from being a repository of books and gateway to published information, to increasingly personalized information services. Similarly, librarians' roles have shifted from being collectors, custodians and intermediaries to becoming research assistants and collaborators. We can distinguish between the following roles of libraries and librarians:

1. *Libraries as repository of books and published documents, and librarians as collectors and custodians.* Libraries before the advent of computers tend to play this role, many providing only closed access.
2. *Libraries as gateway to information, and librarians as intermediaries.* With computerization and development of computer networks, the focus shifted to facilitating access, including remote access, to physical as well as digital resources. Librarians play an intermediary role to help users make effective use of the information retrieval systems, and locate information sources that are likely to contain relevant information for the user. With powerful Web search engines and free online resources, the usefulness of libraries and librarians as gateways and intermediaries is being questioned.
3. *Libraries as personal information space, and librarians as personal research assistants.* Librarians are increasingly expected to provide personalized services for individual users and user groups, and develop systems and services that support user tasks or have a direct impact on the organization or society that they serve. Library systems are expected to provide support for users to create their own information spaces, populated with a subset of the library's resources that are relevant to their interests and tasks.
4. *Libraries as participatory institutions and social constructions, and librarians as collaborators.* To stay relevant in the age of Google, Web 2.0 and mobile communications, libraries and librarians are increasing its engagement with users, not just in the provision of information services but in enlisting users to contribute and organize content, and even in designing services and systems. Librarians' roles are becoming more embedded in the lives and work of users. Public librarians are becoming pseudo-parents and tutors, and participate in the life of the community as community or floating librarians. Medical librarians become part of healthcare teams to support evidence-based medicine. Academic and special librarians are acquiring advanced degrees and becoming scholar librarians to better support their specialized users. On the other hand, users are being invited to contribute content in the form of reviews and ratings. Students and faculty contribute their theses and papers to university institutional repositories. Members of public libraries contribute photographs and other heritage materials. Information from user loan and browsing behaviour are being used to enrich the static bibliographic records in the online public access catalogues (OPAC). Users are helping to describe and organize records by adding tags and keywords. The distinction between librarians and users are becoming blurred. Libraries are becoming participatory libraries, and eventually users will help to define what the library of the future will be.



Though most libraries play all the above four roles to some extent, there is increasing focus on personalization and collaboration. Library system developers are adding functionalities that support personalization and collaboration. This is impacting the whole suite of information systems and digital resources that libraries offer to users:

- The integrated library system and OPAC
- Abstracting and fulltext online database systems, available through subscription
- Systems providing access to e-journals and e-books
- Institutional repositories or digital libraries of e-resources and heritage materials that are stored locally on the library's servers.

Traditionally, the library online catalogue and digital library interface serve an intermediary and access function to help users search for and browse information resources. However, it is no longer sufficient for an OPAC or digital library to offer just Boolean keyword and metadata searching. The system has to provide more assistance to the user to search, organize, synthesize and use information, and relate it to the user's task or information need. The library system cannot, of course, support every kind of task that users might conceivably perform. However, it is reasonable to assume that some kind of learning and acquisition of knowledge is an essential part of using information to accomplish any task. One can safely say that a library information system must be designed to support learning. Computer-based libraries must evolve into computer-based learning systems.

What is learning and knowledge-acquisition? A major part of learning and knowledge acquisition involves creating links:

- linking pieces of information to form a coherent pattern
- linking information to the user's knowledge
- linking information to a user task.

One can also distinguish between individual/personal learning and group learning. Group learning in an online environment is enhanced by the use of social technology. Library systems should support both kinds of learning.

This paper examines the kind of learning support that can be incorporated into library systems:

1. enhanced support for information browsing and synthesis through linking using shared metadata, references and concepts
2. visualization of related information – using visual interfaces to display related information graphically
3. enhancing library systems with Web 2.0 or social technologies (Library 2.0), such as user tagging, social bookmarking, user annotation and collaborative recommendations
4. adoption of Library 3.0 technology that enhances Library 2.0 systems with intelligent processing and text mining.

