IT'S NOT YOUR PARENTS' LIBRARY ANYMORE:
CHALLENGES AND OPPORTUNITIES IN THE NEW WEBS OF COMPLEXITY

ABSTRACT:

As barriers of space and time dissolve, the global e-future looks as dangerous as it does adventurous. The twenty-first century holds the promise of a modern Renaissance, in which traditional research library collections and services collide with the promises and realities of digital information and knowledge management. As perhaps the most intriguing and grand challenges of the twenty-first century center on implications of the juxtaposition between silicon and carbon for culture, so the most intriguing challenges and opportunities for research libraries center on the juxtaposition between the traditional library and digital information and knowledge management, with resultant webs of complexity. This paper examines these challenges and opportunities, raises questions of values and principles, missions and strategies, content and copyright, and methods and ethics, and hypothesizes that despite their increasingly homogeneous collections, twenty-first century research libraries will be characterized more by their divergences than by their similarities.

> We're in the business of giving away knowledge. For free. Come in, please come in, and take some knowledge for free, no, no limit, keep going, gorge on it if you want, no, it's not a trick, a come on, a free sample and then we'll bill you later, or we'll paper your head with banners and pop-ups. Librarians don't have a lot of status and we don't make a lot of money, more than poets, but not so much, say, as your more successful panhandlers, so our ideals are important to us and the love of books and the love of knowledge and the love of truth and free information and letting people discover things for themselves...
> Larry Beinhart. *The Librarian*[1]

INTRODUCTION

Giving the last guest lecture to a first-semester class of library school students is always pleasurable and sometimes adventurous. The students have plowed through challenging readings, engaged in stimulating discussions, and prepared several portfolios and they have a smattering of knowledge and understanding of the issues faced by contemporary libraries that make them curiously self-confident and thus able to asking some extremely interesting questions. Recently, a very serious young woman asked how I could expect contemporary academic public service librarians to understand all the complexities of online catalogs when all I had needed to know thirty-five years ago, when I began my career as a reference librarian in an academic business library, was the

simple card catalog. Her question was not entirely naïve, but it was provocative. The card catalog was not a simple tool and one had to understand its complexities, that is, the intricacies of catalog records, name and subject authorities, and idiosyncratic filing rules (not to mention what to do if a card was misfiled or you dropped a tray of catalog cards with the rod removed). I did not mention that the enormous filing backlogs, which were one of our 'dirty little secrets," made finding many items, particularly newly-accessioned materials impossible. The card catalog was the primary finding tool available in libraries for most of the twentieth century; it was supplemented by printed catalogs, bibliographies, indices, abstracts, and other finding tools. They were fixed and separate and could only be used one at a time and by only one person at a time.

The information world into which this young woman will step soon as a librarian is quite different, and it is clear that tomorrow's world will be even more complex. She will perform many of the same functions that I did. She will help users find what they want and she will teach them – one-on-one and in groups, face-to-face and virtually – to find and evaluate information themselves. Further, she will create tools to facilitate their searches. But she will do this in a world of incredible numbers of information access tools and information resources -- webs of complexity created not by the transformation of tools from paper to digital form but by their very integration into the universe of information -- and she will be confronted by the demands and expectations of an on-demand generation, grown up in the digital age, who demand instant access, delivery, and control. The transformation of the carbon-based world to one that is increasingly silicon-based will provide her the challenges and the opportunities and the choices that I did not confront thirty five years ago. This transformation and how it forms different cultures on different campuses will cause each library to make different choices that will result in them looking less and less like one another.

"The technological excursions of recent decades have advanced societies in which silicon and carbon, and the systems they generate, permeate our lives and weave webs of complexity that will profoundly challenge the way we live and how we see ourselves and relate to each other, locally and globally."[2]

In 2002/2003, the University of Illinois at Urbana-Champaign undertook a year-long exploration of the anticipated intersections and interactions of silicon, carbon, and culture through the arts, humanities, and technology. The initiative, which was undertaken jointly by the College of Liberal Arts and Sciences and the College of Fine and Applied Arts, with support from the Madden Initiative in Technology, Arts, and Culture, and the University's Chancellor and Provost, explored the interplay between the arts, humanities, sciences, and technology fields at UIUC. Projects sponsored by the initiative explored such topics as:

- Visualizing the Global: New Knowledges, Cyber-Globalization, and a Reorientation of Perspectives

- Memory and the Construction of Identity and Culture

- Hands On, Plugged In: Living on the Prairie

- "Walking" Through Knowledge Networks in Virtual Space

This initiative represents what is perhaps the most important challenge of the twenty-first century: the implications of the juxtaposition between silicon and carbon. Silicon and carbon can interact in pervasive and sometimes terrifyingly invasive ways, making the body increasingly technological and technology increasingly human-like. Contemporary ideas of private spaces and public interactions inevitably will be challenged. It is these interactions that epitomize the essence of the transformation we are experiencing in academic research libraries and it is these interactions and

transformations that our young student will have to face and shape as her career matures.

