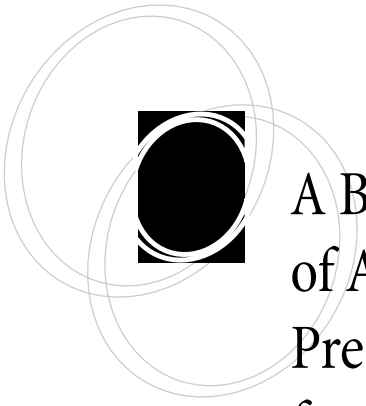

A Brief History of the Future of Academic Libraries: Predictions and Speculations from the Literature of the Profession, 1975to 2000—part two, 1990 to 2000–

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"Any sufficiently advanced technology is indistinguishable from magic."[1]

Arthur C. Clarke.

abstract: During the last quarter of the twentieth century, the literature of academic librarianship was replete with articles predicting, anticipating, speculating, and/or cautioning about future possibilities for the field. The seminal works of F. W. Lancaster, who was one of the early predictors and enthusiasts of "paperless information systems," are the key points of departure for this literature. This article (which covers the period of time from 1990 to 1999), as well as its first part (1975 to 1989), employ a citation-tracking method for gathering and reviewing this literature. Each work discussed in this article either cites Lancaster's work, or another that cites it, so that the resulting literature review has grown from a common source of thought. The aim is to provide an analytical overview on how academic librarians saw and attempted to shape the future of their field during a period of unprecedented change.

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1990–1994

Envisioning and Planning the Future of Academic Libraries

Change happens. Transformation, however, is planned. During this period, there emerged a copious literature reflecting generalized, multi-faceted visions of what the prototypical "academic library of the year 2000" would look like and do. The task facing the profession was to formulate preferred visions, then develop strategic plans that would lead to the realization of those desired outcomes.

Michael Gorman wondered if the academic library of 2001 would be a "Dream or Nightmare or Something in Between."[2] The answer to that question, he proposed, would be determined by what happens in five key domains of change: 1) funding, 2) buildings and space, 3) materials and access, 4) staff, and 5) library users. He cautioned equally against treating traditional library services and functions as sacred and, conversely, buying wholesale into the "dogmas of information science and the 'Paperless Society.'"[3] Similarly, Philip Young also itemized five areas where change would occur, although his focus was on materials: 1) Format—"Information will be stored in several formats for the foreseeable future," 2) Access—"Librarians must continue to press for broader access that includes retrospective conversion," 3) Retrieval—"Libraries must be able to deliver information and documents in an increasingly wide variety of formats," 4) Costs—". . . will be for equipment, resource purchase, and term access fees not easily transferred to individual users," and 5) Control—"Librarians will continue to be the filters through which data in many formats are sifted, organized, and made sensible to users."[4] These and other topics were all mentioned in an informal poll of academic librarians conducted by Richard Dougherty and Ann Dougherty.[5] But the underlying theme repeated several times was that although academic libraries would be challenged to address more complex user needs, success would be measured only by how well these are met.

Many articles examined the unique transformational issues faced by research libraries. In a fashion somewhat reminiscent of Fremont Rider, who wrote fifty years earlier, Eldred Smith argued that the sheer massiveness of research libraries was rapidly becoming ungovernable, and that these libraries were collapsing under their own weight.[6, 7] His radical solution was to employ networked technology to convert, to acquire, and to consolidate the complete scholarly record in a centralized knowledge archive. In this scenario, physical libraries would serve as the public gateway to this resource. Most writers agreed with Smith's contention that size should no longer be the measure of a quality research library. Jay Lucker, for example, predicted: "Measures of quality of research libraries will transcend the traditional counting of volumes and titles and instead look at their ability to match user needs with relevant information."[8] Still, most were reluctant to embrace technology as the sole panacea. Paul Mosher pointed out that most libraries' experience thus far was that, for all of the benefits of technology, cost savings was not one of them.[9] Norman Stevens noted that, because their realm encompasses all knowledge, research libraries are slow to change and that "The traditional role of research libraries, as that role has developed in a little more than a hundred years . . . is likely to continue for some time."[10] Both saw more practical solutions to the problem of size in access to networked information, and, as a new initiative for

traditionally self-sufficient libraries, organized resource sharing and consortial purchasing.

In order to manage for successful transformation, it was necessary to consider the above and other speculative visions and use them to guide planning. As Jerry Campbell noted, the difficulty of this process would be magnified by the influence of external factors (e.g., economics, politics, the pace of technological development, etc.) over which academic libraries had little or no control.[11] It was apparent, therefore, that new paradigms for planning were needed, and various models from business were borrowed and modified for library applications. Several characteristics of strategic planning differentiated it from traditional, task-oriented planning.[12] In separate, complementary articles, Meredith Butler and Hiram Davis, and Nancy Hewison and Emily Mobley reinforce that strategic planning must invoke a broad context that takes into account broad, environmental forces, must analyze how these affect the local context at all levels, and then must develop an outcome-based plan consistent with institutional goals and the library's mission.[13,14] Joanne Euster remarked that the accelerating rate of change, with no end in sight, would require continuous strategic planning that is cyclic, rather than episodic.[15]

