Competition or Convergence? Library and Information Science Education at a Critical Crossroad

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I. The Changed Information Landscape

Libraries and librarians have long been early adopters of information technologies. For decades, librarians have applied computerization to library operations. Standardization and computerization of bibliographic records decades ago made possible automation of library systems, the creation and utilization of giant bibliographic utilities such as OCLC with its 52 million records. Collaborative adoption of information technologies decades ago brought shared cataloging, on-line public access catalogs, bibliographic databases, enhanced interlibrary loan and document delivery, and acquisition of information in digital formats, resulting in worldwide access to library resources. Nonetheless the revolution in information technologies that produced the World Wide Web in the mid-1990s hit the information profession of librarianship and the educational establishment like an earthquake.

As librarians vividly recall, the changes that resulted in radically different approaches to access to information content, and the ability to communicate and collaborate around knowledge, brought fear to many in Library and Information Science (LIS). Computer scientists promised that intelligent agents would provide direct access to Internet content and in the process would bypass intermediaries, including librarians. Some feared that the Internet would make both libraries and librarians superfluous, or doom them to extinction. Looking back a mere decade, it is not difficult to see that the Internet and the changing information infrastructure brought at least fear of a crisis. Built by computer scientists, the Internet provided radically new kinds

of information flow and created a new information landscape—just as an earthquake might. The continuing information revolution has been at the same time the most serious crisis ever faced by the field and its biggest opportunity.

The changed landscape has influenced both practice and education. Added to this situation is the current shortage of professional staff, so profound that it has been noted by the press, and by the First Lady who has spearheaded a major recruitment effort (Tenopir, 2002; Lynch, 2002). In addition, statistics predict the impending retirement by the end of the next decade of 68% of the nation's librarians (Tenopir, 2004; Lynch, 2002). These factors have focused attention on the education of librarians.

This paper focuses specifically on the changes that are ongoing in the evolution of LIS education; it is framed as a discussion of crisis and opportunity. Continuing change in the information environment is a compounding factor in the crisis; while information technologies have had a profound impact on libraries and librarians, a group of vocal librarians appear to resist the inevitable changes that must occur in educating information professionals for the future. Factors external to the field and the field's changing research paradigm, to be discussed below, have put LIS educators in direct competition with others for the domain that had been claimed since the end of the 19th century by librarians. This paper examines the changed landscape in which LIS education operates and its accompanying opportunities for the domain that LIS claims.

II. It Is Not Just Technology: The Changing Research Paradigm

The knowledge base of LIS, built largely by faculty in LIS programs, grew slowly throughout much of the 20th century, but experienced rapid growth in the last two decades well before the Internet crisis of the 1990s. In the process of the growth of the knowledge base of the field, increasing numbers of researchers realized that "library problems" were actually "information problems." Over 30 years ago Robert Taylor, dean of the Syracuse program from 1972 to 1981, suggested moving from the Ptolemaic and library-centered view of the universe to a "dynamic Copernican universe with information at its center and with libraries playing a significant, but not necessarily central, role." (Sutton, 2001) This paradigm has come to be accepted by LIS researchers and has permitted them to develop more effective frameworks for their work which today encompasses what Marcia Bates, UCLA faculty member, researcher, and theoretician, has summarized as the three "Big Questions" of LIS research: "(1) The physical question: What are the features and laws of the recorded-information universe?

(2) The social question: How do people relate to, seek, and use information?
(3) The design question: How can access to recorded information be made most rapid and effective?" (Bates, 1999).

Researchers seeking the answers to the three big questions identified by Bates have moved LIS education into a Copernican universe with information at its center and, as Taylor predicted, libraries as one of the planets in the universe. The knowledge gained from this approach has entered LIS education and has influenced the changes identified in the KALIPER study discussed below. The changed information landscape and the changing LIS research paradigm have been accompanied by intensive internal examination of domain knowledge within LIS and more broadly within the framework of information, rather than the library framework. These changes, of course, have occurred program by program. Broad-spectrum examinations of various scholars looking across this changing field have produced both a variety of thoughtful, penetrating journal articles and a group of serious monographs that seek to synthesize the knowledge domain and contributions of LIS. This section of the chapter examines some of this work.

III. Operating in a Highly Competitive Environment

Eight years ago LIS researchers Nancy A. Van House and Stuart A. Sutton, re-examined the Ptolemaic vs. Copernican debate started in the 1970s by scholars such as Robert Taylor, but made an urgent priority by the advent of the Internet. Using an ecological metaphor which compared library-focused education to the Panda Syndrome, these scholars noted that the panda is nearing extinction because of its limited ecological niche arguing that narrowly focused library education programs were doomed to extinction.

> LIS education is operating in an extremely dynamic and highly competitive environment. The growing importance of information, developments in information technology and the information environment, and LIS' own efforts at adaptive radiation have created an ecological convergence between LIS and other professions and professional education programs both in LIS' traditional niche (e.g., "digital libraries") and new niches (e.g., information management). The information field is undergoing radical change, and LIS is not the only profession seeking to claim jurisdiction.   (Van House and Sutton, 1996)

Van House and Sutton warned "that the increasing value of information is bringing other professions into the information field, and changing the boundaries and rules of competition" adding that "both the LIS profession and education for LIS...[are] engaged in a struggle with other professions and academic disciplines both for jurisdiction over the information functions that have traditionally been the problem domain of LIS and of the information functions brought about by changes in technology and society." Van House

and Sutton further warned that "to compete, LIS education and the profession have to be more cognizant of their own and their competitors' habitus and the dynamics of this changing, enlarged field..."

Noting an ecology of professions, they indicate that "professions are created, grow, transmute, and disappear... Convergence is especially likely when the rewards (money, prestige, power) of a problem area or professional niche are great, attracting attention from many professions" and, quoting Andrew Abbot, they indicate that "knowledge is the currency of the competition. (Abbott, 1988, p. 102)"

While the knowledge gains resulting from LIS research have served to position LIS education for the information technology revolution, they have also served to distance it from practice, creating what some in the field see as a crisis in "library" education (American Library Association. Congress on Professional Education, 2000). Michael Gorman, for example, insists that

> There is a dearth of research in US LIS schools that is dedicated to the real needs of real libraries. This is the result both of the divorce between information science oriented faculty and practicing librarians and of the fact that LIS schools in the US tend to be part of large universities that value (and reward) pure research over applied research. This has led to a gap in the library journal literature between arid and inaccessible reports of pure research and naïve "how we did it good" reports.   (Gorman, 2003)

Indeed, fostered by the factors identified earlier, the education establishment for this field is in the midst of a period of change which has led to major repositioning and focus, major curricular changes, adoption of new approaches, technologies and knowledge, and identification of new constituencies and an extensive infusion of new resources in some schools. The information technology revolution provided the necessary impetus for change and programs with faculty attuned to these external factors and engaged in research are more likely to be positioned for this essential change.

