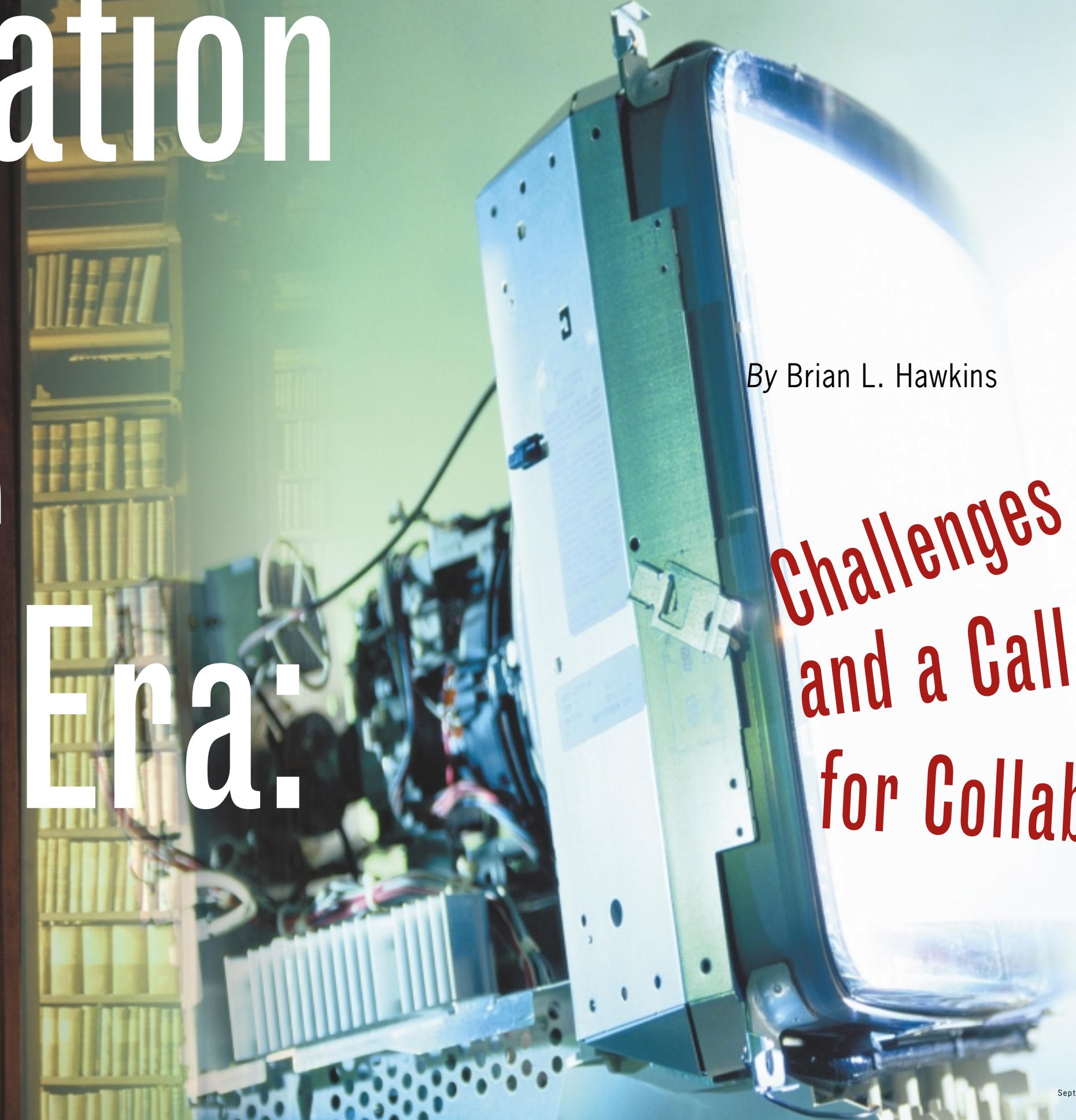


Information Access in the Digital Era:



By Brian L. Hawkins

*Challenges
and a Call
for Collaboration*

Libraries, as well as colleges and universities, are facing major transformational change as digital technology fundamentally alters how services are provided, research is conducted, and learning is enabled. Technology is breaching the traditional disciplinary boundaries through which the institutions are organized and through which information is categorized and accessed. It has challenged and made obsolete many current practices of providing library services, budget

ing resources, defining student constituencies, and handling tenure decisions, for example.

