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Shaping a new generation of LIS professionals in the 21st century

LiLi Li
Associate Professor / E-Information Services Librarian
Georgia Southern University Library
P.O. Box 8074
Statesboro, GA, United States

Abstract:

This paper explores which key information technology skills new LIS graduates must have in dynamic and interactive library scenarios. With the web-based library information technology architecture, this paper outlines the developing trends in information technology applicable to web-oriented library information resources and services. Taking an example from three top American LIS graduate programs, this paper makes practical suggestions for LIS instructors to promote creations and innovations in LIS curriculums. Finally, this paper draws a clearer road map for new LIS graduates how to select LIS graduate courses for their future career developments in service-oriented and user-centered library environments.

INTRODUCTION

Propelled by innovative cutting-edge and emerging information technologies, the Internet has become a primary platform for information delivery and dissemination. The prosperity of web search engines has been greatly shaking the social functions of the library in today's information world. More and more research papers are published to predict when the library will finally exit from the stage of history. As early as in February, 2008, Lyman Ross and Pongracz Sennyey warned us that "As a direct consequence of the digital revolution, academic libraries today face competition as information providers." New breakthroughs in information technology have been a real key factor for Library Information Science (LIS) programs worldwide to absorb more computing and information system courses. At the same time, the global financial crisis that happened in 2008-2009 has slashed many libraries' operating budgets and frozen new hiring in library settings. Under the shadow of the double dip recession, new LIS professionals will have to improve their competency in grasping more computing experience, knowledge, and skills in competitive library careers. Therefore, this paper intends to provide a clearer roadmap to show how and where innovative information technologies are impacting which library information resources and services over the Internet.

WEB-BASED LIBRARY INFORMATION TECHNOLOGY ARCHITECTURE

Since the late of 1990's, the Internet and the World Wide Web (WWW) have become the primary technology platform for libraries worldwide to deliver web-based information resources and services. With the typical three-tier web-based client/server library information technology architecture, it is obvious that different library computers, including desktop computers, laptops, netbooks, and smart phones, are located at Tier 1 (also called Web clients at the frontend). Middleware, which contains Web server and many other business rules, is located at the Tier 2. Various data repository objects, including HTML/XML based documents, catalogs, data warehouses, digital libraries, e-databases, knowledgebase, web forms, and other digital assets, are located at Tier 3 (also called the backend).
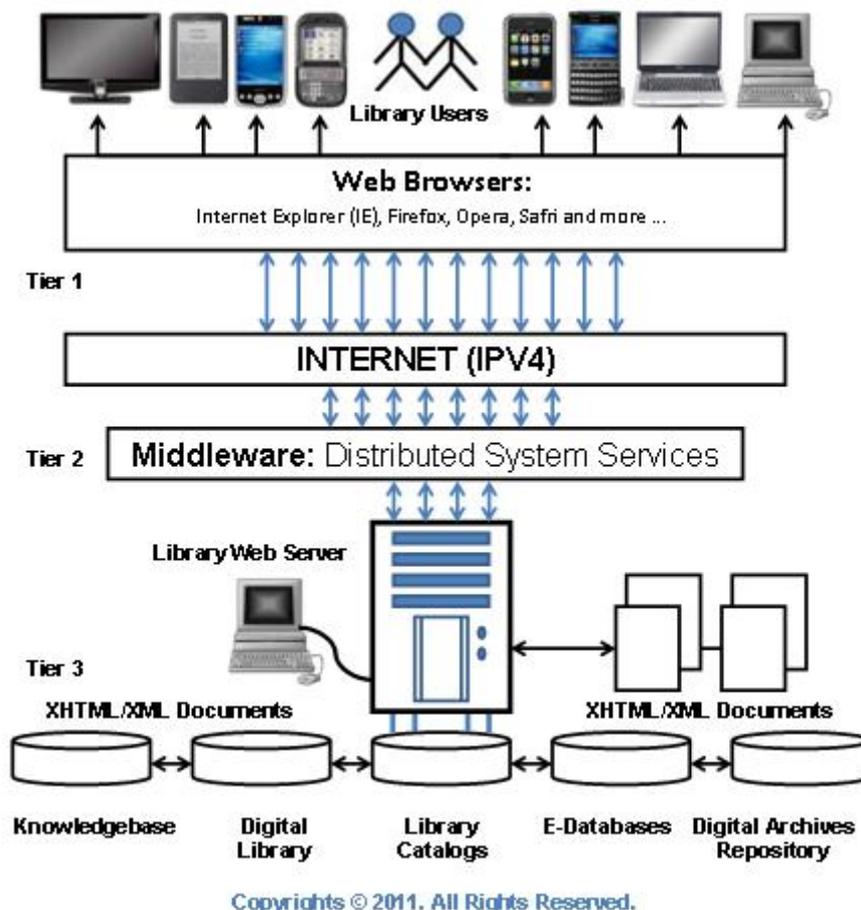
Figure 1: 3-Tier Library Information Technology Architecture