IV. Documenting LIS Education in the Midst of Change

W.K. Kellogg, the breakfast cereal industry pioneer, established the W.K. Kellogg Foundation in 1930. Since its beginning Kellogg Foundation has continuously focused on building the capacity of individuals, communities, and institutions to solve their own problems. It seeks "to help people help themselves through the practical application of knowledge and resources to improve their quality of life and that of future generations." (Kellogg Foundation)

Seeing the Internet revolution in its infancy and fearing a crisis in the delivery of information by libraries and in education for librarians that would result in these institutions falling hopelessly behind, the Kellogg Foundation developed a program initiative, Human Resources for Information Systems

Management (HRISM), designed to insure that information professionals would be able to increase access to "knowledge and resources" with the aim of improving the quality of life for people. The concern at the time was that, without intervention, the Internet revolution might very well render libraries and librarians irrelevant (Bishoff, 1999).

During the tumultuous period of the 1990s, the W.K. Kellogg Foundation, seeking to influence change in LIS education, funded several experiments in change among a group of LIS programs including the University of Michigan, Florida State University, Drexel University, and the University of Illinois. The University of Illinois Graduate School of Library and Information Science (GSLIS) grant focused on the revision of the core curriculum courses (shortly after developing an extensive distance education program). Florida State University's LIS program (which has since become the School of Information Studies), focused on the development of an undergraduate degree in information technology and network management. Drexel University's College of Information Science and Technology focused on the use of information technology in curriculum delivery. The University of Michigan changes will be profiled under Trend 1, below.

At the end of the HRISM experiments, Kellogg, in addition, funded the most extensive examination of LIS education in nearly a century—KALIPER, the Kellogg–ALISE Information Professions and Education Renewal Project. The findings of KALIPER and additional developments in the past 4 years that impact the education of those who seek to become librarians are discussed below.

V. The KALIPER Project

The 1997 conference of the Association for Library and Information Science Education (ALISE), entitled "Reinventing the Information Profession," featured interdisciplinary speakers, highlighting some of the results of the Kellogg educational experiments mentioned above. (Durrance and Pettigrew, 1999, p. 287). This conference also received funding from the Kellogg Foundation and Kellogg leadership was present. Following the conference, a group of ALISE leaders approached the Kellogg Foundation for additional funds to look broadly at educational changes being made at schools of library and information science. KALIPER, a research project that was undertaken between 1998 and 2000 sought to

- determine the nature and extent of major curricular change in LIS education across North America, and
- help move curriculum reform toward achievement of critical mass in the field. (KALIPER Advisory Committee, 2000)

The study itself was a comprehensive examination of LIS curriculum conducted by a team of 20 scholars. The original aim of KALIPER was to review approximately one quarter of North American LIS programs. However, the interest in educational change was so great that KALIPER scholars, instead, examined nearly half the North American LIS programs looking for evidence of change in LIS education.

The KALIPER Project included: guidance by a Blue Ribbon Committee of field leaders; competitive selection of scholar researchers; an iterative study design incorporating multiple data collection methods starting with a dean survey to which 84% of all programs responded; case studies of the four Kellogg-funded programs; examination of a broad group of LIS/IS programs and comparison across schools; and analysis of statistics provided by KALIPER schools. It used a qualitative approach to analysis of programs using a variety of data collection methods including examination of program web sites, self-study reports, ALISE statistical reports, syllabi and readings for core courses, and selected interviews. The project, in addition, fostered exchange of data by scholars (Durrance and Pettigrew, 1999; Pettigrew and Durrance, 2000; Cox et al., 2001).

The KALIPER Report, the most important study of LIS education since the Williamson Report (1923), was issued in 2000 and its Executive Summary was widely distributed both in paper copy and on the Internet. Reports on the project were given at major associations such as ALISE, American Society for Information Science and Technology (ASIST), the International Federation of Library Associations (IFLA), and various national and international conferences. A number of articles presented the KALIPER findings; two appeared in the *Bowker Annual Library and Book Trade Almanac* (Durrance and Pettigrew, 1999; Pettigrew and Durrance, 2000). ALISE devoted an entire issue of the *Journal of Library and Information Science Education* (Summer, 2001), and articles on the study have appeared in major library journals and on the Internet (Pettigrew and Durrance, 2001). Unlike the Williamson Report which found early library education in disarray, KALIPER found active movements toward change in the education of information professionals for libraries and other information environments.

Now, less than 4 years since the completion of KALIPER, it is clear that the trends first presented in 2000 have become even more pronounced. At the same time there has been growth in the formation of information programs arising outside of LIS. This section of the paper will examine the changes in LIS programs identified by KALIPER and highlight additional changes in the past 3 or 4 years, while the final section of the paper will examine and discuss rivals for the domain that has been claimed by LIS for many decades.

VI. KALIPER-Identified Trends and Their Current Manifestation

A. TREND #1: In Addition to Libraries as Institutions and Library-Specific Operations, Library and Information Science Curricula Are Addressing Broad-Based Information Environments and Information Problems

KALIPER scholars learned that by the end of the 20th century, LIS education had begun the change from a library-focused Ptolemaic model to an information-focused Copernican paradigm. Even before the Internet, a group of LIS programs reflected a rapid adoption of an information focus. KALIPER scholars found that faculty were very much aware that information professionals need to develop a "big picture" view of the information world. Curricula included courses framed toward broad information environments. KALIPER scholars found that schools were marketing both to a diverse student body and a diverse set of employers without, in the process, eliminating libraries as job targets for their graduates.

KALIPER teams found that LIS schools proclaim their domain as covering cognitive and social aspects of how information and information systems are created, organized, managed, priced, disseminated, filtered, routed, retrieved, accessed, used, and evaluated. How people get and use information has an increasingly prominent role in the curriculum with courses on user-centered design of information retrieval systems, information search strategy, and information-seeking behavior. LIS programs are incorporating approaches that deal with a variety of new problems into the curriculum including those associated with traditional content with an eye to increasing access to users. Courses look broadly at information access questions, redefining collections to better incorporate the virtual, and recognizing the blurring of institutional boundaries.