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Libraries provide a clear example of both the promises and the pitfalls of new technology—both the problems solved and the problems created. The acid paper that helped fuel the spread of literacy in the mid-nineteenth century ironically contained the seeds of its own destruction: during the last forty years, libraries have been faced with a massive preservation challenge. Today, digital technology presents a similar dilemma: the potential for greatly enhanced access combined with uncontrollable and unexpected chaos.

Perhaps the greatest obstacle to moving forward in this area is the myth that the Web already provides a library environment. Too many political and academic leaders believe that all someone has to do is search the Web for any information needed. True, a vast amount of information is indeed available on the Web today, but it is not a coherent collection of information. Because the Web is not catalogued, no one has a good idea of what exactly is there or how this information fits into a larger taxonomy of knowledge. Instead, we have rather primitive, inelegant key-word search engines, which are neither effective nor efficient in the retrieval of information. Furthermore, the most valuable information is generally covered by copyright and thus not available on the Web; the amount of scholarly, intellectual, and aesthetic information available on the Web is truly minimal when compared with what is available in a good library. In addition, most material that is historical and for which copyright has expired has not been digitized, and there are no systematic efforts to address this gap.

Although several individual libraries have started programs to digitize some of this material and include it in their own collections, these efforts represent a duplicative and noncomprehensive approach. Finally, the Web lacks standards and methods to validate or authenticate information. There is no librarian or scholarly publisher making informed decisions about the quality or the appropriateness of the information before possibly adding it to a coherent collection. With the Web, everything is equally valid (or not) and there are no filters.

James O'Donnell has clearly stated these challenges:

There is great value in the diversity and abundance of information out there [on the Internet], and one may reasonably expect that diversity and abundance to continue to explode. But the qualities that make the library valuable are not quite there yet. There is no organized cataloging, there is no commitment to preservation, there is no support system to help you find the difficult or missing resource. Finally, there is no filter: that is, there is none of the sense that a user of a great library has that somebody has thought about the possibilities and selected a set of materials to be both comprehensive and yet delimited. On the Internet, you never know what you're missing.¹

The Web is not a library, and access to it is far from egalitarian. This needs to be clearly understood before we can begin to confront both the challenges and the promises of the Internet. While the Internet offers vast amounts of information available in an almost ubiquitous fashion, many of the basic defining characteristics of a library are missing. These missing elements will significantly retard the educational framework for society. Libraries must be part of the fabric of the new electronic infrastructure that is emerging. Access to the content, the services, and the organization of information is essential to teaching, learning, and inquiry at all levels of the educational systems, as well as to society at large.

A Vision

What is precisely that we strive for, aspire to, or dream of regarding online content, access, and services in this new electronic era? Our vision must include a guarantee of electronic access to the collective corpus of traditional libraries, as well as to Web-based materials and other kinds of information. In addition, this access should be available to anyone, not just a chosen few who have access to materials as a function of geography or status. In short:

All scholarly and research publications (including university, governmental, research, and museum sites) should be universally available on the Internet in perpetuity.

Like all other visions, this one may never be completely realized, but the goal should be understood. To try to capture "all scholarly and research publications" is a mammoth—and perhaps naïve, if not impossible—task. However, it is important to try to maximize these materials via a single access point so that the power of electronic search engines, in combination with as complete a collection as possible, might result in full-text retrieval of current knowledge. This means access to more than just scholarly journals. It means access to historical and special collections, to other types of research output, to databases, to museum archives, to governmental data and publications—to anything that might have intellectual or academic interest in the future. But it also means access to a new electronic corpus of information, and it implies that the appropriate description and validation of content has occurred.

The vision emphasizes that these resources "be universally available." Thus they can be accessed via the Internet, at any time and from any place. This phrase was carefully chosen to emphasize access, but it leaves open the issue of cost. These resources first need to be available. Access may be free, licensed, or available through micro-payments. There are many different economic models and potential players that will have to be included if this vision has any chance of becoming a reality.