Another approach to gathering input for planning from a variety of perspectives was employed by Richard Dougherty and Carol Hughes who conducted a series on "Preferred Futures for Libraries," sponsored by the Research Libraries Group.[16] In the first round of six workshops, held in 1991, library administrators and chief academic officers engaged in collaborative brainstorming about how they envisioned their university libraries would function in the year 2000. There was agreement on many key points:

> Provosts and librarians share an image of the future of information resources on their campuses. They all strongly prefer a future in which there is universal access by faculty and students to multiple information resources in all possible media via a single multifunctional workstation. Other images of a preferred future are jointly held—all require basic cultural changes in the academy beyond the control of library director or chief academic officer . . . Eventually, some concrete response to demands from students and faculty for a more highly sophisticated information environment will be necessary on every campus. Leadership in the articulation of campus priorities, innovation in the development of demonstration projects, and long-term strategic relocations of resources from various sources will be required if the vision of the future is to be more than a mirage.[17]

Giving specific directions to campus leaders was the objective of the second series of workshops. In these sessions, a broader assemblage of "stakeholders" was queried. Among these constituencies were university administrators, information technology managers, university librarians, faculty, scholarly publishers, and foundation leaders. In addition to gathering data from all of these perspectives, the practical result of the workshop was the identification of more than thirty possible pilot projects that could stimulate momentum for change and be initiated in the near term. The six suggestions receiving the most votes for further elaboration were: (1) Devise a prototype project that will help interested stakeholders to understand better the factors that are limiting universities' ability to act now, (2) Bring the national discussion of library futures to the local campus and develop collaborative models for problem-solving within the univer-

sity, (3) Develop network access for everyone from a personal workstation, (4) Start with an upheaval—give no money for materials to the library for a year, and instead invest the funds in developing a new campus information infrastructure, and (5) Develop a project to ensure the preservation of electronic information.

With all of this writing and programmatic activity, though, many felt that progress was too slow. C. D. Hurt opined that: "In discussing the copious literature on the future of librarianship, we cannot help but be struck by the rhetoric and singular lack of action."[18] In their survey of academic library directors, Peter Deekle and Anne de Klerk found that, while there was widespread recognition that new administration models would be needed in the future, many were taking a "wait and see" approach to large scale organizational change.[19] The stakes were high, and this was new territory. Caution was perhaps understandable, but the consequences of procrastination were also potentially severe. Brian Hawkins used an exclamation mark in this title of his article, "Creating the Library of the Future: Incrementalism Won't Get Us There!" and he further proclaimed: ". . . if we don't begin immediately our libraries, our educational institutions, and ultimately the very intellectual fabric of our broader society will be in real jeopardy."[20]

Visions of Digital Libraries and New Theories for Information Management

Central to virtually every broad vision of future libraries, and a goal in every strategic planning process was the transformation of the traditional academic library into a vital conduit for networked information. In making that point, several writers proposed various alternative terminologies to underscore that the library of the future would be something intrinsically different from the print-based library of the present. Michael Buckland distinguished between three types of libraries: the "print library," the "automated library," and the "electronic library." The difference between the latter two is that the "automated library" uses computers to generate print materials while in the "electronic library" exclusively digital media are managed.[21] Similarly, Peter Lyman distinguished between "electronic libraries," where information exists in both print and electronic form, and "digital libraries," which contain resources that are only available online.[22] Clifford Lynch used those same two terms interchangeably, but stressed that the essential feature of these libraries is that they support an interactive exchange of networked information.[23] Others looked farther ahead, to an age in the not-too-distant future of "virtual libraries," where the library's entire collections and resource base is digital online and in fact there may not exist any physical library building.[24] Harold Billings spoke of the "bionic libraries," which would constantly evolve, driven by the ongoing interplay between old and new systems.[25] Charles Lowry foresaw "informatted" libraries, which provide ac-

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cess to all "knowledge formats" and are run like a high-tech, private sector business.[26] Other writers emphasized the human services aspect of future library services. Ronald Larsen's "colibratory" and Debora Shaw's "collaboratory" both stressed the interactive, dynamic nature of network-based information services.[27, 28] Arnold Hirshon argued that, in a decentralized and distributed information environment, the academic library director's perspective must change from one in which the library is viewed at the center of a broad information universe (a "Ptolemaic" conception) to one where the information creators are central (a "Copernican" system) and libraries, along with students, faculty, and university managers, are in overlapping orbits around them.[29]

Not everybody, however, was so apparently anxious to dismantle the edifice of the library. In his provocative monograph, *The Myth of the Electronic Library,* William Birdsall concluded with nine enduring values that he felt must characterize libraries of the future: (1) Librarians should not accept a society dominated by technology as inevitable, (2) Libraries must continue to serve as centers of campus and community activity, (3) Librarians must not abandon their identification with libraries, (4) Librarians should adopt a service model that supports personal information consultation and education, (5) Librarians should promote self-sufficient library users, (6) Librarians should focus on knowledge management, rather than information organization, (7) The knowledge base of librarianship resides in several disciplines, (8) Librarians should reject market-driven values, and (9) The library must serve as a bridge between the individual and the campus/ community.[30] In a similar vein, in an article on planning for academic library construction and renovation, Sarah Michalak pithily assured readers that, even in an electronic future, "The library will have walls."[31]