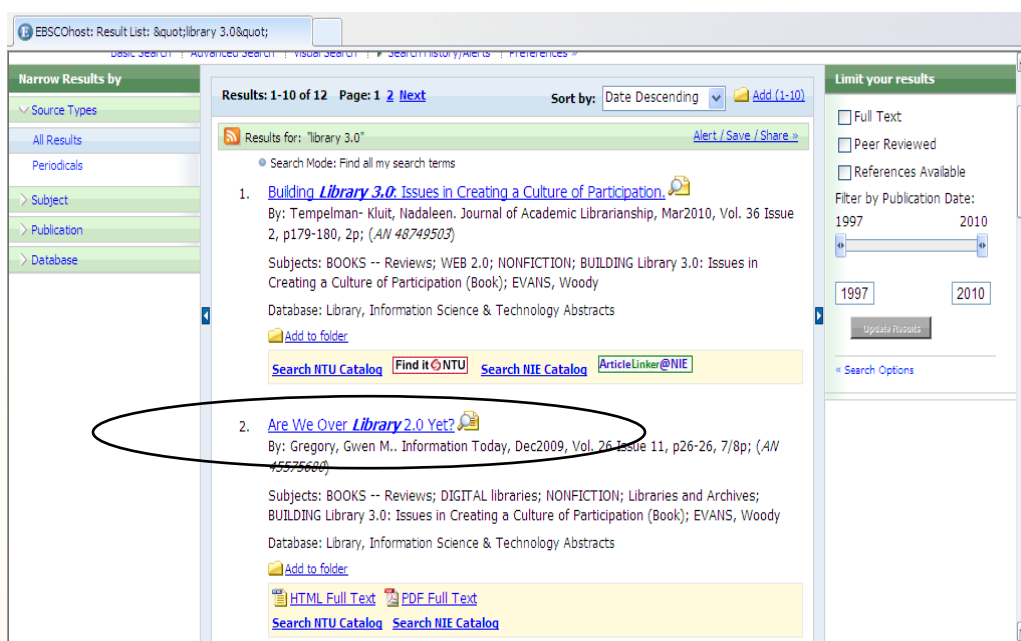


Figure 1. Example search result screen from EBSCOhost system

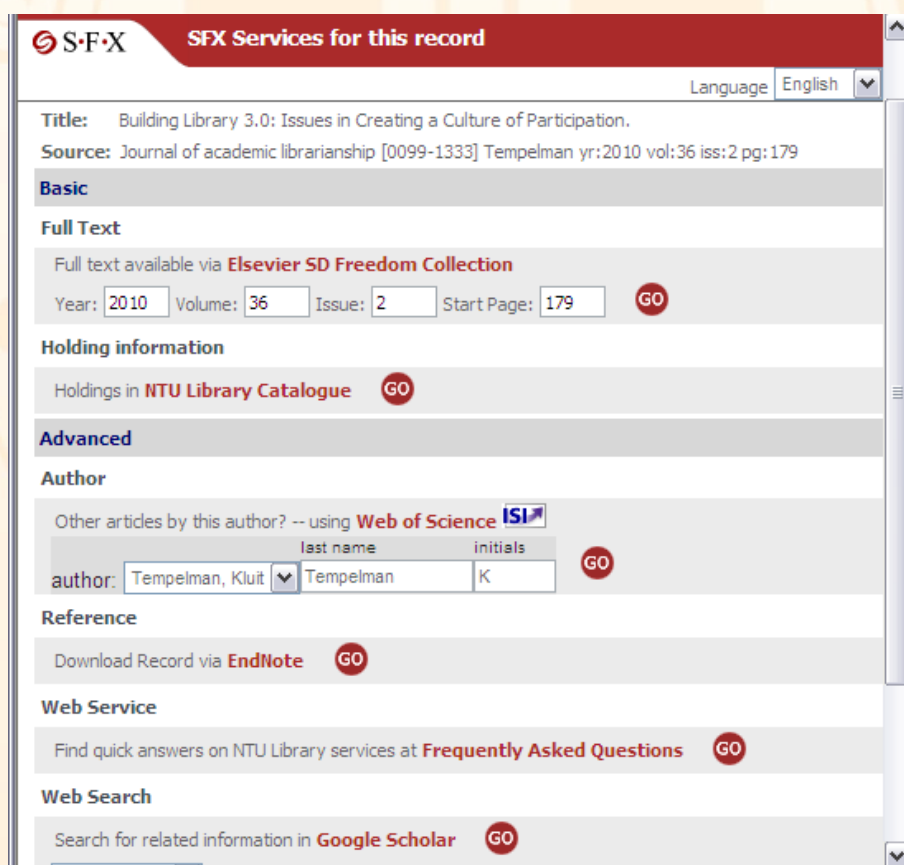


Figure 2. Response screen from an SFX link resolver

Google scholar

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Figure 3. Google Scholar links to the local library holdings

PubMed.gov
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National Institutes of Health

Search: PubMed

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J Med Internet Res. 2010 Jun 11;12(2):e18.

Definition of Health 2.0 and Medicine 2.0: a systematic review.