The global e-future looks as dangerous as it does adventurous. Today, the outlines of this future are being drawn by scientists and engineers. But unless philosophers, writers, artists, social scientists, performers, public intellectuals, policymakers, librarians, and others join the design process, the silicon future will be less rich than the carbon one from which we are emerging. As the barriers of time and space dissolve, artists and scientists and librarians and others must interact with each other in their own spaces -- in laboratories and studios, offices and libraries -- however these spaces change, to rediscover the energies of learning together and innovating collaboratively.

Libraries have long been represented by tangible symbols: the jewel in the university's crown, the heart of the university, the campus's treasure. These images are remarkably similar from campus to campus. Our large main library buildings are important iconic representations of our place in the university. But these images are static; they connote traditions – often described as supportive of teaching, learning, and research – that are grounded in carbon at a time when the world in which we operate is transitioning to one dominated by silicon. To represent our future, Wendy Lougee uses the clever metaphor of fabric – a commodity that spreads across the institution flexibly, fluidly, and dynamically, where and when it is needed.[3] The image of fabric represents the library as a more integral, integrated, and collaborative commodity than does a jewel or a building that stands fixed and alone. Each piece of fabric is distinguished by different textures, colors, shapes, and sizes, just as each academic research library will become increasingly distinguished by its diffusion, its shapes, its expertise, and its services as the twenty-first century progresses.

Every generation of librarians has met grand challenges. After struggling through the financially challenging Depression years, my parents' generation seized the opportunity to build great collections by scooping up materials from bombed-out libraries and private individuals whose collections had been ravaged by war and whose needs for cash were greater than their need to keep their books. These materials, coupled with the huge flow of materials made available through such post-WWII programs as those supported by PL480, produced masses of books that could not be processed for many years, resulting in enormous backlogs of inaccessible materials. That generation also built great buildings, established systems of departmental libraries that were located where disciplinary faculty were located, and reacted to its inability to provide on-site everything their clienteles needed by shaping interlibrary loan systems and laying the groundwork for some of the major collaborative institutions on which my generation has relied. In fighting for academic freedom in the McCarthy era, my parents' generation codified values that were most important to maintain.

My generation rose to the challenge of developing new bibliographic standards, new best practices, new technologies, new means of providing access, and rising expectations and demands for access to content and services that crossed the boundaries of time and place. At the start of our careers, we almost always had sufficient resources, but that did not last long. One of the first papers I ever presented was entitled "How To Say 'No' and 'Why' Diplomatically."[4] A significant proportion of the funds that universities had traditionally made available to libraries were diverted to support burgeoning campus information technology operations, creating enormously challenging declines in support for library collections and staff. At the same time, increases in scholarly output, the penetration of commercial publishers into the marketplace, new publishing methodologies, rising prices of scholarly materials, the

growth of big science on our campuses, and dramatic rises in general inflation rates coupled with a consequent fall in the value of the U.S. dollar, created enormous losses in buying power and caused us to begin the first wave of cancellations of large numbers of serial titles and to decrease spending for monographs in an effort to try to support "core" scientific journals. Our collections became more and more like each other's.

At the same time, the causes and extent of the previously unexplained deteriorating physical state of many of the materials in our collections became known and we established programs to improve environmental conditions and preserve the intellectual content of materials too fragile to save physically. We became advocates and activists in trying to release the bonds the commercial sector held over much of the production of scholarly communication. The reintroduction of important information public policies that created obstacles to access and privacy -- copyright and filtering, for example -- presented additional barriers to our success; we rose to the challenge by becoming involved actively and sometimes successfully in trying to change public policies. We continued to reaffirm the profession's core values as we continued to meet these challenges.

Many of the choices we made to improve content availability and services to users were successful because we worked together or because they were obvious or easy to make. We adopted the MARC standard and began to use OCLC's services; introduced online catalogs, first to improve the efficiency of cataloging and then to improve services; developed metadata schema and harvesting tools to improve access; cancelled serials; turned to microfilm both to save shelf space and to preserve the contents of the materials we finally recognized were deteriorating on our shelves and we persuaded the federal government to support some of our efforts. As a result, the libraries we ran all bore a great resemblance to one another. They still do. Organizational cultures may

differ from one institution to another, but when any of us walks onto another campus, we know fairly well where the library is, how it is configured, and what range of services it provides. We still know many libraries by the strengths of their locally-owned collections – at least for now.