What even skeptics could no longer deny, however, was the radical degree to which library automation had already changed how information is stored, organized, distributed, and retrieved. Several writers attempted to provide a necessary theoretical context for this new reality. One of the broadest and most comprehensive of these kinds of works was Buckland's *Redesigning Library Services*. In this "manifesto," he states that the place to start strategic planning for the future is by re-emphasizing the most basic, universal purposes of libraries: "The role of library services is to facilitate access to documents; and the mission of the library is to support the mission of the institution or the interests of the population served."[32] In both cases, the needs of the library user are the most important consideration. Thus, for planning purposes, it is necessary to ask what are the user's needs and how are they changing. This, then, provides a context for reconsidering library services and collections.

Whether in a digital, electronic, virtual, bionic, or in any other kind of future library, the work done by librarians was bound to change. Again, new paradigms and redefinition of services were needed. Esther Bierbaum proffered the "least effort principle" as being relevant to all library endeavors.[33] Apart from the virtues of its simplicity, the paradigm could be used as a basis of quantitative study and comparison. In addition to developing more efficient systems for information retrieval, librarians would also be called upon to be more analytical and interpretive when evaluating resources. Getting the "right" answer to a problem would not be sufficient; rather, librarians would need to get the "best" answer. To do this, Campbell hypothesized, librarians will engage in "knowledge cartography," which involves continuous monitoring and map-

ping of information resources.[34] This concept was especially descriptive of information searching of hypertext and hypermedia resources, which contain linear, vertical and referential linkages. Ross Atkinson called this a "concentric stratification" of information, where the sequence of links is determined by the user.[35] Because of this, Thomas Froehlich maintained that the classic concept of "relevance," built into indexing vocabularies and database structures to enable very specific searching, had become obsolete and must be replaced by systems that enable the users to search, to filter, and to rank information by their own criteria.[36] Other writers also advocated that librarians concentrate their work and research on the "knowledge" level, studying how information becomes knowledge and organizing resources to facilitate that transition. The fundamental message in all of these writings is that the technological revolution was being mirrored by an intellectual revolution in how librarians conceptualize the information universe.

Some were convinced that, because of the dramatic changes in their work and the expanded array of skills required to do it, the time had come to retire the word "librarian" (and its persisting stereotypes) in favor of something more representative of the profession's emerging roles. Several new and some rather fanciful appellations were suggested. Helge Clausen preferred "information professional" as a more inclusive term for anybody working with "the theory and practice of creating, acquiring, assessing and validating, retrieving and dissemination information."[37] Yves Courrier examined the meanings of a similar term—"information specialist"—but found that the essence of what an "information specialist" does is unchanged from that of a librarian: i.e., "to assure a quality service to a particular clientele, by ensuring the functioning of a well adapted information system."[38] Campbell suggested the term "access engineers" as descriptive of those engaged in his previously mentioned process of "knowledge cartography."[39] In an essay entitled "What Will They Call Us in the Future?" Marydee Ojala sampled such titles as "cybarian," "information officer," "information manager," "information architect," and "knowledge counselor." What is perhaps most notable in these discussions is that the sense that the profession might become obsolete, pervasive in earlier literature, is absent. As librarians began to actively plan for the future, their places in it became clearer and their optimism swelled.

Several writers, such as Sheila Creth and Susan Jurow, saw that as library support staff became better trained and more technologically savvy, their roles would become enhanced.[40, 41] Some blurring of responsibilities between support staff—especially systems workers—and librarians would evolve. Allen Veaner insisted that while all library staff had become "knowledge workers," the proper functions of academic librarians in relation to support staff would remain distinct because of the intellectual character and academic responsibilities of the profession. He wrote:

> "The role of academic—the design and management of information systems for the academic community—is determined by programmatic responsibilities and related powers. To meet new conditions, academic librarianship requires a new manifesto derived directly from the academic community itself in preference to ready formulas from business and industry."[42]

An essential component of this manifesto, according to Veaner, would be an acknowledgement that the academic librarian makes a significant intellectual contribu-

tion to the academy and, like faculty, "exercise[s] an exclusive locus of power."[43] In that regard, the faculty status model for academic librarians continued to be discussed, and the Association of College and Research Libraries sponsored a think tank on how to promote and strengthen faculty status in 2001. Yet another means by which various writers, such as Monica Foderingham-Brown and Robert Trujillo and David Weber, suggested that academic librarians could better represent the values and mission of the academy was to actively work to encourage pluralism and multiculturalism.[44, 45]