Utilizing the Internet platform, global libraries are able to set up web-oriented information resources and services, such as Ask-A-Librarian, bibliographic instructions, computerized library catalogues, distance learning programs, e-government information resources, information literacy programs, Interlibrary Loans (ILLs), library workshops, virtual classrooms, virtual library tours, virtual references, and other specific community liaison programs or services. All of these library information resources and services, in most of cases, are created by HTML (Hypertext Markup Language) and XML (Extensible Markup Language) documents located at the frontend. As for other scripting languages, such as CSS

(Cascading Style Sheets) and Java Scripts, they can be located either at the frontend or at the backend. At the backend, server side scripting languages, including ASP (Active Server Pages), ColdFusion, JSP (Java Server Pages), .Net Framework, PHP (Hypertext Preprocessor), etc., are providing controls and responses to web users' access rights, inquires, inputs, and other related web activities. Invisible to web browsers, the primary role of server side scripting programming languages is to generate dynamic and interactive web pages.
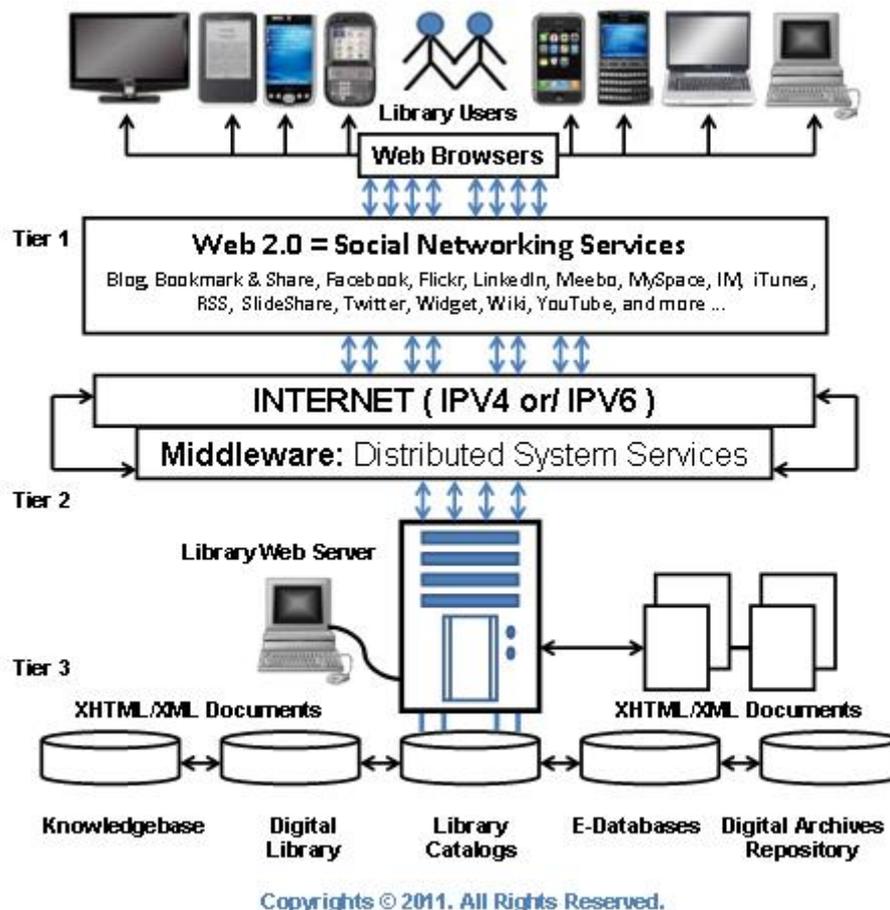
Figure 2: Social Networking Services Applicable for Library Information Technology Architecture

Impacted by the surging wave of Web 2.0 and social networking services, libraries worldwide have started utilizing numerous top social networking applications and websites to enhance and integrate web-based information resources and services. In his "Web 2.0 Compact Definition," Tim O'Reilly (2005) said that "Web 2.0 is the network as platform." One year later, he again clarified in his "Web 2.0 Compact Definition: Trying Again" that "Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform" (O'Reilly, 2006).