B. A Post-KALIPER Look at Trend 1: A Move to Information Programs

In the intervening 4 years since the KALIPER report, various LIS programs have moved even more rapidly toward more effectively addressing broad-based information environments and information problems in their programs. A quick look back at previous decades puts this move into perspective.

Thirty years ago, light years in the rapidly changing cyber world, Syracuse University, under the leadership of Robert Taylor, became the first "information school," by not only including information in the name of the program, but by also becoming the first school to drop the designation "library" entirely from its name, well over two decades before the Internet crisis of the 1990s. Indeed, Syracuse's website and other promotional

materials proclaim it to be "The ORIGINAL Information School." Other library school programs began to incorporate "information" into their names 25 years ago, achieving a near total shift from "library"-only focused names to "library and information" (or "information and library") designations by the end of the 1980s.

It was not until the past decade, however, that programs began to drop "library" from their names in large numbers. By the mid-1990s only a handful of programs had eliminated library from their names. These actions were at least partially responsible for the American Library Association's First Congress on Professional Education (1999) (Kniffel, 1999). The move to eliminate the "L" word has continued at an accelerated pace. By early 2004 nearly one-third of accredited LIS programs (16 of 52) have chosen to remove "library" from their official names—and the trend continues. These actions have caused much concern among librarians that in removing "library" from their names, programs had, in the process, eliminated the institution from the curriculum. Sutton suggests that the "focus of study has shifted from the institution to the processes that underlie information creation, storage, transfer and use" and, in the process, education has been strengthened (Sutton, 1995).

While decades in coming, this trend signifies that educational programs have taken a turn in the road that has, indeed, resulted in a distancing from its origins—the need to educate professionals for libraries. At the same time this trend strengthens the education of information professionals, whose numbers include librarians, by focusing more broadly on information problems and environments (such as the Internet). In less than 10 years a group of "schools of information" or "I-schools" have emerged from schools formerly called schools of library and information science. These include, in addition to Syracuse, schools at the University of Michigan, the University of Washington, Florida State University, the University of California, Berkeley, the University of California, Los Angeles, and the University of Texas, Austin. The new programs are experimental, and while sharing a number of similarities no two are alike. Only time and the evolutionary process will reveal the most successful experiments. One such experiment at the University of Michigan is described below.

The University of Michigan School of Information and Library Studies (SILS) had a highly regarded MLIS program in the early 1990s. Incoming dean, Daniel E. Atkins, led the faculty in the submission of a proposal to Kellogg (Educating Human Resources, 1996). The grant proposal identified the strong need to create radical changes in education for information professionals; it identified both strengths and weaknesses in the intellectual constructs of several disparate fields, including LIS, computer science-engineering, and management information systems. It then proposed

a model for information education that would mobilize the strengths of multiple disciplines.

Kellogg, understanding that LIS programs, including Michigan, had been under-funded, provided a major infusion of funds. The University of Michigan, as well, made substantial financial investments in the School of Information between 1992 and present. This enabled the School to assemble a core of interdisciplinary faculty and begin the difficult process of developing a curricular-scaffolding nexus that spanned several disciplines before it was necessary to show large enrollment increases. In this way, the School was able to create the instructional vision first and then attract students to it, rather than the more common, but less effective practice, of trying to co-evolve a pedagogical vision and rapid student growth. These funds also enabled the development of a substantial information technology infrastructure as well as the creation of infrastructure in the areas of student services, instructional computing, and teaching innovations that would have been impossible otherwise.

The School of Information, re-chartered by the University of Michigan Regents in 1996, was conceived as a non-departmentalized enterprise focused on an integrated learning model with multidisciplinary foundations, symbolized by Borromean rings focusing on the three basic domains of interest to SI, and their interlocked nature. In the rendition below they are flattened and resemble a Venn diagram, emphasizing both their separate parts and their binary and tertiary interactions (Fig. 1).

The multi-disciplinary SI faculty are united by several shared beliefs. One is belief in an increasing need for *information professionals*, skilled
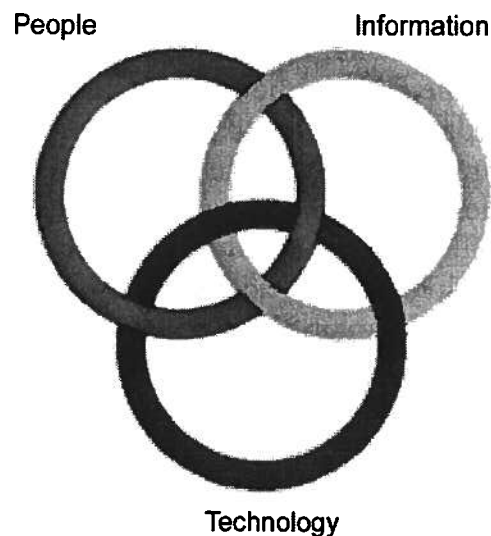

Fig. 1   Borromean rings representing people–information–technology.

practitioners who understand the complexities of the information realm who can help individuals and organizations deal with those complexities in reaching their objectives. This is not surprising, given that this professional bias was embodied in the SILS faculty and in the fields from which new faculty came: management, public policy, engineering, computer science, etc.

SI's vision is that of a heterogeneous and multi-disciplinary faculty tied together by shared interests and a common commitment to professional education and research focused on information. The result has been a rich portfolio of research and instructional capacities that spans disciplines and breaks new ground. The integrated vision provides the master narrative of the School, but it is embodied through practical specializations in Library and Information Science (LIS), Human–Computer Interaction (HCI), Archives and Records Management (ARM), and Information Economics, Management and Policy (IEMP). These serve as formal specializations within the integrated Masters of Science in Information (MSI) degree program, and they help organize activity within the School and establish identifiable linkages to professional communities outside the School. They have become strong mobilizing forces without eroding or threatening an integrated vision.

The framework of specializations at information schools like the UM School of Information bears watching. For example, the 25 or so other ARM programs in North America are embedded as sub-specializations in LIS programs or history departments. SI is the first school to offer graduate education in ARM that is on par with other specializations. The larger ARM community is watching this development with interest. The younger field of HCI, in contrast, has wandered from one possible institutional home to another, finding difficulty in establishing legitimacy in programs such as engineering, computer science, management, or psychology. The HCI community has watched the evolution of HCI in SI, and a number of strong HCI groups have begun to emerge in a group of newly formed information schools evolving along the lines of the SI model.