My generation, however, has not until now faced the grand challenges presented by the transition from carbon to silicon and the fundamentally different conceptualizations of the library's and the librarian's role within the academy it presents. The choices each library makes today and tomorrow will differ greatly one from the other. Many choices will not be easy or obvious and many will not rely on collaborative action. Being strategic will be very important; being trendy will no longer be important at all. The libraries that your children's generation will take over from you for the most part will look very different from today's libraries, and most of them will not resemble each other nearly as much as today's libraries do.   There are adventures and dangers ahead. How one assesses the risks and what choices one makes will determine which of this generation's libraries will thrive, which will decline, and which will disappear.

Rather than try to articulate a fully developed vision of the future, I want to focus on a few observable trends and the challenges and opportunities they present. What is changing around us in society, in universities, and in libraries? Where will the challenges and opportunities lie? What choices are there to be made? Those are some of the questions on which this article will center.

SOCIETAL TRENDS

We live in an 'on-demand' world that centers increasingly on 'me.' The internet has become the most important source of current information for most people today – the primary place they go for research, general information, hobbies, entertainment listings, travel, health, and investments. We can expect that the internet will evolve to become much more universal, ubiquitous, and pervasive than it is today. Although we can predict that all media will eventually move around the world in tiny packets that will be basic units of tomorrow's communications, we are not yet certain of its their importance.[5] Visions of the future painted by futurists such as Ray Kurzweil[6], who envisions a world where the difference between man and machine blurs and where the soul and the silicon chip unite, may not emerge by 2020 as Kurzweil predicts, but it is clear that the internet will become increasingly ubiquitous and important.

We are learning some very interesting things about internet users. The more experience users have with the internet, the less television they watch. The ramifications to a nation whose population once spent a large portion of time in a passive activity (television) and now transfers that to an interactive activity (the internet) are profound. It could affect every aspect of American culture, the economy, politics, and social behavior. And it will likely affect reading habits, with people moving from print to online publications and from static to dynamic documents. The increasing access to full text documents, exemplified by Google's new undertakings that will provide access to scholarly materials[7] and that will digitize millions of printed books in the next decade[8] will have profound effects on how people access and use information and will further blur the boundaries between 'scholarly' and 'popular' works. The ubiquity of information on the internet, coupled with the ability to access it in an instant, raises expectations and demands that librarians will need to meet independent

of time and place. That is certainly something librarians of my generation did not have to consider a generation ago.

Many aspects of society are being changed by the transition from a carbon to a silicon-based world. Perhaps nothing exemplifies this better than mass marketing, which has been stood on its head by the shifting emphasis from selling to the vast, anonymous crowd to millions of specific consumers, has particular importance to academic librarians. For marketers, the evolution from mass to micromarketing represents a fundamental change driven as much by necessity as opportunity. Further, the proliferation of digital and wireless communication channels is diluting yesterday's mass audience that was accessible through a handful of media outlets to individual audiences spread across hundreds of cable-TV and radio channels, thousands of specialized magazines, and millions of computer terminals, video-game consoles, personal digital assistants, and cell-phone screens.[9] The relentless search for products and services that are "right for me" will continue to drive demand. Ultimately, this is all about offering a degree of customization for everyone, everywhere. The same technological advances that are fragmenting the mass audience are also empowering a new class of digitally savvy consumers who compile, edit, and otherwise customize the media they consume to their own personal requirements. Clearly what were the common experiences of my generation are evolving into the more individualized experiences of members of the current generation.

A recent article in *Business Week*[10] points out some of the implications of these new societal behaviors. My generation hailed the remote control, which began to give us some easier control over what we watched. Who has not channel-surfed or muted commercials? The remote control was just the tip of the iceberg, however. While members of the millennial generation consume gobs of digital fare, they also have

mastered technical tools to evade marketers and to customize their own programming. Customers, with their fingers on the delete button, the mouse, or the remote, wield control as never before. Instead of blasting consumers with fusillades from the TV, advertisers must reach them through hundreds of web sites, TV and radio channels, video games, music downloads, and more.