Still as a debatable virtual service model, the buzzword Web 2.0 is now widely being promoted by social network applications and websites in service-oriented and user-centered library settings. What is a Social Network? The free online encyclopedia Wikipedia defines a social network as "a social structure made up of individuals (or organizations) called 'nodes,'

which are tied (connected) by one or more specific types of interdependency, such as friendship, kinship, common interest, financial exchange, dislike, sexual relationship, or relationships of beliefs, knowledge or prestige." Social networking applications refer to blogs, Instant Messaging (IM), RSS, social bookmarking, and wikis, etc. Social networking sites include Facebook, Flickr, Myspace, Twitter, YouTube, etc. Currently, social networking applications and sites are accessible at the frontend of the library information technology architecture over the Internet. Library users need web browsers to access to these web-based social networking applications and social networking sites. Figure 2 abovementioned outlines what Web 2.0 and social networking applications as well as social networking sites are impacting on web-oriented library information resources and services over the Internet platform.

FUTURE LIBRARY INFORMATION RESOURCES AND SERVICES

The evolving Library Information Technology Architecture over the Internet platform has showed where evolution and revolution in information technology are changing web-based library computing environments. In the digital age, therefore, we can see that digital libraries, e-books, machine translations, mobile computing, smart phones, touch screen technologies, semantic web, wireless communication, etc. will lead the future developing trends in information technology for library innovation and knowledge creation. The digital age is only the prelude of the revolution in future information technology.

In the evening of February 14, 2011, I happened to watch a popular American Quiz Show named Jeopardy. I really enjoyed watching how easily IBM super intelligent robot named Watson won the championship title from its two human rivals. At that moment, I realized that it will no longer be a dream to see more and more super intelligent robots in our future information society. Once the digital age is over, the age of super intelligent robots will follow.

As a matter of fact, Watson's success has already given us an example where the future library automation can be expanded. Watson's accurate answers with cool accents definitely will provide demanding information seekers with high-quality information resources and services. If IBM or Google deploy Watson in the future, global library information services could be taken by IBM super intelligent robots, plus Amazon Kindles, e-databases, Google Books, Google Scholar, and other web search engines. The primary daily workloads for information services librarians might be changed to general robot maintenance and programing.

Although there are still so many uncertainties for the emerging and future roles of libraries all over the world, we can still be sure that the current library information resources and services will be impacted by new technological breakthroughs in the fields of artificial intelligence, data warehouses, e-books, machine translations, mobile and wireless telecommunication, semantic web, etc. The current developing trend in information technology has proved that the only way of rescuing for future libraries and LIS programs at stake is to merge with computer science, information systems, and information technology. When all the paper format information is eventually replaced by e-format information in the future, it will be the last moment for us to say a final goodbye to the library of today. As a result, librarian positions in the future will be replaced by computer programmers, information technology consultants, and information system specialists.

QUICK ANALYSIS AND COMPARISONS OF THREE TOP LIBRARY AND INFORMATION SCIENCE (LIS) CURRICULUMS

Based on the information statistical data collected by the ALA (American Library Association), there are currently fifty-eight Schools of Library and Information Science available in the North America. Most of them are located in Canada and the United States. Due to a limited amount of time, the author cannot review all the top LIS (Library Information Science) graduate programs in these two countries. Utilizing the current ranking report compiled by the U.S. News and World Reports, the author has separately selected three top American LIS graduate programs from the University of Illinois at Urbana-Champaign, the University of North Carolina at Chapel Hill, and the Syracuse University. The website of the U.S. News and World Reports offers detailed information regarding its education rankings methodologies. The methodology of the author's simple review is to examine the scopes how many information system and technology courses are covered in the current LIS graduate programs. As a reference for LIS instructors and students, it only intends to compare differences among these three top American LIS master programs, instead of being judged as a ranking report. More accurate and detailed comparisons and evaluations could be completed in future researches.

Generally, traditional LIS programs focus on library administration, archives and manuscript collections, children and young adult librarianship, records management, cataloging, public and reference services, acquisitions and collection management, special collections, etc. Information Science, Information Systems, and Information Technology programs, instead, focus on databases and data warehouses, digital libraries, emerging technologies, instructional technologies, multimedia, social media, web design and development, etc. As an interdisciplinary subject, library information science has been more closely associated with computer programming, information systems, and technology in today's information society.

At the Graduate School of Library and Information Science (SLIS) in the University of Illinois at Urbana-Champaign, its core graduate program has a specialization in the management of history of social sciences and humanities, especially in the classical fields of archives, cataloging and classification, children literature, community development, copyrights, economics, history, knowledge management, law and policy, library and museum management, public library, oral history, rare books, social informatics, and so on. Also, SLIS in the University of Illinois at Urbana-Champaign offers Certificates of Advanced Study in Digital Libraries and in Biological Informatics. Unfortunately, the percentage of information system and technology courses in its current graduate program seems to be a little lower. Among the total number of 209 graduate courses at the course level 400-500, there are only 35 graduate courses, which only counts as 16.7 percent in its whole SLIS curriculum, focusing on the field of database, data modeling, entrepreneurial IT design, information visualization, network management, systems analysis and management, Web 2.0, Web design, etc.