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Abstract

BACKGROUND: During the last decade, the Internet has become increasingly popular and is now an important part of our daily life. When new "Web 2.0" technologies are used in health care, the terms "Health 2.0" or "Medicine 2.0" may be used. OBJECTIVE: The objective was to identify unique definitions of Health 2.0/Medicine 2.0 and recurrent topics within the definitions. METHODS: A systematic literature review of electronic databases (PubMed, Scopus, CINAHL) and gray literature on the Internet using the search engines Google, Bing, and Yahoo was performed to find unique definitions of Health 2.0/Medicine 2.0. We assessed all literature extracted unique definitions, and selected recurrent topics by using the constant comparison method. RESULTS: We found a total of 1937 articles, 533 in scientific databases and 1404 in the gray literature. We selected 46 unique definitions for further analysis and identified 7 main topics. CONCLUSIONS: Health 2.0/Medicine 2.0 are still developing areas. Many articles concerning this subject were found, primarily on the Internet. However, there is still no general consensus regarding the definition of Health 2.0/Medicine 2.0. We hope that this study will contribute to building the concept of Health 2.0/Medicine 2.0 and facilitate discussion and

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Definition of Health 2.0 and Medicine 2.0: a

Figure 4. Search result screen from PubMed

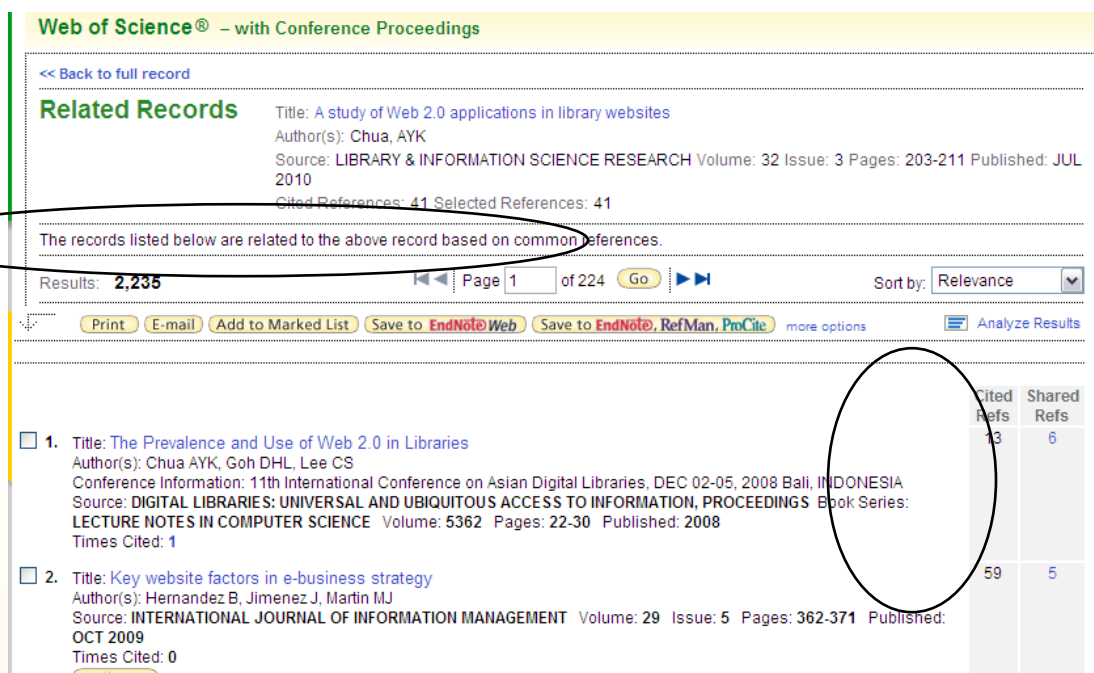


Figure 5. Search result screen from Web of Science

Visualization of Related Information

With all the different types of linked information to display on the screen, interface design is a challenge. How can the interface be designed to support learning? Digital library interface design is an active research area. One line of research focuses on visual interfaces and visualization of information. Relationships between documents can be seen more easily in a graphical form. Visualization technologies have mainly focused on depicting documents (or document clusters) as nodes or points, and relationships between them as links or distance in a 2 or 3 dimensional space. The documents or document clusters can be represented as icons of various shapes, colours and thicknesses to represent the nature of the content. The field or structure on which the points or icons are placed may be a tree structure, grid, scatterplot, or some other structure (Cugini, Laskowski & Sebrechts, 2000).

Visualization technology can be used to provide a conceptual map of the whole database, just the set of retrieved records, or the local neighbourhood of a retrieved record. Another kind of visualization is to superimpose documents with a geographic element onto Google Maps in what is known as a mashup.

One example of a visual interface to an information retrieval system is NIRVE (NIST Information Retrieval Visualization Engine) that allows the user to visualize, cluster and manipulate a set of documents retrieved by a search engine (Cugini, Laskowski & Sebrechts, 2000). The program can be downloaded from <http://zing.ncsl.nist.gov/~cugini/uicd/nirve-home.html>. One of the interface models, which they referred to as the 2.5D model, is shown in Figure 6. The interface displays clusters of documents that share the same query concepts. The cluster of documents that contain all the query concepts occupy the north pole, while the cluster containing none of the concepts occupy the south pole. As the user moves downward from one cluster to the next, the number of query concepts decrease. Each cluster is represented by an icon depicting a bar graph that shows the relative frequency of the concepts in the cluster. Each cluster icon can be clicked to display the set of documents.