Changing the pedagogical thrust of education in the information professions requires simultaneous change in the larger institutional realm of the professions. This lesson was learned quickly upon the launch of the MSI program in 1996. The American Library Association's Committee on Accreditation had scheduled the re-accreditation review for the MILS for 1997. The relatively simple solution of seeking accreditation only for the library specialization within the MSI degree was antithetical to the whole idea behind the new degree. The School worked with ALA on an innovative scheme to accredit the entire MSI degree, thereby broadening the scope of what might constitute professional training in librarianship and enabling students with much broader training to take positions that required a graduate degree from an ALA-accredited program. Five-year accreditation for the entire MSI

program was granted by ALA in 1998. This action sparked controversy among traditionalists within the profession. In the end, however, the innovation prevailed: in 2002–2003 the ALA reaccredited the MSI for a full 7 years, specifically noting SI's leadership in broadening the field of library education.[1]

C. A Post-KALIPER Look at Trend #2: While LIS Curricula Incorporate Perspectives from Other Disciplines, a Distinct Core Has Taken Shape that Is Predominantly User-Centered

Trend 2 addresses two important and related areas; it encompasses both increased user-centeredness and increased interdisciplinarity (often bringing different disciplinary views of the user). The missions of most LIS programs as well as the emerging Information Schools show these academic programs to be user-centric. The University of Michigan's School of Information's core mission, for example, is based on an integrated approach to the study, design, and management of information systems, in particular "bringing people, information, and technology together in more valuable ways" [Mission Statement].

There has been an infusion of multidisciplinary perspectives into LIS curricula as LIS faculty have broadened their focus beyond libraries, as faculty from multiple disciplines are hired, and as faculty conduct research with colleagues who have degrees from other fields. These perspectives emerge as well when schools offer joint programs and courses or team-teach with faculty from other departments. Faculty in increasing numbers of LIS programs are growing increasingly multidisciplinary with new hires and through additional joint appointments.

Information-focused programs focus on individuals, groups or societies. While employing a user-centered perspective has been a hallmark of some schools' curricula for a long time, there is little doubt that "user-centeredness" has infused or pervaded most of the research and teaching in LIS. Extensive conceptual and empirical research focusing on information seeking and use, as well as user interaction with information systems, has made strong contributions to the knowledge base and, as a result, to curriculum (Kuhlthau, 2004; Pettigrew *et al.*, 2001). An increasing number of core courses or course components address information seeking. In revisions of core courses, the incorporation of instruction in information seeking could be seen in varying degrees of granularity ranging from the cognitive issues of personal information seeking and use to the broad-based role of information in practice and discourse communities. For example, increasingly schools have added

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[1]This brief description of the University of Michigan School of Information has been adapted from the strategic assessment document prepared by the School in December 2003.

faculty whose interests focus on HCI which focuses on designing, developing, and evaluating technologies that fit the capabilities of the user, the work to be done, and the surrounding work practices and organizational context.

D. A Post-KALIPER Look at Trends 1 and 2: Expanded Interdisciplinary Research Focusing Broadly on Information Problems and Environments; the Development of a Golden Age in Scholarship

While KALIPER addressed a variety of curricular and support questions, it did not directly address research. The information revolution provided the opportunity to broaden scholarship. Although this influence was seen and reported at the time of the KALIPER report, it has expanded, in part because of an increasing number of new hires from fields that also focus on aspects of the changing information landscape and in part because the changed information environment has provided LIS researchers with the opportunity to apply their research approaches to broader information problems and environments.

Moreover, the move from a library-centered paradigm to an information-centered paradigm and the increased interdisciplinarity both of the new information schools and LIS programs has resulted in an increased ability to identify frameworks that explain the types of research conducted by LIS faculty. Figure 2, "Broad Groupings of LIS/IS Research" is based on an examination of program websites that feature faculty research as well as a general examination of LIS/IS research in such texts as Rubin's (2000) *Foundations of Library and Information Science*. Figure 2 groups this research into five broad categories—information technologies, content, information systems, human information behavior, and cross-cutting categories. It reveals the breadth of contemporary research interests across a wide range of information environments and information problems. Figure 2 shows that LIS researchers look broadly at problems associated with increasing access to information; it does *not* suggest that researchers ignore libraries; rather it suggests the variety of topics that inform LIS education—and thus librarians.

UCLA faculty member Marcia Bates recently noted the broad applicability of LIS/IS research. Writing both for LIS audiences and more broadly, Bates charges that while building the Internet,

> hundreds of millions of dollars have been invested to re-invent the wheel—often badly. Everybody understands and takes for granted that there is an expertise needed for the application and use of technology. Unfortunately, many Web entrepreneurs fail to recognize that there is a parallel expertise needed about information—collecting it, organizing it, embedding it successfully in information systems, presenting it intelligently in interfaces, and providing search capabilities that effectively exploit the statistical characteristics of information and human information seeking behavior.   (1999)

Information Technologies	Information/ Knowledge (Content)	Information Systems	Human Information Behavior	Cross-Cutting Areas
Technology capabilities and limitations	Defining the nature of information and its value	Information storage and retrieval	Information needs information seeking and search processes	Information Environments
Historical aspects (including various information technology innovations)	Life-cycle of information	Computerized information systems	Characteristics of information users	Historical aspects
	Publishing (including electronic)	User-centered design of information systems	Information use and uses	Management approaches and concerns
Issues; legal questions	Physical and virtual collections	Approaches to organization of knowledge/ information	Human information interaction	Evaluation approaches and issues
Impacts of IT	Economics of information		Information literacy	Information policy
Identifying and selecting information technologies	Costing and pricing of information and information services	Increasing system capabilities	Impacts (outcomes) of information use	Methods
Human factors in technology		Search retrieval models		
Specific information technologies such as the internet and web technologies	Value-added functions	Database and file structure	Effects of information on decision-making	
	Bibliometrics; webmetrics	Computer–human interfaces	Communication and professional practice designed to increase access to information (including service development)	
Cyber-infrastructure		Expert systems & intelligent agents		
		Studies of use of the system or information resources		

Fig. 2 Broad groupings of LIS/IS research. This figure is influenced both by examination of individual research profiles of LIS faculty on School websites and Chapter 2 of Richard Rubin. *Foundations of Library and Information Science,* NY: Neal-Schuman, 2000 (especially pp. 23–53).