Finally, the vision proposes that these resources be available "in perpetuity." This phrase emphasizes the need for a strategy of preserving these resources over the ages. While the challenge of acid paper continues to plague librarians of traditional collections, this problem pales in the light of the challenges of preserving the new digital collections. The development and implementation of a coherent plan for preserving these resources is essential. Unfortunately, in the current milieu, this function has been largely ignored, and knowledge is being lost as a result.

This vision is not original. A similar vision was articulated during a series of meetings, held in 1994, of chief academic officers and librarians from several colleges and universities. Perhaps one of their more significant observations was that there was no "plan or vision on how

we might achieve this dream and get from here to there!"²

There is still no plan on how to get there. The scope and the enormity of the set of tasks implied in the vision are so daunting that the common reaction seems to be to wring one's hands, affirm the vision, and hope that someone else will address the problem. Developing a plan—or more aptly, a set of plans—to address these critical issues is necessary. For the sake of example, let us take the concept of knowledge management and the current challenges of describing and validating content and make an initial attempt to outline a possible direction that might lead to a first step in the fulfillment of the vision. Let's start with a discussion of knowledge management.

Knowledge Management

For many in the academic world, *knowledge management* is an old concept, a function historically performed by librarians. However, in the digital era, this term has taken on nuances that point to the need to rethink the old paradigms—to reconsider who the new knowledge management players in the academy might be. According to one definition, knowledge management is "the process of transforming information and intellectual assets into enduring value. It connects people with the knowledge that they need to take action, when they need it. In the corporate

other hand, is personal, context-specific, difficult to formalize, and hard to communicate and transfer. Combining these two types of information—using formal and informal information to guide processes—provides the perceived value of knowledge management. The focus is on unraveling individual know-how and applying it to explicitly driven processes so that the right knowledge is available to the right people at the right time.⁴

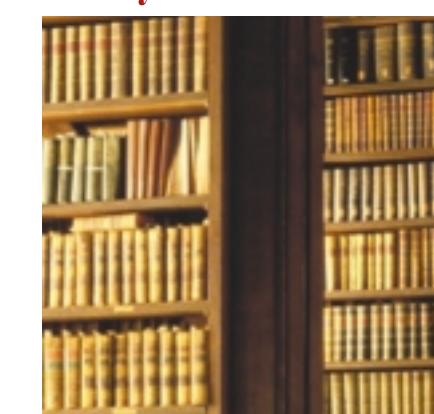
These interesting concepts are being applied in limited and often modest scale in industrial settings. The commercial world hopes to capture the promised efficiencies of knowledge management in order to gain competitive market advantage. The knowledge management paradigm has even been referred to as the next "killer application" in that it provides organizations with valuable, credible, and insightful information—a tremendous asset and a unique advantage.⁵ Thus companies are generating databases, links to Web sites, and portals to facilitate the integration of explicit and tacit information.

The questions to be addressed here are whether this paradigm is applicable to higher education and, if so, how it might be applied. Although academic libraries have focused quite effectively on collecting, organizing, and presenting explicit information, the Web adds an entirely new dimension. Explicit informa-

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sector, managing knowledge is considered key to achieving breakthrough competitive advantage.⁶

The key to knowledge management is capturing the knowledge of process—how organizations get their work done—and of how various elements of information connect to this process. Two different types of information are necessary to accomplish this: explicit and tacit. Explicit information is packaged, easily codified, transferable, and communicable. Tacit information, on the



tion is difficult to acquire because of the explosive, bottom-up nature of the Web, and tacit information is equally or perhaps more difficult to obtain because it is buried in Web-based links to other sites, databases, and publications. In academia, most of the tacit information associated with an area of study lies with faculty. The tacit information of a literature may be what characterizes much of the informal, side conversations at academic conferences, in discussions between graduate students and their mentors, for example.

It is precisely this type of knowledge that John Seely Brown and Paul Duguid describe so eloquently as they talk about the value-added dimension of an academic community.⁶ However, in commenting on knowledge management in the college and university context, Blaise Cronin and Elisabeth Davenport suggest that this informal knowledge can be captured by creating a space, and reconstituting the academic village, so that explicit and tacit information can be combined and shared by faculty. "The challenge is to design a customized, yet flexible infrastructure that supports both individual and collective learning so the organization, whether a corporation or a university, can adapt to discontinuous change in its operating environment."⁷

The academic community has been collecting tacit information for years. Known as marginalia or annotation, this information has often taken the form of bookmarks, either physical or electronic. The physical bookmarks include the scribbles and notes that were previously found on the backs of the cards used in a library card catalog.⁸ Electronic bookmarks are the hot links that connect related Web sites. But for the most part, the tacit information has taken the form of "tools" or "aids" created by individuals. This information is not systematized and is certainly not available to a broader community. Why would one even think of unleashing such massive and unwieldy sources of information? The answer lies in the potential increased productivity and innovation that might arise if this information can somehow be integrated into the processes of scholarly inquiry.