Figure 7 shows a search result screen from the Grokker E.D.U. interface that was used as a federated search interface at Stanford University (Hane, 2004, December 20). The interface displays clusters of retrieved documents, that are clickable.

The use of visualization is still not prevalent in commercial OPACs, fulltext databases and institutional repositories because of the difficulty of depicting textual information graphically, in a way that is helpful to the user and does not require much effort to learn the visual system. What is more common in OPACs is the virtual shelf browser, that allows the user to browse library records by shelflist (i.e. call number) order (see Figure 8).

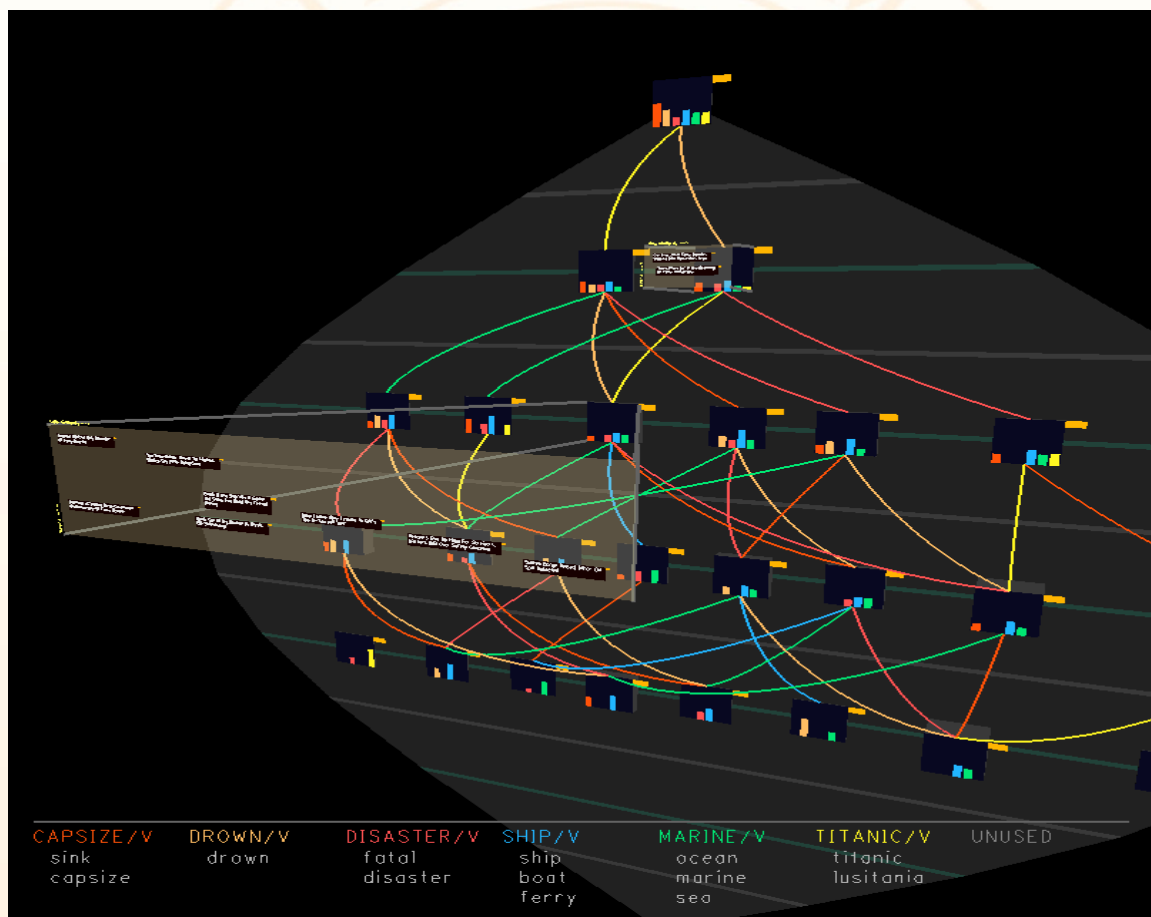


Figure 6. NIRVE 2.5D visual interface for displaying search result
(source: Cugini, Laskowski & Sebrechts, 2000)