Bates points out that while librarians have "created multi-million-item online public access library catalogs, when online access was a brand-new concept, and had developed a tremendous amount of expertise about how to handle large, messy databases of textual information…it has been almost an article of faith in the Internet culture that librarians have nothing to contribute to this new age" (Bates, 1999).

Bates posits that much of the expertise of information science is invisible and, as a result, people outside the field, including researchers from other domains, fail to recognize the contributions of this meta-field whose domain "is the universe of recorded information that is selected and retained for later access" as such "cuts across, or is orthogonal to, the conventional academic disciplines. (1999, pp. 1044, 1046)" Bates argues that because much "information work" is unseen, it is thus undervalued in the information environment characterized by the Internet. She adds that as "the society at large is discovering information and the problems of information description and organization" but failing to recognize the expertise required to describe and organize knowledge (1999).

E. An Emerging Golden Age of Broadly-Framed Monographs

The field's more broadly-focused research as well as the increased ability of its researchers to articulate the domain of LIS, has resulted in what could be considered a golden age of monographs that serve to distill and integrate the knowledge base that has been amassed by LIS/IS faculty. The monographs identified below, all published within the past 4 years, are indicators of a golden age of scholarship, precipitated, at least in part by the changes in the information landscape that have helped scholars more effectively articulate the core knowledge of the field.

Christine L. Borgman (2000), Professor and Presidential Chair at the UCLA Graduate School of Education and Information Studies, is the author of *From Gutenberg to the Global Information Infrastructure: Access to Information in the Networked World*. This book brilliantly examines the emerging global information infrastructure (GII). Borgman presents a big picture view of changes associated with digital libraries and the Internet. She poses the construct of a "global digital library" as a framework for thinking about "access to information in an internationally distributed computer network." In the closing paragraphs of the book Borgman states,

> Research on digital libraries and on access to information has moved from computer and information science into the physical and life sciences, the social sciences, and the humanities. Concurrently, research questions have expanded from technical concerns for information retrieval and content representation into social aspects of digital libraries and across all phases of the information life cycle. Scholars in the disciplines are working with computer and information scientists to construct and study digital libraries tailored to their information needs and practices. Researchers are partnering with information professionals such as librarians, archivists, curators, and records managers to address pragmatic technical issues, management questions, and preservation and policy concerns.

Geoffrey C. Bowker and Susan Leigh Star (2000) who were for several years on the faculty at the University of Illinois GSLIS, have written

an excellent monograph on the meaning and uses of classification. A reviewer of the book, *Sorting Things Out: Classification and its Consequences* asks:

> Is this book sociology, anthropology, or taxonomy? *Sorting Things Out*, by communications theorists Geoffrey C. Bowker and Susan Leigh Star, covers a lot of conceptual ground in its effort to sort out exactly how and why we classify and categorize the things and concepts we encounter day to day. But the analysis doesn't stop there; the authors go on to explore what happens to our thinking as a result of our classifications. With great insight and precise academic language, they pick apart our information systems and language structures that lie deeper than the everyday categories we use. The authors focus first on the International Classification of Diseases (ICD), a widely used scheme used by health professionals worldwide, but also look at other health information systems, racial classifications used by South Africa during apartheid, and more.   (Lightner, 2000)

Two LIS faculty members, Ann Peterson Bishop of the University of Illinois, GSLIS and Nancy Van House of the University of California, Berkeley, School of Information Management and Systems, have collaborated with a Geographic Information System (GIS) researcher to edit an excellent monograph on approaches to evaluating digital libraries, *Digital Library Use: Social Practices in Design and Evaluation* (Bishop *et al.*, 2003).

T.D. Wilson, commenting on this landmark book, notes,

> It will be readily apparent that, at the present stage of development of digital libraries, a socio-technical systems perspective ought to be productive of inter-disciplinary approaches to problems. And so it appears to be the case in this volume. The authors of the papers included here are from a variety of different disciplines... [including] names recognized in various aspects of computer science, communication studies, human/computer interaction studies, anthropology, librarianship and information science. In fact, when the digital library phenomenon is reviewed fifty years from now, it may be recognized that its key contribution will have been to lift library research out of its self-defined 'ghetto' and into the wider world of scholarship.   Wilson (2004)

> The reviewer concludes that, "this volume ought to be made essential reading for any librarian, any library researcher and any academic in the field."

The long-awaited 2nd edition of Carol Collier Kuhlthau's groundbreaking book, *Seeking Meaning: A Process Approach to Library and Information Services*, has just been issued (2004). This work in its earlier edition has made very strong contributions to shaping research in information behavior and bringing the field to maturity through her theoretical contributions. One of the major contributions of her empirical research is documentation of change in the holistic experience of people in the process of information seeking, incorporating the physical, cognitive and affective dimensions from the perspective of the user. At the time that it first appeared in the early 1980s it was a radical departure from the source and point of access approach of much

of the research in the field. Kuhlthau's work is as widely admired by practitioners as it is by researchers and theoreticians.

The appearance of University of Kentucky School of Library and Information Science faculty member Case's (2002) *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior*, reveals the maturity of scholarship associated with research on information behavior. Case's excellent examination of scholarship in this area was named the winner of the 2003 ASIST Best Information Science Book Award. Case reviews hundreds of studies of information-seeking behavior and examines the body of research on information seeking, including basic research on human communication behavior as found in the literature of psychology, anthropology, sociology, and other disciplines. This book would not have been possible without the cumulative research of scores of researchers. Case's fine book can serve as an excellent introduction for practicing librarians to the growth of scholarship in this vital area.

The final book cited in this brief list of broadly framed monographs that are becoming LIS text books—and which should be required reading for all practicing librarians—is by Professor Richard L. Rubin, Director of the School of Library and Information Science at Kent State University— *Foundations of Library and Information Science*. NY: Neal-Schuman, 2000. Rubin's introduction to LIS seeks to bring together the full range of LIS research (2000). The quoted segments from a group of interviews, below, is taken from Amazon.com samples of the many reviews of this title.[2]

Journal of the American Society for Information Science
"Sound and thorough. Rubin's book will for now be the textbook for MLIS foundation courses"
Journal of Academic Librarianship
"[An] important addition to the library and information science (LIS) education literature"
Library Quarterly
"Rubin helps present and future librarians understand the need to respect the past but to prepare for the future"

This book, like Case's, would not have been possible without the growth of research and scholarship in LIS. It is evidence of the maturity of the field in this first decade of the 21st century.