Knowledge management in an academic setting must encompass the community of scholars in a given discipline

and must be able to integrate publications, data sets, tools for manipulating such data, connections to databases of pictures and images, and much more. Portal technology is being used by corporations to bring together tacit and explicit information in a "push" technology framework. This technology also has potential in the academic environment because of its ability to help screen and filter information, to hone in on explicit meanings, and to effectively push this filtered information to users. Jerry Campbell has described the nature of the content, the services, the engines, and the tools that might theoretically be included in such a "scholar's portal."⁹

Much of the writing about knowledge management has focused on competitive advantage, on how one firm can have a leveraged position over another. In the academic world, however, collegial rather than competitive motivations change the nature and the dynamics of the knowledge management model. True, the "bragging rights" of having a larger or more comprehensive research library have been used competitively to try to attract better faculty, but for the most part, the culture of higher education is based on the free flow of information, without competitive concerns:

Typical knowledge management strategies for business stress the processes of capturing, exploiting, and protecting institutional expertise. ... The situation is different for universities, however. Here, the construction of knowledge draws upon an established set of open practices: the scholarly communication system. At the heart of this process lies peer review. When scholars vet their work for publication, they strive to have their ideas as widely disseminated, discussed, and used as possible, including in the classroom, within their disciplinary communities, and in the public sphere. Consulting firms may not routinely broadcast and share information, but these activities are second nature within the academy.¹⁰

So if we are to envision a different set of library resources, perhaps including a knowledge management dimension, what

might this look like, and more important, how might this be created and by whom?

Current Content Challenges and a Possible Direction

The print-only world has used a complex but well-defined system of content validation and description involving librarians, referees, reviewers, and publishers. This selection system gave the chosen material a legitimacy that students and scholars came to depend on. Furthermore, technological advances and collaborative efforts have allowed the costs of this process to be reduced through shared electronic cataloging (e.g., OCLC) and through the purchase or licensing of abstracting and indexing electronic databases. Librarians recognized that the only scalable and affordable approach to such processes was to take advantage of leveraged and shared resources.

The rise of electronic information resources freely accessible through the Internet has disrupted this relatively efficient system in a number of ways. There is no clear and defined role for libraries with regard to the selection, preservation, and provision of the digital resources accessible through the Net. Additionally,

scholars trying to thoroughly research an area must go to a library to conduct the traditional search process and then must do an electronic search of the Web and other electronic resources. Scholars doing this searching must have the ability to discern the quality, authenticity, and validity of the information that they find on the Web. Of greatest concern is that a student may consult only the Web, either assuming that the information available there is complete and accurate or that the Web alone provides an adequate resource. There are plenty of reasons to believe that students today and in the future will fall into this trap, including the fact that their preferred method of working is to do everything online. Although everything possible should be done to educate students and others that each of these two approaches has its own merits, it is unrealistic to think that such educational efforts will be highly successful with the vast majority of students who have grown up with the Web.

Another problem with the Web today is the nature of the various search engines, such as Yahoo! and Altavista. Though such services offer much wider coverage than any traditional cataloging approach, they do so with far less quality and filtering and with a very different, often less powerful, level of description. A search using one of these engines may yield a half million or more hits. These search engines are also tainted by a bias rooted in their commercial advertising relationships. Most searchers do not use—or know how to use—the advanced features and the more sophisticated search algorithms embedded in these applications. Consequently, they search virtually the entire Web. Thus, in the current environment and with the current tools, we are left with incomplete information, little if any organization, and rudimentary, inefficient, and often inaccurate searching. The current electronic environment can, however, provide an interesting set of "reference" services, such as those found on Amazon.com, offering reviews and materials related to that for which the user was searching. These services are increasingly being perceived as a value to scholars, and academic libraries need to think through the

relationship between their own offerings and those of the commercial services.