Access/ Ownership and The Transformation of Scholarly Communication

Lyman was one of many writers to observe that "The system of scholarly communication is in crisis."[46] In academic libraries especially, the drive to change was fueled as much—if not more—by necessity rather than opportunity. In 1990, Sharon Rogers and Charlene Hurt described how they believed scholarly communication would be conducted in the 21st century.[47] Researchers would submit their work electronically to a central networked clearinghouse, which would direct the paper to specific subject categories. Subscribers could read it and offer comments for a finite period of time, after which a management review board would decide whether to publish, reject, or return the manuscript for revisions. Ann Okerson proposed a similarly cyclic model: a "circle of gifts," wherein members of a community of scholars both contributed to and benefited from the information submitted to the network.[48] As Charles Schwartz explained, however, hindering this transition would be that, by its nature, the system of scholarly communication is loosely coupled and thus difficult to change, while the academic reward system of publishing is tightly coupled and thus resistant to change.[49] Susan Crawford cited the buzz that the "cold fusion" controversy had created over e-mail networks as evidence that the whole concept of peer review would change and that significant contributions to scholarship might come from works that cannot be truly described as "published" in any conventional sense.[50] Still many of the stakeholders in—and even the advocates of—these new systems for scholarly communication saw in them the potential for chaos. To prevent this, some argued that librarians must not only provide access and expert searching to a range of electronic resources, but also must strive to organize them and monitor their usage.[51] Vicki Anders, Colleen Cook, and Roberta Pitts espouse that view where they write: "When everyone is plugged in, the librarian becomes the 'gateway' The gateway librarian advises on the best route to information and interprets the language of access."[52] By contrast, Irene Hoadley and Sherrie Schmidt saw the service role as being fundamentally different: "The emphasis . . . is on the scholar performing searching and choosing the appropriate information rather than the librarian fulfilling the role of the intermediary. The implication of this scenario is that the role of the librarian is really that of teaching and guiding rather than doing."[53]

As Lancaster had predicted in 1978, these "paperless" information systems were taking root first in the sciences. The most extensive study of the current and probable uses of networked scientific information was published by The American Physical Society's Task Force on Electronic Information Systems in 1991.[54] Cited frequently in the literature of librarianship, this report predicted that by the year 2020, the totality of research in physics would be available via a "physics information system," a network

that would serve both as a publisher and a massive library/archives of the literature. This was not the entirety of the system, however, for the physics information system would be a component of a larger National Library of Science, comparable to the National Library of Medicine, except that its resources would be primarily electronic. Scientists would select the content for the library while librarians would organize and manage it. Commenting on these trends and projections, Julie Hurd believed that a positive result would be a greater intellectual cross-fertilization as researchers traverse disciplinary boundaries, especially in the sciences.[55]

By 1994, the vision of the members of Task Force was taking shape, albeit in a somewhat different form than they had projected. The Internet arrived suddenly, with profound effects upon the world's information infrastructure. Librarians, educators, and scholars alike speculated that, as the Internet evolved, it might answer all of the needs for the kind of high-speed, wide area, graphical and interactive network that could support truly paperless information systems. Many writers suggested that a National Educational and Research Network (NREN), connecting colleges and universities across the continent, would become the centerpiece of a National Information Infrastructure (NII). The NRENAISSANCE Committee of the National Research Council endorsed developing an Open Data Network (ODN) as the basis of the NII.[56] To realize the full promise of NREN and the NII, librarians would have to be specific about what they expected and required from new systems of scholarly communication. Bailey listed twenty-two requirements for a holistic network-based electronic publishing model.[57]

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What effects would these developments have upon library collections and resources? For several years, the two words "access" and "ownership" had been separated in the literature almost invariably by the antagonistic preposition "versus," as if to state that libraries had to choose one or the other. During this period, the literature reflected far more concern with the access dimension, for librarians realized that addressing information needs at that level required new ways of thinking about services and collections. John Riddick criticized that, philosophically, "collection development is in shambles."[58] In order for access to become an acceptable option for users, it must be timely, or, as Ronald Leach and Judith Tribble and others wrote, the document must reach the user "just in time."[59] Atkinson, Pamela Bluh, and Julie Wesslingall predicted that document delivery would become a primary service in the near future.[60] Interlibrary loan and resource sharing would also flourish. Still, Marsha Ra wondered whether electronic resources would be sharable and conjectured that "resource sharing, as we now understand it, will probably cease to exist."[61]

The emerging priority of access would change other traditional services, too. Nancy Elder wrote about the economic value of reference services and suggested that, to com-

pete with other information providers, reference librarians would have to supply value-added services, analyzing and interpreting the usefulness of specific resources.[62] Jennifer Cargill expected that users would come to demand customized reference services.[63] Chris Ferguson insisted that reference must be improved qualitatively, which would require setting standards and benchmarks for performance.[64] Taking that idea even further, Kilgour suggested that, through expert use of electronic resources, librarians could aspire to matching users with desired information 100% of the time.[65] Still, in keeping with a recurring theme in the literature for several years, several writers, like Judy Myers, Ilene Rockman, and Mabel Shaw insisted that the traditional, humanistic principles and interpersonal skills of good reference work will remain core in the future. [66]