The six titles included here are only a few of the rich array that have appeared within the past 4 years. They are reflections of an extraordinary period of LIS scholarship and knowledge growth; they place LIS properly as

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[2]http://www.amazon.com/exec/obidos/tg/detail/-/1555704026/104-9704125-8276755?v = glance&vi = reviews, accessed April 24, 2004.

a key contributor to knowledge growth beyond what has been considered the domain of librarians. These titles show the value of examining phenomena from a broad vantage point.

The final set of trends identified by KALIPER, discussed below, are outgrowths of this broad view of the field.

F. Trend #3: LIS Programs Are Increasing the Investment and Infusion of Information Technology into Their Curricula

KALIPER noted that the increase in investment in information technology infrastructures and the infusion of information technology into the curricula should not be simply dismissed as a sign of the times. Something more meaningful is occurring that is having long-reaching effects. The intense focus on most anything digital is undoubtedly redefining LIS education as we add more core courses and electives to the curriculum, infuse existing courses with digital elements, and seek out more faculty who can teach in these areas. Information technology is attractive, it is fast becoming the glue of our daily existence, and market forces and funders of education and research are willing to support IT development and use. For these same reasons, the parent institutions want programs that lead in teaching and research on the electronic frontier.

G. A Post-KALIPER Look at Trend 3: Leadership in Cyber-Infrastructure Growth

Information technologies continue to explode requiring LIS programs to continue IT development and to hire faculty capable of incorporating both knowledge and skills into the curriculum. Some schools such as those who participated in the federally funded digital library initiatives are conducting research for cyber-infrastructure development, the comprehensive, advanced infrastructure based on information and communication technology, including the Global Information Infrastructure and preparation for the next generation of information technologies. Faculty in LIS and information schools continue to make strong contributions to the knowledge base in this area (Borgman, 2000). Professor Dan Atkins at the University of Michigan School of Information recently chaired the National Science Foundation's Blue Ribbon Panel on Cyber-Infrastructure that produced a major set of recommendations that are expected to have wide-ranging impact on the cyber-infrastructure of the United States (Revolutionizing Science, 2003).

H. Trend #4: LIS Schools and Programs Are Experimenting with the Structure of Specialization within the Curriculum

Schools involved with KALIPER indicated that they were "rethinking specializations" including offering more generic curricula, adding new specializations such as medical informatics, or developing joint degrees with other schools.

As part of preparing students for specialization, some schools impose program entry and/or exit requirements, such as work experience in industry, or require their students to complete practical engagements or compile graduation portfolios that describe their field experiences during their programs. Other exit requirements include successfully completing internships or other practical engagement activities.

I. A Post-KALIPER Look at Trend 4: Experimenting with the Structure of Specialization

In a number of programs, with the exception of school library media specializations, there is less emphasis on type of library specializations. Promotional materials developed by LIS programs often indicate that students are provided a generalist education so that students will be prepared to work in a variety of environments. For example the University of Washington School of Information indicates that the "Master of Library and Information Science program is a 63-quarter-credit program which takes a generalist approach while still offering numerous opportunities for students to focus on particular areas of emphasis." (University of Washington)

A new set of specializations are beginning to replace the type of library specializations. Often these focus more on the needs of users. Emporia School of Library and Information Management, for example, indicates:

> A professional program must be designed to meet the changing needs of the profession and of society in general. SLIM is constantly reviewing and, when necessary, restructuring its curriculum to meet these changing needs. The curriculum focuses on the varied needs of diverse users and on interpersonal interactions and communication as essential elements in the design and implementation of information services.   (Emporia)

Similarly the University of North Carolina—Chapel Hill Program Presentation indicates that possible specializations at the School of Information and Library Science include: "human information behavior, database and information retrieval systems, networking and Internet technologies, and management of information systems." (University of North Carolina) Rather than limit the student to one environment, these new specializations provide students with knowledge and skills they can use in a variety of settings.

J. Trend #5: LIS Schools and Programs Are Offering Instruction in Different Formats to Provide Students with More Flexibility

Flexibility in the curricula is perhaps nowhere as evident as in instructional formats. Today's students have more choice than ever regarding course length, day and time of course offering, and on or off-campus meetings. Traditionally, distance education courses were offered in a different physical location; within the past few years there are an increasing number of off-campus courses offered via some form of telecommunication and/or via the Internet.

K. A Post-KALIPER Look at Trend 5: Distance Education

Ten years ago only 10 North American schools offered courses using the distance education option. Now 36 (well more than half of all accredited LIS programs) provide technology assisted distance-education degrees (Daniel and Saye, 2001). The ability to use information technologies has revolutionized the way that LIS education is delivered. The Syracuse University School of Information Studies website indicates that the School "has been offering master's degrees through distance learning since 1993" noting that "online courses are of the same academic rigor as on-campus courses. Members of the School of Information Studies faculty teach in both the online and on-campus formats." (Syracuse) The number of programs delivering the LIS degree distance education is so extensive that the phenomenon itself has spawned a body of research. (Illinois)

L. TREND #6: LIS Schools and Programs Are Expanding Their Curricula by Offering Related Degrees at the Undergraduate, Master's, and Doctoral Levels

KALIPER scholars documented the rapid expansion of undergraduate programs, noting that the rapid enrollment gains in a number of LIS programs was due to the growth in related degree programs identified by KALIPER, particularly at the undergraduate level. The KALIPER study also noted the growth of additional master's and doctoral programs. Pettigrew and Durrance, in a summary of the project, commented:

> In short, schools are expanding in many directions. New continuing education programs, workshops, and other alternative programs have enabled schools to tap into expanded markets and provide another potential source of revenue. Since its merger with the College of Education, Missouri has implemented a certificate program in new media at the undergraduate and graduate levels. South Carolina offers two post-master's programs—certificate of graduate study in library and information science, and specialist in library and information science—while Syracuse offers a summer college for high school students in information management and technology. Syracuse also increased its number of graduate

certificates to include telecommunications management and software project management with a possible addition of interactive multimedia.   (Pettigrew and Durrance, 2000, 2001)

M. A Post-KALIPER Look at Trend #6: LIS Schools and Programs Are Expanding Their Curricula by Offering Related Degrees at the Undergraduate, Master's, and Doctoral Levels

Since the KALIPER report was issued, a number of schools have developed or are developing innovative undergraduate programs (majors and/or minors). For example, undergraduate degrees are offered in such areas as: Information Technology; Information Science; Information Systems; or Information Technology and Informatics. Those receiving undergraduate degrees comprise more than a third of the graduates of Drexel, Pittsburgh, and Syracuse and half of the graduates at Florida State University and the University of Wisconsin, Milwaukee (ALISE, 2002).