Members of the millennial generation are also renowned for their multitasking. 99 percent of college students use email, and 59 percent use instant messaging. The first generation to grow up clicking mice, college students are used to controlling the flow and content of programming, whether music downloads or TV. And there appears to be fervor for up-to-the-second information. Members of this generation will spend money, but they demand options and control. And control over their seemingly unending range of choices gives them unprecedented power.

How the world has changed as we have moved from mass to micro! Old consumers passively received network broadcasts; new consumers are empowered media users who control and shape content. Old aspirations were to keep up with the crowd. New aspirations are to stand out from the crowd. Old brands were big and ubiquitous; new brands are niche brands and product extensions, and mass customization means many new variations.[11] Old library users came to a building to use or borrow materials; new ones access content independent of time and place, fettered by the geography of a single physical collection.

Public policies have always been important to the flow of ideas, information, and knowledge. The global place of the United States, the specter of fear of enemies from abroad and from within, and philosophies that position our freedoms in current contexts have varied from era to era. Formers and current generations fended off threats to academic freedom in the McCarthy era, threats to privacy in the Cold War era, and

threats to the free flow of information as new copyright policies emerged in the age of the photocopier. Recent global developments in copyright protections in the emergent digital age and reactions to the terrorist attacks in the United States on September 11, 2001 have created current policies that reflect underlying philosophies of protection for creators and greater governmental powers to intrude on what had been interpreted previously to be private activities. As the United States struggles to define its place in a world it no longer dominates and in which it is no longer the center of higher education to which the rest of the world is drawn, coming generations will undoubtedly struggle with policies that threaten the fundamental values of librarianship. Without aggressive advocacy, huge amounts of content and relatively unrestricted access and demand for control over content on the one hand, and increasing intrusions of governmental entities into access and use on the other, are set to clash – but hopefully not to crash and burn – in the coming years.

THE UNIVERSITY CONTEXT

Research universities are unique institutions, defined by their underlying mission to generate and disseminate knowledge in all spheres. They are perhaps the only institutions that bring together scientists, scholars, and artists to carry out this work themselves and to transmit the values and tools of their fields to the next generation. The challenges and choices academic research libraries will confront cannot be understood fully without understanding current and anticipated changes in research universities and the cultural changes that shape institutional growth.

U.S. colleges and universities are facing many challenges as they make their way through the early years of the twenty-first century. Financial constraints (which in public institutions are causing shifts from dependence on state funding to dependence

on tuition and private fund-raising), coupled with profound changes in electronic and networking technologies, new interdisciplinary collaborations, increasing dependence on 'big science' grant funding and technology transfer, the withering of the vast pool of international students, increased focus on teaching undergraduates in research universities, and changes in scholarly communications, are just some of the forces that are creating conditions for changes as deep and important as those experienced during other transformative periods. These are exemplified by the Morrill Act of 1862, which led to the establishment of land grant institutions; the rise of graduate education and the development of disciplinary-based departments in the late nineteen and early twentieth centuries; the GI Bill, which created new and unprecedented opportunities for the democratization of higher education and new expectations from the system; and the rise of federally-funded "big science," that grew during the post-WWII, cold war era.

Public universities continue to have a mandate to educate the majority of America's higher education student. The states that traditionally funded them, now faced with increasing costs of health care, security and law enforcement, and K-12 education, are increasingly unable to provide the levels of funding their compact with higher education requires. Previous plunges in state funding in the 1980s and 1990s were fairly quickly erased by rebounds in the nation's economy that were mirrored in most states, and although unfunded federal mandates, most notably in health care, put large liens on state budgets, rapidly rebounding revenues outpaced these commitments. But the tale of the first decade of the 2000s has so far had a different story line. Large state commitments and more unfunded mandates, coupled with a reluctance to impose new taxes, even – or perhaps especially – at a time when federal tax rates were being reduced, have led to cuts in funding for higher education and widespread acceptance that even when state economies rebound, increased funding for higher education is very

unlikely.   These financial challenges are troubling and appear to be permanent, and

they are not unique to public institutions; with the exception of the most elite private

colleges and universities, many private institutions are also struggling financially. Just

as we are facing these dire budgetary circumstances, we are developing some of the

most promising models for teaching, learning, student engagement, delivery of

information content, and the use of technology.[12] Our challenge will be to take

advantage of these models while operating in an environment of declining financial

resources. Fundamental changes will characterize those institutions that will thrive

throughout the twenty-first century.