Two specific areas of technical services that would change as an access services paradigm gained prominence were cataloging and acquisitions. Atkinson noted that if less and less is being acquired and if many orders are placed directly by library users, traditional acquisitions would be bypassed in many transactions. Nevertheless, acquisitions librarians could serve as change agents by using their in-depth knowledge of the economics of publishing to guide the library when implementing access, delivery and notification services. The online catalog would remain the user's point of entry to library resources, but its contents could be practically unlimited.[67] While the catalog would continue to function as the database of local records, David Tyckoson elaborated that "The future catalog might be in fact an index to all library collections and function cooperatively with, but independent of, any single library."[68] The possibilities of exploiting the power of technology to enhance bibliographic records excited many librarians. Holly Lange wrote that the cataloger's work would be performed at a universal workstation, which might have such specialized features as online presentation of cataloging rules and automatic error detection.[69] Where new access options are offered to library users, Peter Graham felt that linkages between external and disparate systems should be created within the catalog. Hypertext catalogs, for example, would make linking convenient and expedient.[70] Barbara Anderson wrote that while future expert systems might eventually handle descriptive cataloging, subject cataloging would probably remain the realm of catalog librarians.[71] Irene Hoadley and John Corbin saw entire technical services departments being reorganized to satisfy access needs.[72]

The fullest realization of an access services paradigm in libraries required that a substantial volume of primary journals be published electronically. In this realm, it seemed likely that the interests of librarians and publishers would diverge, chiefly over economic issues. Atkinson warned of a "coming contest" between publishers and librarians.[73] John Garrett put it even more colorfully: " . . . Librarians and journal publishers had one thing in common—each regarded the other as a bloodsucking leech."[74] From the publishers' perspectives, there were logistical problems with electronic publishing, for, as Brett Butler observed: " . . . there is no mechanism to support electronic distribution with the control desired by publishers."[75] There were also economic disincentives, which Greg Anderson described: "The publishers are also aware that establishing cost models for electronic publishing is very complex . . . Given this environment, commercial publishers are not highly motivated to charge forward into the transformational world of electronic publishing."[76] Patricia Glass Schuman expressed similar doubt from a librarian's point of view: "I have little faith in an electronic distribution

system that pays a royalty per use for a publication . . . But I have no idea how a user might access a single part of a 300-page book—or how often."[77] Paul Gherman went even further in positing that: "In the future, the article may well be the basic unit of academic information for users."[78]

Perhaps the most intractable issue inhibiting the widespread publication of electronic documents was copyright. Garrett summarized the requirements of a comprehensive copyright management system from the publisher's perspective:

> Rights and royalties management will need to link and authorize access to information in many different forms, created and distributed under diverse rights-owning systems (e.g., print, film, sound, photographs) . . . The digital library systems must include a copyright management system that (1) provides for confidential, automated rights and royalty exchange; (2) ensures owners and users that information is protected from unauthorized, accidental, or intentional misattribution, alteration, or misuse; (3) ensures rapid, seamless, efficient linking of requests to authorizations for information use; and (4) encompasses effective billing and accounting mechanisms. [79]

From both the perspectives of publishers and librarians, there were often differences in interpretation of how such a system should work, especially in determining how and on what royalties would be paid and what would constitute unauthorized use. Furthermore, what might become of the "fair use" concept in a pay-per-view system? Jane Ginsburg envisioned "copyright without walls," but also conceded that the distribution of scanned print materials and, especially, of those published in digital format might not be covered by "fair use" provisions.[80] Several writers predicted that contractual agreements between publishers and libraries could supplant copyright laws, for better or worse. Laura Gasaway envisioned that an ideal licensing agreement would allow downloading and copying for single users, electronic reserves collections would be permissible, authors would retain copyright for themselves and their institutions, and fair use law would be extended to digital publications.[81]

While the discussion about electronic journals usually centered on their costs and economics, the possibility of electronic books focused on other issues as well. Proponents like Kurzweil[82] and Jon Gold[83] touted the many advantages of electronic books. Kurzweil called them "powerbooks," which might be read on a monitor or on a palm-sized computer screen. Many others, however, doubted the primary assertion that an electronic book could ever duplicate, much less improve upon the print book. Geoffrey Nunberg cited human preference for print books as being a significant cultural factor ensuring their survival.[84] Sven Birkerts, a humanist, wrote that there exists an "ecology of reading," a whole-body process wherein the physicality of the print book and how it is used affects the ways people think and retain information when reading. This, he argued, could not by its very nature be replicated in a computer.[85] Most agreed, however, that market acceptance would determine the fates of the electronic book over time. Gregory Rawlins predicted that within ten years, electronic books would become major forces in the publishing industry.[86]

Despite their many differences, it was evident that the only resolution acceptable to all would of necessity come from cooperation between publishers and librarians. Noting that: "Each has developed an intransigence based on the use of copyright as

both a weapon and a defense . . . " Billings appealed that " . . . librarians and publishers should sit down at a table of common purpose and join again in what has always been a necessary partnership."[87] At the same time, in an earlier article, he had also commented that: "Widespread suggestions have been made for the establishment of publishing or information distribution mechanisms in not-for-profit agencies as replacements for commercial sector publishing."[88] The matter of how information would be disseminated in the future was one of the most unpredictable facing librarianship during those early years of electronic publishing.