Some programs have differentiated master's degrees. For example,

- University of North Carolina offers a Masters of Science (MS) in Library Science and an MS in Information Science.
- Rutgers, likewise, has two degrees, the Master of Library and Information Science; and the Master of Communication and Information Studies.
- Syracuse, in addition to its MS in LIS has an MS with School Media Certification; an MS in Information Management, an MS Federal Government Specialization in Information Management (in Washington, DC), and an MS Telecommunications and Network Management. Syracuse's Masters in Information Science accounts for 31% of its graduates. (ALISE Statistics, 2002)

In sum, the changes identified in North American LIS programs by KALIPER scholars have continued and accelerated, thus shaping LIS education for the new digital era. The most noticeable changes have been in increased interdisciplinarity, the move toward curricular developments and research that focus broadly on information problems and environments, and a recent move toward the development of newly emerging information schools, a phenomenon to be discussed below.

Importantly, KALIPER has thus influenced the ways LIS is framed. The findings, themselves, have had an impact beyond bringing together the data on change. They have been: incorporated into articles that discuss curricular change, used in curricular revision in various LIS programs, discussed and debated by librarians, and used as the basis for new "KALIPER" studies in other countries.

Programs seeking to educate information professionals, including librarians, for the 21st century are stronger than ever. Students better

understand the needs that people have for information and how to more effectively assist them in getting the information they need, they gain skills in using information technologies, and they have a broad understanding of information systems. These changes not only have prepared LIS education for the digital age, they have also moved it toward a convergence of various disciplines, each making some claim on control of the domain.

VII. Information Education: Competition or Convergence?

Modern education for librarianship at the end of the 19th century arose in response to what was then a major crisis in staffing brought on by the generosity of Andrew Carnegie and his Carnegie Corporation that resulted in over 2000 public library buildings (Van Slyck, 1995). The Carnegie Corporation, recognizing the unintended outcomes of its largesse, commissioned a study of the approaches to educating the librarians for these newly funded libraries. The study, called by the name of its developer—the Williamson Report—uncovered a crisis of education (Williamson, 1923). This study showed that the educational apparatus in place in the early 1920s was grossly inadequate; many librarians trained on the job, most educators were ill-prepared, courses were too rudimentary, there was no consistency in training, the field lacked textbooks, there were no standards to assure quality, and education itself was grossly under-funded (Williamson, 1923). To protect its investment, Carnegie fostered the institutionalization of library education in universities and moved toward an accreditation process that would improve the dismal quality found by Williamson. It is important to note, however, that both the crisis and its solution were library centered: the solution to the crisis brought on by too many poorly trained librarians was to create educational programs designed to produce better educated librarians. This narrow construct, focusing education on a single institution, did, indeed, solve the immediate problem. However, over time—as other disciplines recognized the value of organizing the world's *digital information*, this institution-specific solution contributed to sowing the seeds for the current crisis in LIS education described by Van House and Sutton (1996) as the "Panda Syndrome."

The KALIPER Report clearly demonstrated that educators fully understood the value of providing librarians the skills they needed to organize and retrieve information on the Internet (as well as in other formats). In the process of change, LIS education has taken great strides to assure that its graduates are capable of anticipating and responding to the needs of the digital age; these changes have brought the convergence with other disciplines that focus on digital formats.

Today conditions are ripe either for the field's most serious crisis or for an unparalleled growth opportunity. The changed information landscape has created an uneasy playground for a disparate group of players that results in both a threat and promise of a renaissance in librarianship as one of an emerging group of information professions. Various competing players, each breaking out of formerly narrow constructs, have laid claim to the same domain—information. The Internet crisis has resulted in a new set of information life cycle problems that need to be solved (Hodge, 2000); various solutions are being offered by professionals educated in different disciplines.

Van House and Sutton (1996) warned of converging and competing interests. These interests, of course, include education programs that stand ready to educate some segment of tomorrow's information professions. For example, with the rapid rise of the personal computers in the 1980s and the urgent need to improve computer interfaces for non-computer scientists, the sub-field of computer science now known as HCI emerged. Its primary professional organization, the Computer–Human Interaction (CHI) developed in the early 1980s as a Special Interest Group of the Association for Computing Machinery (ACM). Well-developed HCI programs are in universities such as the MIT Media Lab, Carnegie Mellon's HCI Institute, Georgia Tech, Virginia Tech, and the University of Maryland. Scores of programs are emerging from computer science that focus on preparing students broadly for careers in information technology. The School of Information and Computer Science was formed in 1968 at the fledgling University of California, Irvine as one such program. These programs are becoming increasingly interdisciplinary with the realization that the knowledge from a single discipline is inadequate either to conduct research or to develop relevant curricula. Other academic programs designed to educate information professionals include various informatics programs, most commonly medical informatics in Medical Schools and information management programs in Business Schools.

Major digital library initiatives funded by the US government brought together researchers from various disciplines and fostered interactions among computer scientists, LIS researchers, economists, and others such as experts in GIS. These interactions have provided a vehicle for examining disciplinary differences and, as a result, researchers across several fields have come to a better understanding of their differences and have begun to develop "a view [of digital libraries] that encompasses the social, behavioral, and economic contexts in which digital libraries are used." (Borgman, 2000, p. 240) Rival claims of jurisdiction over the domains associated with the new information world coupled with pressures from constituents in libraries could nudge LIS education into its former narrow library focus. However, intellectual convergences, such as those that resulted from the federally funded digital

library initiatives, can be seen among a diverse group of researchers, many of them in the newly formed interdisciplinary "information" schools.

The most recent convergence examples that have emerged from the new information landscape are cross-disciplinary experiments such as the one at the University of Michigan School of Information. Such new schools hire faculty from multiple disciplines. The new information schools have hired PhDs from computer science, HCI, information economics, cognitive psychology, LIS, and other fields. For example, University of California at Irvine has sent PhDs to several of the new information schools and a dean to the University of Michigan. Penn State, a newly formed information school with no history of LIS, has hired faculty with LIS degrees. Since these new programs have now been in existence for between 5 and 10 years, they have begun to graduate PhDs who are taking positions in LIS programs, computer science departments, or the emerging information schools.