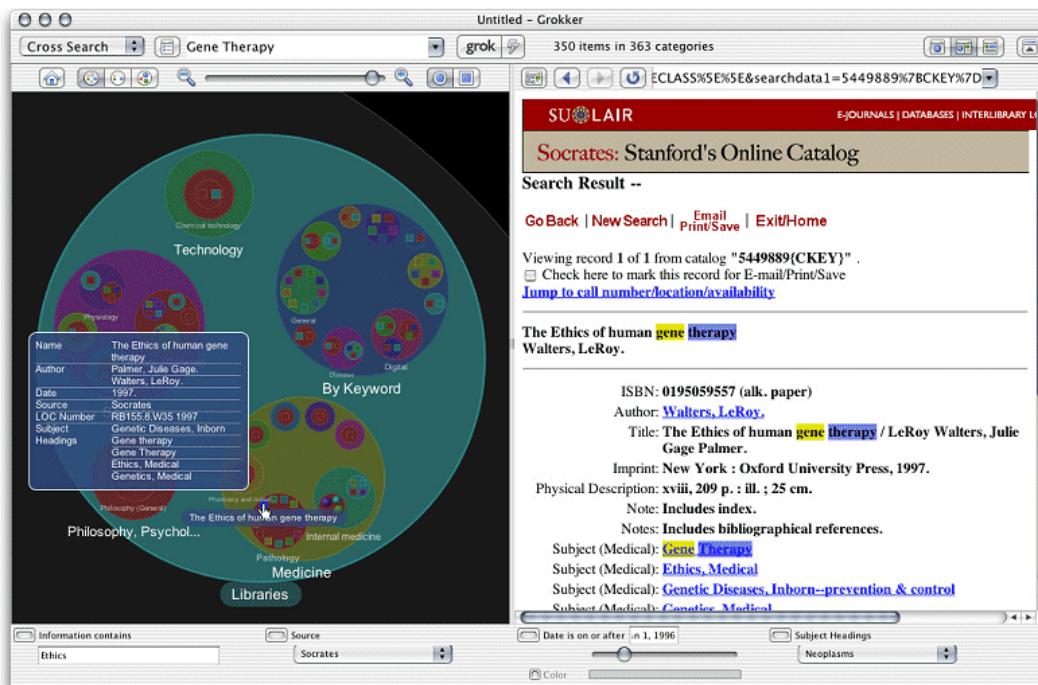


Figure 7. The Grokker E.D.U. interface used at Stanford University
(source: Hane, 2004, December 20)

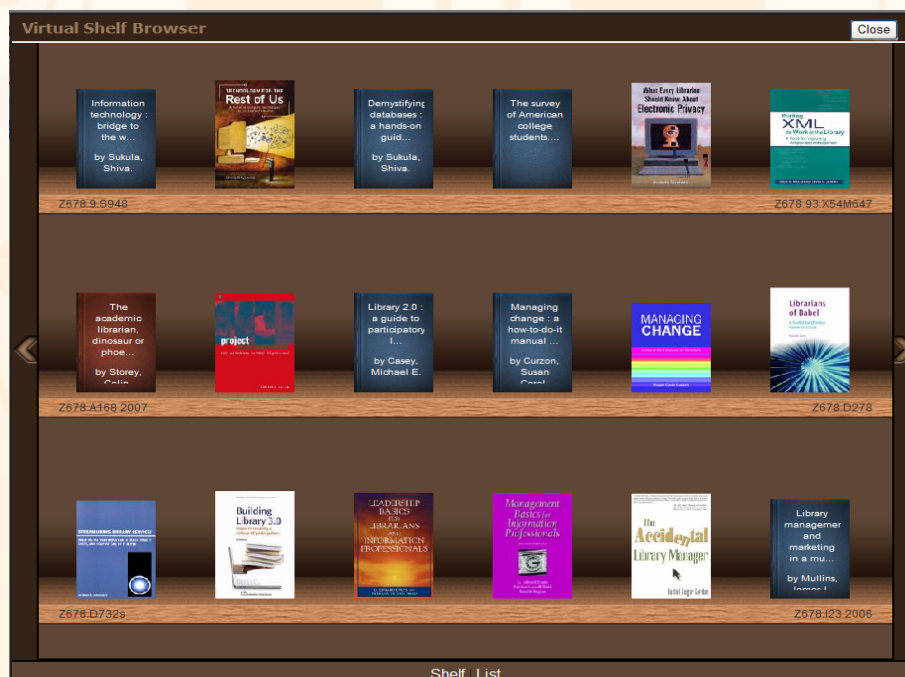


Figure 8. Virtual shelf browser



Using Library 2.0 Technology

Library system developers are taking advantage of the craze over Web 2.0 and social technologies to incorporate social and collaboration functions in library systems, in a movement that has been referred to as Library 2.0 (Maness, 2006). Collaboration functions that have been incorporated include:

- Social tagging of records and displaying the tags as tag clouds, to reflect the relative frequencies of the various tags. This provides additional access points for browsing and searching, as well as an additional way to reflect the subject content from the users' perspectives.
- Bookmarking of records to create a personal library collection, and sharing the bookmarks as recommendations (called *social bookmarking*).
- User annotations, usually in the form of reviews and ratings. These functions have been referred to as *catalog* features (Anderson, 2009).
- Collaborative recommendations, similar Amazon.com's "customers who bought this item also bought" feature. This is based on a measure of document association calculated from the number of users who loaned or downloaded both documents.