1995–2000

The Arrival of the Information Society

In librarianship, as indeed in almost all of modern society, the year 2000 was a numerically arbitrary but symbolically significant milestone. Lancaster himself had cited the turn of the century as the date by which the predicted transition to paperless information systems and the disembodiment of the library would be essentially complete. Over the years, progress toward that and other scenarios was thus monitored in terms of where the current reality stood in relation to what was predicted, hoped for, or warned about by 2000. Much of the literature of the period from 1995–1999 exhibited a realization that, in fact, libraries in the year 2000 would be much like the libraries of the current day, and that the revolution in library services fueled by technology was still far from complete.

The final years of the twentieth century witnessed a major milestone in the realization of an "information society" with the development and rapid spread of the World Wide Web. Writers of a futuristic bent had for decades been predicting some technological advance which would create the "scholar's workstation." CD-ROMs, while powerful in their own way, were clearly not the ultimate solution, and the Web promised success where they had failed. Now that a mechanism for supporting a pervasive network of information was in place, librarians had to grapple with its impact. Was the Web simply another tool to use in the time-honored tasks of reference and research? Or, was it a threat to the very existence of the library? With so much information available through the Web, what role would librarians have in evaluation and classification?

One hopeful answer was that the function of librarians as filters for information would increase. As information became more readily available, users would have increased problems in sorting out what is relevant for their needs. Lyman, in a tongue-in-cheek article about libraries in 2030, quotes from an imaginary article of the future: "Public opinion surveys reveal that users are becoming less informed because so much information is available it is impossible to actually find any answers," and that librarians are "the only professionals able to bring order to the growing chaos of information."[89] The title of this article, "The Midas Crisis," refers to a paradoxical situation in which users starve for information even while surrounded by it. Others also envisioned future information overload. Stephen Arnold wrote that the next decade would be characterized by "information everywhere" in an environment he called a "datasphere."[90]

Fearing that information abundance could spiral into information saturation, Amanda Spink borrowed a term from the environmental sciences and described the task of librarians in terms of "sustainable development."[91]

"Knowledge management" was a term often used to describe a new role for librarians. The basic concept, which originated in business and special librarianship, was described by Stephen Abram as a continuum from raw data, to organized information, to assimilated knowledge. Traditional libraries have dealt with resources at the information stage, but with new tools it would become possible to design services that operate at the knowledge level. A central question that he poses for the future is: "If we accept that knowledge can only be stored effectively in an individual human brain, how do we store information so that it can be absorbed faster as knowledge?"[92] The key is to focus on how the transformation from information to knowledge occurs. Richard Rowe proposed that librarians, acting as "cybermediators," could create "knowledge packages" for their clients.[93] Among the possibilities foreseen by Paul Evan Peters was that academic librarians and scholars might collaborate to form "knowledge guilds" for this purpose.[94] Philip Agre hypothesized that if librarians become better attuned to the "institutional circuitry" of an academic discipline they could develop schemes to organize information according to the specialized understandings of its practitioners. These information bundles would reflect not only a specific subject, but also its relationship to the overall literature of the field.[95] Libraries providing this level of service would become what Donald Riggs termed "learning organizations."[96]

The Internet and New Meanings of Library Collections

By 1995, the World Wide Web had made the Internet a pervasive network that extended into virtually all academic libraries and into the homes and dorm rooms of many students. Comparisons between the Internet and library collections were often made but the question, as framed by Martin Dillon and Erik Jul, remained: "Can a library provide through its OPAC access to Internet resources that equals or exceeds the access it provides to the other information resources in its collection?"[97] One point of view held that Internet resources could be cataloged using the existing MARC/AACR2 standards and can be made available through the library's OPAC. Dillon and Jul provided a thorough overview of issues relating to the content, format, access, and use of Internet resources and detail of two Internet cataloging projects at OCLC. These projects were based on MARC, and while the authors noted some weaknesses to this approach, they also found it "preferable to inaction or premature acquiescence in the face of unproved alternatives to cataloging."[98] Even proponents conceded that this would be a daunting task, though. Diane Hillmann pointed out that not all Internet sites should be cataloged, so decisions would need to be made as to which ones were qualitatively worthy.[99] The

By 1995, the World Wide Web had made the Internet a pervasive network that extended into virtually all academic libraries and into the homes and dorm rooms of many students.

transitory nature of Internet sites was also problematic. Pat Oddy insisted that the transience of many Internet sites is driven by private markets and, for that reason, urged librarians to resist pressures to catalog them.[100] Similarly, Eric Wainwright viewed the Internet not as a collection of information resources, but as a media for communication and transaction.[101] Ling Hwey Jeng added to those objections that the task would be extremely labor intensive.[102]

Another answer is that the Internet cannot be cataloged at all, but that it can be organized and searched. Holly Lange and B. Jean Winkler argued that a traditional "catalog" of the Internet is neither possible nor particularly desirable. An alternative approach recognized that the means of providing bibliographic control for the Internet are within the Internet environment itself, not within the library OPAC.[103] Greg Notess added to his "Internet Wish List" more effective global search engines, with qualitative reviews.[104] These ideas gave rise to metadata standards designed for quick cataloging of Internet resources, the best known of these being the Dublin Core. Another possibility was the development of either general or discipline-specific indexes such as INFOMINE and the Librarians' Index to the Internet.[105] Jeng addressed some of the issues involved in cataloging Internet resources, including the problem of differing standards, for instance, SGML/TEI headers vs. traditional MARC tags.[106] This SGML vs. MARC problem is further elaborated by Hillmann.[107]