As noted above, the vision for online resources involves a system of selected, academically viable resources, with some validation of the authenticity of the content and with a more legitimate process for selecting and finding information. In the print-on-paper world, this filtering has been provided by libraries. Today, the broader higher education community can continue to depend on the presently available search engines, with their associated limitations, or can develop a new point of entrée, that is, a portal with selected sources, better search tools, and a validated set of resources. Such a portal could address many of the current problems and limitations by providing an appropriate inventory of resources, the necessary descriptors, and an associated search engine.

Ideally, a search engine is needed that focuses exclusively on Web sites, data sets, video clips, and other source material deemed to have academic value. These materials need to be collected and brought together, through the use of a common interface, a concept similar to the one being employed by the OCLC CORC project. The hundreds of thousands of Web sites that presently "feed" current search engines need to be filtered, with those that have legitimate value being identified and included for preservation in much the same way

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that a traditional library collection is assembled. Such a sophisticated search engine would provide the complex Boolean logic and search algorithms that are the equivalent of modern library search engines. Over the long term, this process should develop a collection with the same degree of "reasonable completeness" that is associated with a good library.

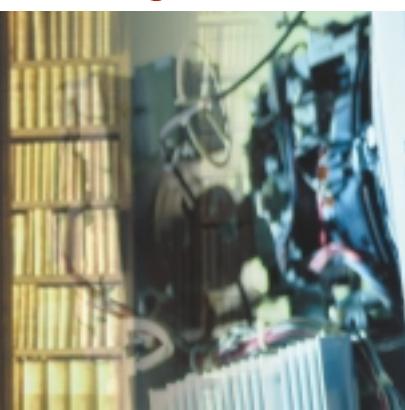
A second requirement for such an engine includes the development and application of systematic standards in the

definition of metadata, cross-reference information, and other important identifiers necessary to conduct more complex searching. What is needed is an agreed-upon set of conventions for the description and identification of information in any number of media.

In dreaming about what such a search engine might do, we should simultaneously consider who might use such a set of tools, so that a practical plan can be developed. The potential market for this service could be quite large and go well beyond the higher education community. Most assuredly, it would include college students, faculty, and staff. It would also include research professionals outside of higher education (including research institutes and corporate research-and-development professionals); those involved with cultural heritage organizations, such as museums and galleries; and workers in government, public libraries, and the public schools. Such a portal could address many of the current problems and limitations by providing an appropriate inventory of resources, the necessary descriptors, and an associated search engine.

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If the market for such a set of services goes well beyond research universities, or even the higher education community as a whole, then it is fair to assume that these



services would present a viable opportunity for a commercial enterprise. An existing or new company with the necessary seed capital and business acumen to develop such an effort might provide a much better and longer-term solution than would yet another fragmented approach by higher education. And a "private" approach could spread the costs of the project over a much larger audience, hence reducing the unit cost that would be needed. Advertising could also provide a significant source of revenue to support the effort. The market for these services—the educated, upwardly mobile—is highly sought-after by companies wishing to advertise. Attracting a large proportion of this market to a particular site and having large numbers of "eyes" on banner ads on the Web site is the objective of many very successful portals today and a means of significant subsidization. By using such ads, it is possible that these services could be made available at a nominal price or even free.

A not-for-profit corporation run in concert with a number of higher education institutions or associations offers one model for such an initiative. Another model is a private, commercial enterprise run in concert with members of the academic community. In either case, the operation needs to be run like an actual business, involving professionals in the areas of management and marketing so that an efficient business operation can be established. This business approach is in contrast to the all-too-common history of projects that have been run ineffectively by individual campuses. The business approach would also ensure that this effort could be sustained over the long term. To the degree possible, the first exploration of alternatives should reside with partners that have proven track records of working collaboratively with higher education.

The creation of such a business would require significant seed capital to begin the collecting and cataloging of the information resources. This effort would be a very large undertaking and would require a sizable number of qualified librarians and other professionals. Venture capital might be raised from traditional sources, or a group of well-endowed colleges and universities might provide the

seed money and be stakeholders in the enterprise. The "product" that is developed could be purchased or licensed directly by an end user, or it could be licensed to another portal company to add value to the partner portal site, thus providing an additional income stream.