At the same time, the world of scholarly communication, the arena in which

information and knowledge are created and disseminated, is undergoing an

extraordinary transformation, a transformation of similar – or perhaps even greater –

importance as the invention of the printing press or the development of scholarly

societies. Technologies such as e-mail have changed fundamentally the ability of

scholars and students to collaborate across time and place and the computing

environment is being restructured fundamentally on most campuses by the deployment

of new classes of systems such as portals, learning management systems, and

institutional and disciplinary repositories. "E-mail, electronic discussion lists, Web

sites, and other communications platforms have offered opportunities for new and joint

efforts of many different kinds to achieve results not even imaginable just a few years

ago. Yet, even as these changes have had a substantial impact on many of the primary

activities of scholars and students, the challenges of implementing the more profound

changes in the system are far more significant and difficult to overcome."[13]

Wendy Lougee argues that current trends of distributed computing and open

networks, coupled with emerging models for scholarly communication, have eased the

boundaries among stakeholders, which in turn allows more permeable and overlapping of roles. "Content once fettered by physical constraints has been loosened. The conventions of scholarly communication have been stretched and opened to a wider audience. The products of publication have become more process-like. The roles of libraries have also changed to embrace new opportunities for facilitating and shaping content, communication, and collaboration."[14]

Although transformations from carbon to silicon have enabled scholars to collaborate more easily with each other, the products of scholarly communication have not yet changed substantially in form. Authors still make arguments and convey information, ideas, and insights. However, Those changes are on the horizon. Some new genres of scholarly communication are beginning to emerge. The University of Virginia's Institute for Advanced Technology in the Humanities, for example, is beginning to produce a new genre that expands the capabilities of the traditional monographic form. In the coming years, we can expect to see scholars who have grown up from the very beginning of their careers working in digital environments, creating new forms and formats, multimedially integrating works that diminish the privileged place that text has historically occupied.[15]

Silicon has permeated many areas of our traditional universities. Many have invested hundreds of millions of dollars in enterprise-wide administrative and student information systems, designed to improve the efficiency and effectiveness of management processes. However, few of these implementations have been trouble-free; although some of the barriers to success are attributable to the technology, a much larger part may be attributable to the insufficient attention paid to organizational culture – processes, politics, and patterns of information sharing, or lack of sharing.[16] These experiences are extremely informative to those leaders who will be transforming

today's libraries into tomorrow's, for understanding, managing, and successfully changing organizational culture is at least as important as technology to the ultimate goals of any enterprise.

In addition to trying to change organizational culture (overtly or not), university leaders are also trying to change the culture of how scholarship is done on their campuses. "Silicon, Carbon, and Culture" is but one of many examples of strong encouragement for faculty in different fields to collaborate in new ways and in new places. However, many scholars do not need such encouragement from university leaders. Changes in disciplinary and interdisciplinary scholarship are deep, complex, long-term, social, and cultural, and they are fundamentally reconfiguring the university's core activities. Although a stable infrastructure is essential to enable scholars and disciplines to create scholarly content and the tools that serve the need of the discipline, the use of the infrastructure and the tools required, and thus the training required for scholars in the field to use them, will differ from one discipline to another. More intractable than the technological issues are those of changing organizational structures, defining new roles for scholars and publishers and incorporating innovation into traditional environments,[17] and changing organizational culture.

IMPLICATIONS FOR ACADEMIC RESEARCH LIBRARIES

What does it mean for those who lead, manage and work in academic research libraries when tradition collides with digital promises and digital realities? When new generations of students have grown up in a 'me'-centered world of digitally-enabled power and control? When boundaries of time and place no longer exist? When scholars work in new collaborative forms and develop new genres, formats, and models of scholarly communications? When universities are facing unprecedented financial

challenges and when their focus on fund-raising threatens to overshadow their focus on mission? When changes in public policies create an environment so severely restrictive that information cannot be sought freely or used without the specter of Big Brother looking over a virtual shoulder? And when organizational cultures both of universities and scholarly communication stakeholders are unsuited for the future yet appear to be impervious to change?

We are now at a critically important crossroad characterized by profound transformations from carbon to silicon. The arena in which ideas are created, shared, and documented, which is the world in which academic librarians operate, is undergoing a transformation of unusual scale and impact, equivalent or perhaps more phenomenal than the invention of the printing press. Content once fixed in ink on paper, bound and shelved one by one, has become unfettered and is now available to a broader audience that wants it just as it needs it, and wants to control it at any cost; as a result, the focus in libraries is shifting from inanimate collections to specialized expertise.