With the proliferation of the Internet and electronic publications, not to mention the as-yet undiminished numbers of print books, issues relating to library collections were prominent in the literature of this period. This may have been in part because academic libraries were still recovering from their lost dream of self-sufficiency. Until recently, the status of a research library was defined by the extent of its collections, so the questions raised by the late-twentieth century flood of information and information formats struck at the heart of the academic library's sense of importance and identity. Thus, one of the major themes was the idea of an increasing shift to access over ownership. Atkinson referred to it as collection development by "warranty," where purchase and providing access become practically the same.[108] If the academic library could no longer be self-sufficient then the question had to be asked: "How can we best identify and enhance local access to relevant remote resources?"[109] The answer to that question might also serve to answer Buckland where he wondered "What Will Collection Developers Do?" in the future.[110] These questions embodied a growing sense that libraries do not "collect" in the usual sense of the word, but rather "select" from a potentially infinite body of available information. This has been expressed in the library jargon as a shift from "collection development" to "collection management." John Budd and Bart Harloe went one step farther, from "collection management" to "content management," reflecting the idea that libraries should no longer collect the containers of information (books and journals), but should offer direct access to information regardless of its format or physical state.[111] Several writers realized that as libraries shift to greater dependence on non-owned resources there would be a corresponding budgetary shift such that a much higher proportion of an academic library's budget will go to electronic resources. The balance was in question, however. James Neal suggested a figure of 40–50 percent electronic was probably high, predicting that "print-based collections will remain dominant over the next decade."[112]

Another emerging phenomenon in higher education distinctly supported by an access model for collections was distance education. Billings wrote about the complexities that providing library support for distance education would present within the realm of collection development. Twenty-first century acquisitions policies must take into account such factors as media, access provisions, delivery options, intellectual property rights, partnerships and resource-sharing agreements, and the relationship between on-site and centralized collections.[113] Mark McManus emphasized that librarians have a pedagogical imperative to instill distance students with information literacy skills. This is especially so with them because, lacking traditional library services, their first inclination will often be to use the most conveniently available information, usually gotten via the Internet, without particular regard to its quality. If not, his worse case scenario was that somebody other than librarians "will package material in a readily consumable, mall-like retail package (even if it doesn't include 'learning')."[114] Dee Stallings predicted the advent of an entire "virtual university," the heart of which would be its virtual library.[115]

Final Thoughts on Information Technology and the Future

By 1995, librarians had been bombarded with a hailstorm of predictions about their future, and some of the literature from this time period reveals a detectably jaded tone and a growing feeling that technology will not bring about the total rebirth and redefinition of the library that had so frequently been predicted. Drawing an analogy from *Alice in Wonderland*, Hirshon commented that much of what had been written about the past, present, and future of libraries looked backward to a time when there was "jam yesterday," ahead to "jam tomorrow," but there is never any "jam today." The past can be recollected fondly as a golden age; the future, it can be dreamed, will be bountiful and prosperous. Getting there, however, is the difficulty, for the problems of the present are always all too evident.[116]

This feeling is exemplified in Walt Crawford and Michael Gorman's 1995 book *Future Libraries: Dreams, Madness & Reality*, in which the authors attempted a realistic assessment of the predictions of an all-electronic future for libraries.[117] They argued that such a future is untenable and that there is no real need or motivation to move in this direction, as evidenced by a thriving traditional publishing industry and the continued superiority of paper as a cheap, durable, and portable means of transmitting information. They advocated the avoidance of blind "technolust" in favor of viewing technology as a tool by which libraries *may* be able to perform their functions more efficiently, but urged librarians not to assume that a technological solution would necessarily be the best one. Edward J. Valauskas echoed Crawford and Gorman's sentiments on "virtuality," and specifically argued that the notion of a completely virtual library is impossible due to the massive effort and expense of retrospective conversion of print materials and also to copyright restrictions.[118] Robert Gross and Christine Borgman furthered that even if such a thing were possible, it would reduce the library as an institution to the level of an automatic teller machine at a bank, impersonally spitting out information when requested.[119]

Crawford followed up *Future Libraries* with his 1999 publication *Being Analog: Creating Tomorrow's Libraries*.[120] A theme recurring throughout the work is that the inter-

play among libraries, librarians, library users, and information resources is much more complex than those who predict radical change appreciate. Even though information resources can be made digital, their users are still analog. If for no other reason than that, physical libraries will endure. The range of their services, however, will expand far beyond their walls, and the scope of those services is conceivably limitless, especially as libraries form strategic partnerships. Grand visions of future libraries can be intoxicating, but it is wise to focus on what is immediately do-able, for as individual libraries progress locally, the profession as a whole evolves globally.