Such a portal would also provide access to the tacit information discussed earlier. Referrals and reviews such as those provided by Amazon.com could provide a significant added dimension. Web-based information could be screened, and informative links to other sites, critiques, reviews, and related information could be included. Communities of interest could emerge in specific disciplinary areas, thus enlarging and codifying the tacit information that experts in the area of knowledge management argue is so essential.

However, this portal model implies that those responsible for this new environment include but also go beyond the library community. It implies the active involvement of faculty and scholars in many different areas of study. Ideally, the organization responsible for creating this environment would develop collaborative relationships with the academic community. The more that higher education institutions, libraries, and faculty cooperate with this organization, the larger the collection would become, and the sooner it would become truly viable. In terms of

the more difficult problem is the discovery that strategic problems require collaborative solutions and the will to innovate.¹¹ This point cannot be emphasized strongly enough. The ability to truly collaborate is one of the greatest challenges (and weaknesses!) facing higher education today.

Collaboration

In an article unrelated to higher education, Andrea Youngdahl describes and makes distinctions between three concepts that are all too often used synonymously: cooperation, coordination, and collaboration.¹² She suggests that cooperation is an informal—and often superficial—level of involvement. It includes sharing information, serving on committees together, and yet allowing participants to fundamentally stay separate and to continue to function in a completely autonomous manner. Youngdahl describes coordination as having a more mutual level of commitment. Coordination involves actual resource sharing, filling in the gaps that the participants would not be able to accommodate individually, and adapting and accommodating differences in order to achieve a goal.

Finally, she suggests that collaboration involves a synergistic—not an additive—solution. This collaborative model requires the actual commitment and investment of resources, based on a shared vision. Collaboration is not competitive but is

rather a new formulation that creates a new community. It is precisely this new kind of collaboration that institutions of higher education need to adopt if they are to be viable in the future.

Many colleges and universities are attempting to develop their own distributed learning environments. Yet the cost and complexity of such stand-alone structures—along with the fact that academic institutions lack the nimbleness, flexibility, and responsiveness needed to be competitive—will almost certainly serve as a significant barrier to individualized solutions. Collaboration among institutions will become increasingly essential. So far, few institutions have attempted to develop a broad-ranging curriculum that would qualify as a liberal arts education. For this reason, collective action and other consortial efforts drawing on faculty and resources from many institutions will likely be the most successful.

Most in higher education have long assumed that not-for-profit educational efforts result in a higher-quality product than that offered by commercial efforts. Yet institutions need to throw off their defensiveness, question this assumption, and embrace the fact that partnerships between and among for-profit and traditional institutions may be some of the most successful models for creating and delivering these new learning environments.

Higher education regularly backs away from collaborative relationships for a range of traditional reasons: institutional pride; the "not invented here" syndrome; the pursuit of control (no matter how illusory that concept has become!); the steadfast opinion that "my campus is unique"; and the wistful desire for the way things used to be. Until now, colleges and universities have unfortunately approached collaboration as something that is done (or should be done) after the primary business is done. In essence, higher education has thought of collaboration as an avocational approach. Yet the challenges and transformations arising today with the speed of change call for campuses to come to grips with the notion that collaboration is the only means of competitive survival.

Effective online learning models will rely heavily on collaboration with external entities, as will any solutions to effec-

tively deal with transforming libraries and with sharing information resources electronically. Can higher education learn to effectively "partner" with other not-for-profit and with for-profit ventures? If so, new opportunities and new leveraging will result, increasing the likelihood of success. Yet the jury is still out on whether higher education institutions can develop these skills. Colleges and universities may continue to bungle along in a "go-it-alone" mode, as they have in the past—to their collective long-term detriment. In this new networked world in which we live, collaboration is a common theme that *must* be embraced.

Conclusion

In the essay "The Labyrinth of the Wide World," William Plater noted: "More than any other traditional asset, the library is the means by which American universities will transform themselves into something entirely new."¹³ The discussion above has focused not only on what might be but also on how we might go about inventing a part of the future and a part of the "something entirely new" to which Plater refers. This is key to understanding and providing for the needs of higher education consumers, be they students or faculty. The community needs to keep its collective eye on the objective, the vision: namely, having intellectual and aesthetic information easily available via the Internet and preserved for the digital era.