Yesterday's libraries were defined primarily by their collections, whose range, depth, size, and character were generally well known to scholars. Today's libraries are best characterized as a combination of collections, content, and expertise, but they still resemble one another greatly and they still operate, for the most part, as separate organizations within their universities. As libraries' general collections become more and more alike, 'special' collections – however defined -- will take on increasing importance. Most libraries will diminish their purchasing of print and will license commonly available digital resources. Some libraries will continue to retain their current print collections, while many will rid themselves of the albatross these large print collections represent through digitization or deaccession, relying on a handful of

libraries that are committed to investing the necessary space and financial resources to maintaining them for future 'just-in-case' use.

As increasing numbers of libraries diminish their print holdings, either actually or in relation to their increased access to digital content, libraries and librarians will begin to operate in ways that epitomize the fabric metaphor Wendy Lougee has evoked; the most vibrant libraries may not be seen as separate institutions at all. Librarians and the content to which they provide access literally will be diffused and infused into the University – in departments, laboratories, learning communities, learning systems, nooks and crannies and more -- in ways that we can barely imagine today. In fact, it is difficult to evoke a common visual image, a single symbolic representation, for unlike the libraries of the twentieth century, each of which bore remarkable resemblance to one another, it is likely that by the end of the century, no two academic libraries' array and delivery of services will be alike. As the century unfolds, and as libraries' collections become increasingly homogeneous, libraries' service array and delivery will diverge, their 'special' collections will become increasingly important, and they will bear less and less in common. Librarians will be path builders, but the paths they break will be quite characterized more by their divergence than their similarity.

Just as it is hard to think about a jewel morphing into fabric, or carbon morphing into silicon, it is no longer valid to think about our past and present morphing linearly into our future. Although we may think there have been parallel changes in the past, I believe that there has been sufficient discontinuity that we can no longer think incrementally. A decade from now, just like our fabric, many, but not all, libraries are going to be much more integrated into the university than they are today. Librarians will be skilled professionals who understand and work comfortably, integrally, and collaboratively within a wide range of disciplines and among the mass of newly

developed and developing interdisciplinary areas that will come to dominate our universities. The library of the future will be about enabling the quest for knowledge through carbon and silicon in ways that will be characterized much more aptly as "collaborative" than as "supportive."

During most of the twentieth century, librarianship took shape by continuing to build collections of tangible materials and developing systems of access and services that mediated between individuals and content to serve expressed information needs. These systems generally treated all materials with the same descriptive schema, and the library's actions had little effect on the structure or functionality of published works. Thus, in general, the library was an organization that served all disciplines with similar tools and it served it in generally the same ways on most campuses, and it was largely an institution that operated separately from the creative or communication processes of other stakeholder groups.[18]

When it first became possible to publish electronically, the reference tools on which we rely became digital replicates of their printed versions. But, just as we have learned that just digitizing pages is insufficient to reconceptualize what they are in a digital networked information environment, so we need to think deeply about the new genres of scholarly output and the new genres of learning materials that will be produced by the new generations of course management systems. As do others, Clifford Lynch calls for libraries to invest and build partnerships with faculty and with creative explorers of this exciting yet dangerous environment, building institutional repository-like facilities, and trying to help people think through the structure of information in those settings.[19] Within this century we will witness an enormous sea change in the ways in which academic libraries are distinguished from one another. Scholars who grew up in the digital age are beginning to move from simple uses of a word processor toward a

world where videos, images, sound, data and interactive materials are considered to be on an equal footing with text, or preferable to text and where traditional content will no longer hold its historically privileged place. As Lynch points out, this will fundamentally change what libraries do. "It is going to change….relationships among scholars, people who know about information management, and libraries, publishers, and authors."[20]

How libraries make choices will be a fundamentally critical issue for each one of them, as well as for members of this and future generations of librarians. The commercial sector may provide some useful models. We have already seen many librarians shift roles from keepers of materials to managers of access to materials and providers of a wide range of value-added services, such as publishing or technology development, that had not been thought to be an important traditional part of a library's role. It is more these services and how they are delivered than it is their collections that will determine each library's future relevance and success

Firms such as Amazon have taken advantage of their understanding of societal trends to offer an array of successful services, such as suggesting recently released or available materials based on filed profiles or past purchasing behavior. Firms such as Amazon have also capitalized on their technology applications and the convenient shopping they make possible to push the boundaries of a traditional "book store." Major search technology providers offer another useful model as they jockey hard for position on the desktops of individuals both in personal and work settings. Localization initiatives by major portal firms are repurposing all-purpose content for local markets.[21] These firms' future depend on responding to the needs of the 'me first' always-on, demand and control needs of today's generation and to whatever needs subsequent generations will express, and to continuously offering new services and acquiring or

developing businesses once thought to be only peripheral to their core businesses. Many libraries will engage in these same behaviors. Some librarians will understand and take advantage of these trends to create an array of information services previously unavailable from academic libraries. Some libraries will expand into new niches and spaces. Some services may be so laden with additional value that libraries will offer them to users willing to pay for them. Unsuccessful libraries will remain mired in a carbon-intensive environment while the silicon-based world expands.