Figure 9 gives an example OPAC search result screen of the Nanyang Technological University Library, with some of the Library 2.0 features. It also shows an example of a mashup of data and functions from multiple systems and sources. The user reviews, user ratings and social tagging data and functions are taken from *LibraryThing*—a social cataloguing and networking site for book lovers (Figure 10). Clicking on one of the user tags will bring the user to the tag browser of the *LibraryThing* website.

These Web 2.0 features collect and summarize the experience and perspectives of a group of users, harnessing the information to support discovery of useful documents. It is not clear to what extent these features enhance individual and group learning.

I believe that stronger support for learning will arise from developments in participatory content creation and organization. *Participatory content creation* refers to the situation where users actively contribute content to the information system, including their interpretations of existing content, and participate in organizing the resources in the system, as opposed to adopting an organization scheme imposed by experts (e.g. librarians). This approach is increasingly used in heritage and museum systems, where users contribute heritage items and provide their interpretations and cultural perspectives on the items. Srinivasan, Boast, Furner & Becvar (2009) explained this approach:

"Web 2.0 technologies have introduced increasingly participatory practices to creating content, and museums are becoming interested in the potentials of "Museum 2.0" for reaching and engaging with new audiences. ... For this to be done effectively, however, some underlying contradictions must be resolved between museum practices, which privilege the account of the "expert," and distributed social technology practices, whose strengths lie in allowing for many, sometimes contradictory, perspectives. ... Indigenous peoples hold contextual, experiential, and historical knowledge around objects that are often absent from catalog entries. These knowledges are often passed on through stories, intergenerational communication, and contextualization of cultural objects by considering present uses. ... it allows the object to serve as an active expression of a set of traditions, allowing those traditions to directly speak about the object." (Srinivasan, Boast, Furner & Becvar, 2009)



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Library 2.0 : a guide to participatory library service

Casey, Michael E., 1967-

"Library 2.0" is a service model that aims to empower library users through participatory, user-driven services. In this resource for library administrators, Casey and Savastinuk review the model's theoretical underpinnings and offer practical advice on its implementation. Some of the issues addressed include reaching new users, incorporating technology, and getting read more...

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xov, 172 p. :

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Explore the virtual shelf browser

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Figure 9. OPAC search result screen at Nanyang Technological University