Certainly, plenty of writers continued to foresee the decline of print and the rise of the virtual library as inevitable. In a keynote address at the 1997 EDUCOM conference, Eli Noam envisioned a world dominated by multimedia learning materials. He also criticized the slowness of the scholarly publishing industry, noting that most readers would tolerate lower publishing standards if it meant faster publication and that electronic journals could still have the same level of selectivity (and, therefore, prestige) as their print counterparts.[121] Fred Heath lamented the forces of the status quo in academe—chief among which was the narrowly prescribed requirements for tenure—as deterring the development of alternative systems of scholarly communication.[122] As Ronald Heckart noted, patron expectations for self-sufficiency would inevitably accelerate the design of user-friendly, gateway interfaces.[123]

There were few, if any, writers who continued to predict that individual access to networked information would render the library obsolete. The basic reason for this was that person-to-person services could not be replicated, much less replaced by machine interfaces. This issue struck to the heart of the profession. Even while writing about the importance of programmatic computer help options, Heckart cautioned that "the disappearance of human involvement in patron assistance" might occur in libraries "without anyone quite realizing that it has happened."[124] W. Lee Hisle called for a return to fundamental values of librarianship, listing an "altruistic sense of service" as first among them.[125] Carol Ann Hughes wrote about the importance of "facework" in building bonds between academic librarians and teaching faculty.[126]

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Even F. W. Lancaster was beginning to have his doubts about the paperless information systems that he had predicted. In a short paper published in 1999, he commented first on what he perceived to be the failure of library technology to improve upon subject access in databases and online catalogs. More fundamentally, he expressed a concern that the library world's focus on technology has resulted in both a dehumanization of library services and a deprofessionalization of the librarian's role. He remarked that as the transition from paper to electronic systems progressed " . . . I became less enthusiastic about the developments and implications and, in the past few years, downright hostile toward them."[127] His great concern was that librarians, often enamored of technology, risked losing their ethic of public service. "Technology alone," he asserted, "will not improve the perceived value of our services to users . . . We need more warm librarians." [128]

Recollections and Conclusions About the Future

In *The Devil's Dictionary*, Ambrose Bierce defines the future as "That period of time in which our affairs prosper, our friends are true, and our happiness is assured."[129] To dream and hope about the future is a perhaps universal human attribute. Wary optimism often characterizes much of the predictive literature of librarianship during the period 1975–2000. As such, it represents a coming of age of the profession, wherein librarians began to realize that merely doing good and valuable work did not ensure a successful future. It would have to be seized.

The turning from one century to the next may be a numerically arbitrary event, but there is no denying its symbolic significance. It is a time both to take stock of accomplishments, and to look ahead. For example, at the dawn of the twentieth century, the future of libraries seemed almost ineluctably better, with progressive improvement into the foreseeable future. At the turn of the twentieth century, librarianship was enjoying a huge upswing. The American Library Association, the *American Library Journal*, and the Library Bureau all had been founded in 1876 and were, by then, dynamic and thriving institutions. John William Wallace was writing about what he envisioned to be a new field of learning, "bibliothecal science."[130] Cutter's *Rules for a Printed Catalog* and Dewey's decimal classification system were in common use. Melvil Dewey and others envisioned a "universal catalog" containing the holdings of all major libraries.[131] By 1900, library schools had been established at Albany, Pratt, Drexel and Illinois. R. R. Bowker, writing to the "librarian of the twentieth century," declared that, thanks to the skilled work of librarians, "the man of the future, who will have more to learn, will learn it more easily," and extolled, "These past years have been the pioneering; the years to come should be those of fruition."[132]

When a bright future seems assured, there is little reason to dwell upon it. The proliferation of predictive and anticipatory writings in library literature from 1975 to 2000 is evidence of a changing and uncertain profession. In academe, some vexing trends were becoming apparent, most notably, the unmanageable volume of publishing and the increasing costs of acquisitions. Still, until the 1970s and even at the time of Lancaster's book and articles on "paperless information systems," many academic librarians viewed their biggest problem as the need to expand or build to make room for ever-growing collections (a difficulty many still hoped would be solved by micropublishing). Certainly, the prescient visions of a "scholar's workstation," as conceived by Vannevar Bush and J. C. R. Licklider, then described in functional detail by Lancaster, were discussed, and many hoped that the foundations for such were being laid by automated initiatives such as the standardization of the MARC record, the introduction of the first bibliographic utility, OCLC, and the stated networking objectives of the National Commission on Libraries and Information Services.[133] Still, the literature of the 1970s and 1980s suggests that the majority of academic librarians believed that technological solutions were coming, but in a somewhat distant future. The year 2000 seemed like a reasonable target. Hence, the glut of literature predicting the shape of library services in that year.

With technological solutions, though, came technological problems. The authors of the later literature covered by this review have recognized and attempted to address these. Most of their basic questions remain unanswered to this day. What is the function

of the library in a networked, distributed university? How are a library's electronic collections to be defined and developed? Who owns electronic information, and how can its use be both protected and promoted? Can libraries compete with commercial electronic information service providers marketed for students and scholars? What of the interpersonal aspects of librarianship—of service, instruction, collaboration? Even the inveterate problems of the costs of materials and the volume of publishing remain considerable; indeed, technology might have exacerbated them. These and other questions will provide substance for librarians to continue to wonder, worry, and dream about the next future(s).

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