Information schools that bring together researchers with exceedingly different intellectual fields with disparate cultures, values, methods, traditions, and approaches to knowledge development into a single faculty are faced with culture shock. Newly interdisciplinary programs need to take steps to overcome differences and build on the strengths of the various disciplines represented by their faculty. Academic integration at this stage of development is a challenge and has been established as a primary activity for such programs as the University of Michigan School of Information. The aim of academic integration is to move beyond the natural distrust that academics have of those educated in vastly different traditions.

Two very important convergence activities underway are discussed below. If successful, these efforts may help create a convergence that could result in the development of a new, interdisciplinary field that encompasses the strengths of multiple fields. The first, within LIS, brings together the new information schools with the aim of creating support systems that will make it easy for these new information-focused programs to discuss their common missions and problems. This initiative began with several meetings of deans from the University of Pittsburgh School of Information Sciences, Syracuse University's School of Information Studies, the Drexel University College of Information Science and Technology, the University of Washington Information School, and the University of Michigan School of Information. As the number of information schools expands, additional deans have begun to attend these meetings. The information school deans have held meetings with deans of all LIS programs since 2003 at the ASIST and at the ALISE. These meetings have focused on broad issues associated with the question of convergence made possible by the common interests of many computer science, engineering, LIS and management information systems programs, the emerging information school movement, and its impact of programs of LIS.

The second convergence initiative has convened a community of deans of information technology (IT) programs that have emerged from computer science departments and the newer, more broadly focused, interdisciplinary information schools. This group has been meeting under the auspices of the major US association focused on research in information and computing, the Computing Research Association (CRA) (www.cra.org) through a division known as the IT Deans Group (CRA-IT Deans Group). CRA started as a membership association of computer science departments, but has expanded to include other kinds of programs. The CRA meetings of the IT Deans Group reveal the struggles faced by the IT programs which have emerged from computer science because their research separate from computer science which, these researchers believe, has developed approaches and knowledge which "often do not live comfortably in departments of computer science." (Finkelstein and Hafner, 2002, p. 4) Thus, a group of IT researchers recognize the need for an emerging IT discipline, which would encompass topics such as these below:

- The study of information: how it is acquired, organized, communicated, managed and used by people and organizations, and how IT changes those processes, sometimes in fundamental ways.
- The study of IT applications per se, including application taxonomies based on technical requirements, functional characteristics, information models, and domain or context of use (e.g., business, government, education, health care, publishing, the military, law enforcement, media and entertainment, science and engineering).
- Techniques and tools for managing the design, development and deployment of large complex IT systems.
- The study of how IT affects human behavior and quality of life.
- The study of how IT affects social and political institutions, and how those institutions in turn affect the development and use of IT. (Finkelstein and Hafner, 2002, p. 4)

While some of these goals are dissimilar from those of LIS, others resonate with the goals of LIS research—and can be seen either as intellectual competition or convergence. While these researchers, however, do not appear to recognize the value of information, itself, nonetheless it is not difficult to see a further convergence that incorporates the research strengths of LIS such as those identified by Bates above.

The leadership of the CRA-IT Deans in bringing together researchers from different disciplines makes it possible for those with divergent perspectives and knowledge to communicate and, possibly, to collaborate. This initiative, which began only 4 years ago, has only begun the work of identifying problem areas and points of convergence

(CRA-IT Deans). At present about 40 programs, including a group of leading LIS/IS schools, are participating in the CRA-IT Deans meetings. These meetings focus on examining the implications of the convergence of various disciplines into a common domain and building a conceptual picture of the intellectual territory covered by all the research and instruction programs. A major conference to examine the intersection of interests represented by a variety of academic programs is planned for summer 2004. (CRA-IT Deans)

Convergences across various academic programs toward an information domain is depicted in Fig. 3: "Moving Toward Intellectual Convergence." The bold arrows show stronger organizational convergence which is seen in participation in interdisciplinary groups such as CRA, while the dotted arrows represent programs that have not moved as clearly toward collaboration with other disciplines.

Schools of information, whether their origin is from LIS or computer science are now seen as representative of an intriguing and powerful notion. An institutional transformation is under way in higher education focused on the study and design of information and information technologies. Key discriminating factors among these new programs are the degree to which they successfully pursue an interdisciplinary view of the problems, and their commitment to the goal of improving human welfare as a result of their efforts. Knowledge gains in LIS/IS leading to an integrative scholarship have assured that the next generation of librarians will be well prepared for the future and that LIS is positioned to become a strong player in the transformation of information education. Christine Borgman summarizes the recognition of a number of researchers in this period of convergence.
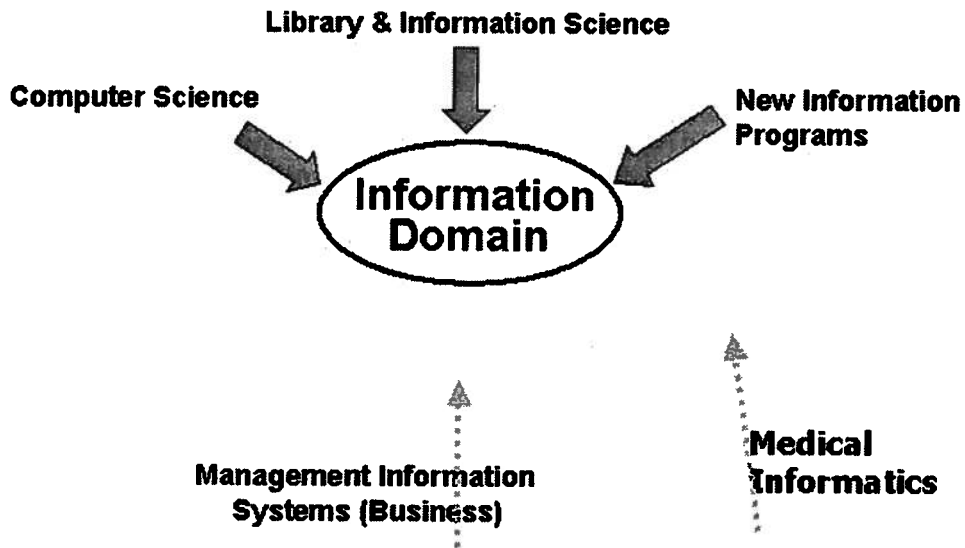

Fig. 3 Moving toward intellectual convergence.

Access to information is too important a problem to leave entirely to government officials, corporate policy makers, librarians, archivists, computer scientists, or lawyers. Rather it is a problem faced by people in all walks of life, at most stages of life, in all parts of the world.   (Borgman, 2000, p. 269)

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