Transformasi Perpustakaan Melalui Teknologi Maklumat

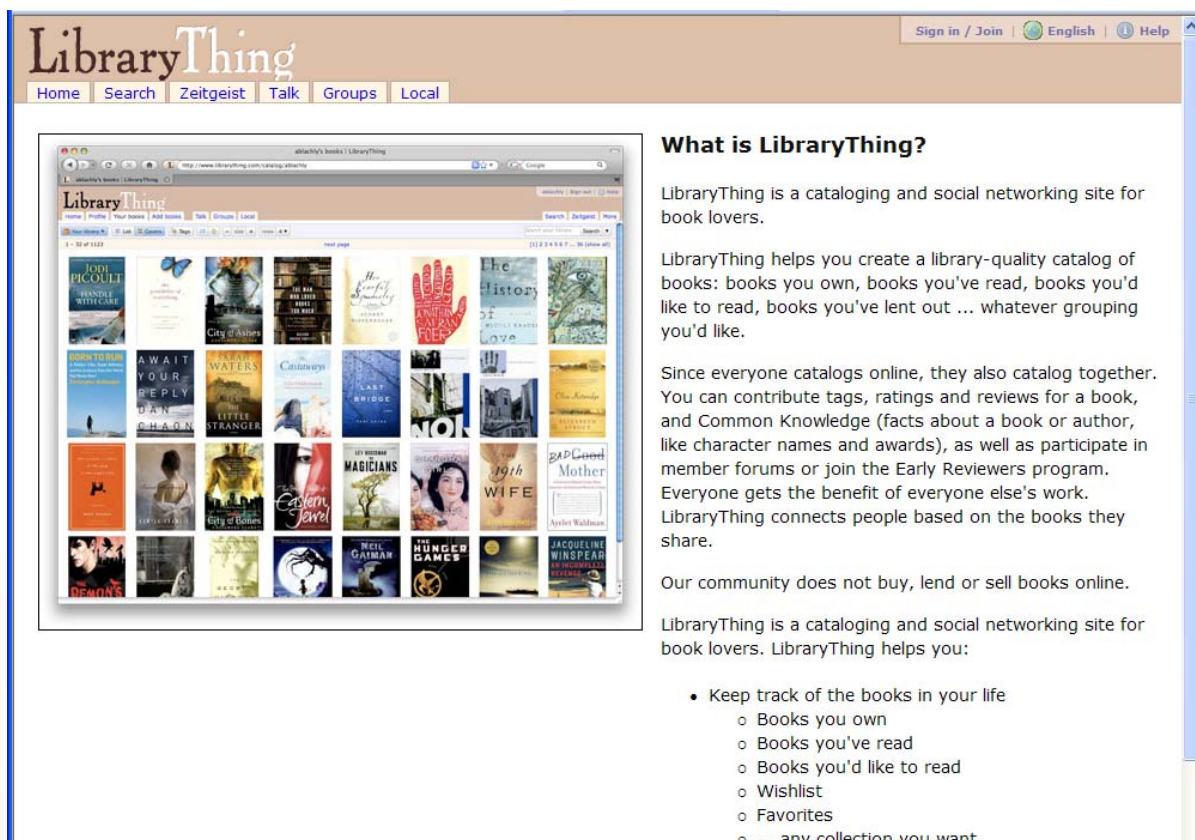


Figure 10. LibraryThing—a social cataloguing and networking site for book lovers

We foresee that this attitude and philosophy will begin to influence library practices and the design of library systems, giving rise to participatory libraries (Maness, 2008; Lankes et al., 2007) and, perhaps, participatory cataloguing! Some libraries have begun to experiment with participatory content creation in a limited way, especially with heritage collections. The Picture Australia project (<http://www.pictureaustralia.org/>) and the Library of Congress Flickr Pilot Project (Springer et al., 2008) are good examples. In both projects, collections of photographs are made available online and members of public are invited to enjoy the photographs and add tags and annotations, as well as contribute their own photographs.

Library 3.0 Technology

Library 3.0 can be characterized as Library 2.0 with the addition of intelligence. I foresee that the next generation library systems characterized by Library 3.0 features, will not only retrieve documents and provide individual and social spaces, but also provide a set of intelligence and analytic tools to analyze, compare and synthesize information to facilitate the user learning. Library 3.0 functions include:

1. Automatic indexing and subject heading assignment
2. Automatic clustering and organization of documents based on similarity and relationships in document content
3. Question answering, and information extraction of related information for particular purposes (e.g. extraction of treatment information from a medical database)
4. Multidocument summarization of the search result set, and automatic literature review generation.

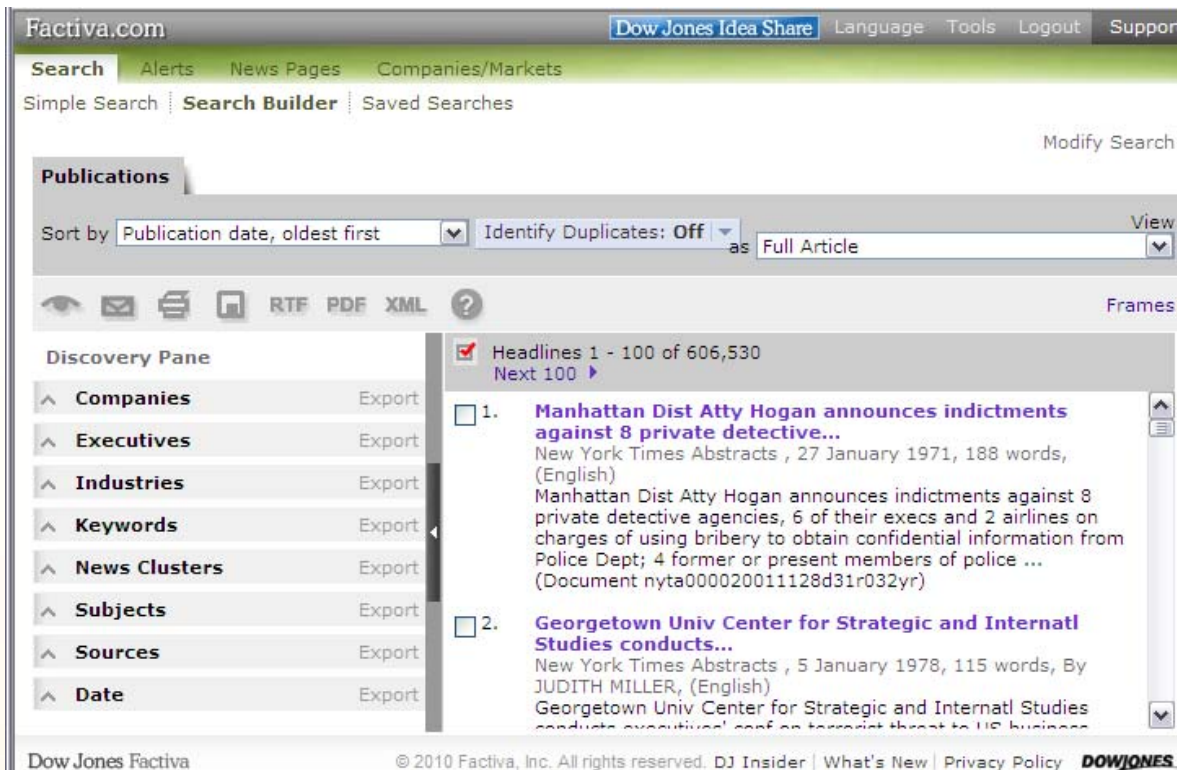


Figure 11. Factiva search result screen for the query "business intelligence"