At the School of Information and Library Science (SILS) of the University of North Carolina at Chapel Hill, new LIS students are offered as many as 20 computing and information system courses out of the total of 87 master courses and seminars at the graduate course level 400-900. It represents the ratio of 23% of its current LIS graduate-level courses focusing on computer programming, client/server architecture, database systems, data mapping and information visualization, digital collections and digital libraries, distributed systems, human interface interactions, information security, information tools, metadata architectures and applications, protocols and network management, system analysis, user interface design, web design and development, etc. Also, these 20 information system courses

are divided into three master's degree programs: M.S. in Information Management, M.S. in Library and Information Science, and M.S. in Telecommunications and Network Management. Perspective graduate students the University of North Carolina at Chapel Hill will have more options to pursue different career developments in the real world.

At the School of Information Studies (SIS) at Syracuse University, LIS students will be able to select 68 LIS graduate courses at the graduate course levels 500-700. Most of these 24 graduate courses are electives, focusing on the fields of data modeling, database management, distributed computing, human-machine interaction, information systems analysis, information technology architecture, network security, telecommunication and network management, web database design, wireless network, etc. In addition to highly recommended courses in the fields of cataloging and classification, digital library, reference services, school media libraries, and much more, the SIS at the Syracuse University also offers three additional certificates: Certificate of Advanced Study in Cultural Heritage Preservation, Certificate of Advanced Study in Digital Libraries, and Certificate of Advanced Study in School Media for LIS graduates. These curriculum arrangements will assist LIS graduates to select different library career paths more effectively and efficiently.

SUGGESTIONS AND RECOMMENDATIONS

It is an old cliché to say that information technologies have changed the way of information delivery and dissemination in the digital age. LIS graduates need to know how and what information technologies are impacting which dynamic and interactive library information resources and services on the web. Rated as the best LIS master programs in the United States, LIS master programs at the University of Illinois at Urbana-Champaign, the University of North Carolina at Chapel Hill, and the Syracuse University are expected to spark creativity and promote innovation in future library automation and digitization.

In the author's brief review, the Graduate School of Library and Information Science (SLIS) in the University of Illinois at Urbana-Champaign covers all the American cultural, historical, and social heritages in Library and Information Science. Now it is being challenged to combine the modern computer and information technologies with American traditional LIS courses. On the contrary, the School of Information and Library Science (SILS) of the University of North Carolina at Chapel Hill is a pioneer to merge more information system and information technology courses with traditional LIS teaching contents. By offering LIS students more options to match their different library careers tracks, the School of Information Studies (SIS) at the Syracuse University offers more computing and information system courses to enhance and promote the essential competency of its future LIS professionals in the digital age. All in all, these pioneering practices provide new creative ideas for global LIS professionals on how to link LIS core values with evolving information systems and technologies.

Although the dotcom bubble has burst, the evolution and revolution in information technologies is still under way. Over the platform of the evolving web-oriented Library Information Technology Architecture, broadband networks, digital libraries, e-books, human intelligence, machine translations, mobile computing, smartphones, streaming video, touch screen technologies, semantics Web, wireless communication, etc. will impact on the future information technology applicable to library settings. Therefore, it is right time for academic administrators, executives, LIS instructors and students, librarians, and other professionals to take action. We need a series of new creations and innovations to adjust our missions and

strategic plans. Current LIS programs need new reforms. LIS instructors need to explore more innovative practices and unconventional approaches to combine computer and information system courses into LIS core courses. New LIS graduates need to understand how and where multi-format information is delivered and disseminated across heterogeneous applications, databases, networks, platforms, and systems over the web.

However, the greatest challenge for current LIS instructors is not only about teaching LIS graduates how to learn better than what they have already known regarding dynamic and interactive library information resources and sources in the pervasive computing environments, but also about fostering LIS graduates' competency in utilizing unfamiliar information media which LIS instructors and students never have had a chance to work with today. In fact, the ultimate goal of the LIS programs in the world is how to ensure that new LIS professionals could possess new skills of critical thinking, decision making, and problem solving in the future unknown world.

SUMMARY

In one world, the mission and function of the library have been greatly changed in the digital age. A library is no longer recognized only as a warehouse to store printed archives and resources. The library information technology architecture over the Internet platform has provided LIS professionals with the best roadmap to follow the developing trends in information technologies applicable to dynamic and interactive library environments. Using this evolving web-based library information technology architecture as a reference, academic administrators, executives, LIS faculty members, librarians, and other professionals worldwide will be able to shape a new generation of LIS professionals in the coming years of 21st century.

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