The rise of a silicon culture both in and outside of universities will continue to shape the choices each library will make; it will also help determine what functions, will be important to each individual institutional setting and how they will be best delivered. Although "one size fits all" generic approaches will not be appropriate for successful libraries, we can make some generalizations nonetheless about the range and types of services that we might expect twenty-first century libraries to offer.

Today's libraries are much more serious about offering support for teaching and learning than those in which I started my career. We have progressed from giving tours and pointing out such features as "here are the index tables" to explaining the major disciplinary resources and their interrelationships to teaching students how to think critically about their information needs and how to find and evaluate the information they need. For the most part, however, library instruction sessions are offered on a course-by-course basis, often as an "extra" session. Similarly, although reserves services have moved from carbon to a mix of carbon and silicon, for the most part they deliver assigned readings to students in systems that are separate from the course management or other systems students and faculty use regularly. In the future, many libraries will choose to integrate information fluency instruction into course management systems, develop mass customized path-finding services pushed to

students, and offer an array of classroom support services that integrate class readings, information instruction functions, and access to and delivery of content in all media and expertise into the systems the students and their teachers will be using characteristically. As more and more students become equipped routinely with devices that enable them to access library content and services ubiquitously, current "cutting-edge" information commons will be transformed from banks of computers and expert assistance available in library spaces into systems of access and expertise offered throughout campus.

Academic librarians have a long tradition of providing valuable research assistance, but until now it has been characteristically passive, and ill-named. Who, except for librarians and knowledgeable users, know what "reference" is? Yet today's reference services represent an enormous investment in personnel and content and they present users with a dazzling – and confusing - array of access choices. One can make an appointment, spontaneously walk up in person to either an "information desk" or a "reference desk," phone, send e-mail, or chat interactively with a reference staff member. With the exception of e-mail, all other access modes are limited to times in which the library is open and staff is available to help. In large academic libraries, characterized by many department libraries, the choices of where to go and whom to contact for help are impossibly confusing.

Choices about how to assist faculty and students differently than yesterday's models abound. Experiments with other models, such as the deployment of subject specialists to provide a broad range of assistance where faculty and students do their work – in laboratories, in departmental settings, on rounds with doctors, in residence halls and learning communities – or development of research commons designed to provide individualized and mass customized assistance for faculty and students who are

doing research or 'pushing' content *a la* Amazon, are suggestive of new reference service paradigms in which librarians provide proactive research collaboration processes and infrastructure. Also intriguing are models in which librarians are playing stronger roles in evaluating information quality. Despite Stanley Wilder's recent and somewhat retrograde plea to abandon information literacy programs in favor of instruction in reading and writing scholarly material delivered at traditional reference desks[22], these other newly-emerging models are much more compelling and perhaps signal the demise of the "traditional" reference services that were developed throughout the twentieth century.

Changes in the Library's array of services, content resources, and products suggest concomitant changes in the spaces libraries occupy. They also suggest that investments in space will need to grow and that agility in the capacity to reconfigure or cede space for other uses will be paramount to success. Some libraries will continue to invest in large physical spaces while others invest in diffused spaces throughout campus. Most will choose a hybrid model – at least for the next few decades.

Although relatively simple to make, decisions about space configuration and use will be much harder and more complex to implement. Although librarians will have the opportunity to make choices about the configuration and ambience of their spaces, very persuasive arguments will be needed to secure the funds necessary to make changes. However, space will continue to be an important factor in a library's success, whether it is because of the ways in which the space is offered or because it is a financial drain to operate in an environment in which few or no acceptable alternatives are available. It is likely that future generations of faculty and students will confront a wide variety of library spaces that meet their needs increasingly less frequently.