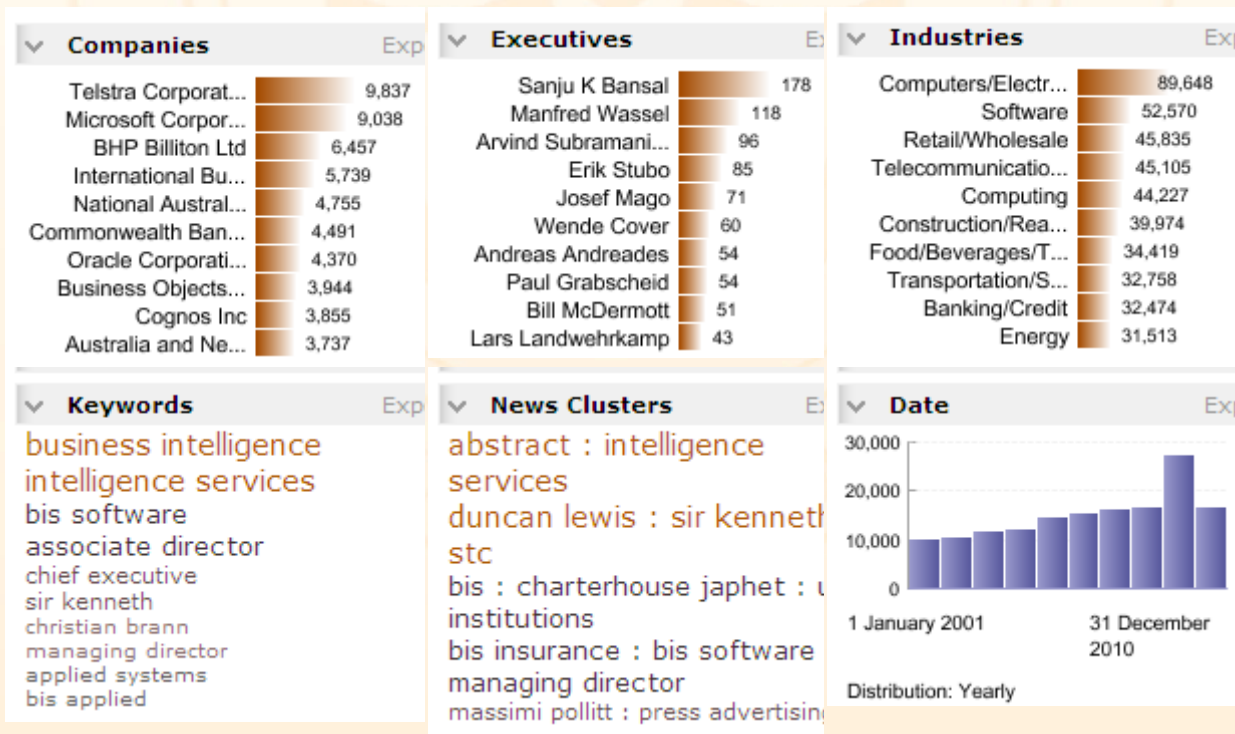


Figure 12. Entity extraction and content analysis shown in the discovery pane of Factiva search result screen



These features can already be found in some fulltext database systems and search engines, particularly the features of automatic indexing and clustering of search results. The Factiva system provides tools for entity extraction (extraction of company, people and industry names) from the fulltext of the search results, as well as a simple statistical analysis of keywords and phrases. Figure 11 shows the Factiva search result screen for the query “business intelligence.” The analysis tools are available in the “Discovery Pane” on the left. Figure 12 shows the extracted entities and keywords listed in decreasing frequency.

Conclusion

Library systems have made good progress in the past decade in improving the usability of their user interfaces, in the areas of linking documents within and across systems and databases, providing federated search functions and adding social functions. As Breeding (2010) pointed out, the focus has been on supporting and enhancing discovery. Current library systems can be termed *discovery systems*, rather than just search and access systems. However, more needs to be done to support learning. Computer-based library systems need to evolve into computer-based learning systems, with more personalization, intelligent processing and text analysis facilities. Users should also be involved in the development of libraries services and systems, and in shaping libraries and library systems into personal tools for collecting, organizing and managing information and information resources that are important in users’ lives and work.

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