Universities have always competed with one another – for faculty, for students, for grants and gifts, for prestige, for almost everything important to them. Libraries, while reflective of their parent institutions' competitiveness, have been more willing to collaborate and share resources to meet their primary goal of improving access to content and services to their campus communities. The 2003 OCLC environmental scan notes that "(s)sustainability is only possible through collaborations."[23] However, although collective action seems still to be preferable to individual action, as witnessed by the vitality of such initiatives as ARL's Global Resources Network, the Digital Library Federation's Aquifer project, and the emerging development of Ithaka's shared services, the Golden Age of Collaboration may be over. We may now be witnessing the beginning of a shift in the nature of collaboration. As predicted several years ago, the littered landscape of consortia can no longer be sustained;[24] we are seeing the start of a trend towards larger consortia as smaller one come together to be more effective.[25]

And yet, competitiveness seems to drive much of the current divergence in the activities of libraries on a scale that is more than insignificant. Significant changes seem happening, however, as some libraries create pacts with the commercial sector instead of the library or public sector to make some of their contents available.   Although most twentieth-century attempts to integrate library and computing operations in large institutions have been abandoned, many new and divergent activities are emerging. Stanford's High Wire Press initiative, the growing dependence on a small number of very large libraries to continue to collect and archive print resources and the different roles that traditional libraries are taking on in the development of digital libraries are only a few examples.

Academic librarians will continue to be confronted by profound financial challenges, emerging pockets of new organizational cultures within their institutions,

and concomitant changes in demands and expectations for information resources and services. However, libraries, and universities, do not have a strong tradition of developing new services or products quickly. In a recent report, the National Research Council's warning to universities is equally applicable to libraries: "(P)rocrastination and inaction are dangerous courses during a time of rapid technological change. Universities will have to adapt themselves to a radically changing world while they protect their most important values...Although it is very difficult to predict the impacts on human behavior and other social institutions with any precision, higher education must develop mechanisms to at least *sense* potential changes and help it understand where the technology might drive it....(S)trategies should include: the development of sufficient in-house expertise to track technological trends and assess various courses of action; the opportunity for experimentation; and the ability to form alliances...."[26]

Models outside of academia might provide good paradigms. Many corporations look to fast-track a better consumer experience by using a five-step process: observation, brainstorming, rapid prototyping, defining, and implementing.[27] Others extend their models beyond content collection towards a more selective and distributed array of services designed to provide content value to their customers. The extension of weblog newsreading software to provide content aggregation services on the desktop in 2004 is a good example.[28] Librarians can argue about the lack resources and about the restraining nature of many of their cultures, but if they wish to make changes as quickly as their users demand and if they want their libraries to be nimble organizations, they must view themselves as catalysts, as proactive change agents, and they must find ways to shed traditions and, while clinging to their values, make faster and better changes.

CONCLUSION

OCLC's recent environmental scan raised a most intriguing question: "What if libraries….erased the organizational charts, the artificial separations of content, the visible taxonomies, and the other edifices real or otherwise built to bring order and rationality to what we perceive as a chaotic universe. What if we built an infosphere rich in content and context that was easy to use, ubiquitous and integrated, designed to become woven into the fabric of people's lives; people looking for answers, meaning and authoritative, trustable results…."[29]   What choices librarians make about whether and how to create integrated information communities that will serve scholars and enable the processes of tomorrow's scholarly communication and the decisions they make about how to best exercise control to add value and serve as catalysts for change will determine their futures. The choices are more abundant than ever before, and what librarians build will be determined by the choices they make.

The leaders of tomorrow's libraries have an array of important choices to make. Their choices will be dependent on a number of factors, including institutional aspirations, organizational cultures, changes in scholarly communications modes, new opportunities, changing values, public policies, and risk tolerance. In the future, a few libraries will be distinguished by their archives of print collections, some by their stewardship of the university's digital archives, some by their array of services, some by their integration into the learning environment, some by their integration into the research environment, some by their spaces, some by the absence of physical space. All will have some elements of all these characteristics and more, but no two late twenty-first century libraries will be alike.

The current and future generations of librarians have challenges and opportunities of unprecedented import. Clearly, contemporary libraries are not mere repositories. They are physical and social institutions, temples to our collective culture

that reflect the high value we place on the information they preserve for us.[30] As Janet Murray wrote, the promise of silicon is that it "will make valuable information available to more people with less effort. If we can figure out how to do that we will not have obliterated the library; we will have expanded it into an even more welcoming and accessible space."[31]

Each library will take the adventurous yet often dangerous path it thinks will best meet the needs of the communities it serves. Some paths will be adventurous, even dangerous; others will not. And unlike in past generations, future libraries will resemble one another less and less. Our landscape will contain libraries that look and act as they do today, libraries that look similar to today's but that act differently, and libraries that bear little resemblance to today's – libraries that do not exist as physical places so much as they are integrated firmly into the fabric of their universities. Some will thrive; others will not. We should all strive to maximize the thrill of making valuable information available to more people with less effort. The libraries that do that will epitomize success.

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