These new conceptualizations of the library, of the information resource environment, and of the college or university itself are all works in progress. All imply new kinds of information, new types of structures, and new forms of collaboration. James J. Duderstadt, the former president of the University of Michigan, captures the challenge before us: "The real question is not whether higher education will be transformed, but rather *how...* and by *whom*. If the university is capable of transforming itself to respond to the needs of a culture of learning, then what is currently perceived as the challenge of change may, in fact, become the opportunity for a renaissance, an age of enlightenment, in higher education in the years ahead."¹⁴

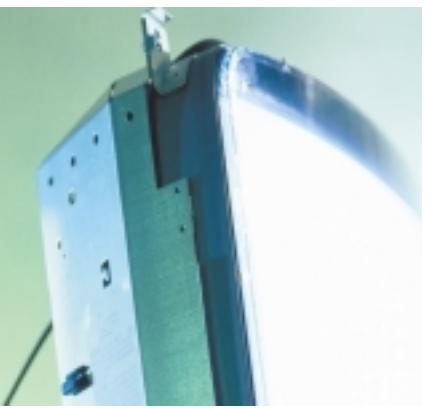
We all need to become active participants in defining this transformed envi-

ronment, but that will occur only if we can reach out across the boundaries of our own institutions, across the boundaries of geography, and across the artificial boundaries that inhibit an active community of scholars supporting one another. It will occur only if we have enough courage to utilize new business models and to participate with new partners. Only through a spirit of collaboration can we successfully adapt to the transformational change that surrounds us in this digital era. 

Notes

1. James J. O'Donnell, *Avatars of the Word* (Cambridge: Harvard University Press, 1998), 69.
2. Richard M. Dougherty and Carol Hughes, *Preferred Futures for Libraries: A Summary of Six Workshops with University Provosts and Library Directors* (Mountain View, Calif.: Research Libraries Group, 1994), 14.
3. Gary A. LaBranche, "Knowledge Management: The Killer App for the 21st Century," American Society of Association Executives, *Membership Developments*, July 2000, <<http://www.asacnet.org/sections/membership/article/1,2261,50864,00.html?headername=Membership+Developments&searchstring=>>>, (accessed July 10, 2001).
4. Jillinda J. Kidwell, Karen Vander Linde, and Sandra J. Johnson, "Applying Corporate Knowledge Management Practices in Higher Education," in *Information Alchemy: The Art and Science of Knowledge Management*, ed. Gerald Bern bom, EDUCAUSE
5. LaBranche, "Knowledge Management."
6. John Seely Brown and Paul Duguid, "Universities in the Digital Age," in *The Mirage of Continuity: Reconfiguring Academic Information Resources for the 21st Century*, ed. Brian L. Hawkins and Patricia Battin (Washington, D.C.: Council on Library and Information Resources and the American Association of Universities, 1998), 39–60.
7. Blaise Cronin and Elisabeth Davenport, "Knowledge Management in Higher Education," in Bern bom, ed., *Information Alchemy*, 35.
8. Nicholson Baker, "Discards," *The New Yorker*, April 4, 1994, 64–86.
9. Jerry D. Campbell, "The Case for Creating a Scholar's Portal to the Web: A White Paper," ARL *Bimonthly Report*, August 2000, <<http://www.arl.org/newslett/211/portal.html>>, (accessed July 10, 2001).
10. Cronin and Davenport, "Knowledge Management in Higher Education," 29.
11. Peter Lyman, "Knowledge Discovery in a Networked World," in Bern bom, ed., *Information Alchemy*, 60.
12. Andrea Youngdahl, "Building and Participating in Collaboratives," paper presented to the California Department of Health Services/Children's Medical Branch Healthy Families Training for CCS and CHDP Staff, Sacramento, California, July 13–14, 1998.
13. William M. Plater, "The Library: A Labyrinth of the Wide World," *Educom Review* 30, no. 2 (March/April 1995): 39.
14. James J. Duderstadt, *A University for the 21st Century* (Ann Arbor: University of Michigan Press, 2000), 334.

The ability to truly collaborate is one of the greatest challenges facing higher education today.



the cataloging, for example, once appropriate and acceptable standards are defined, the cataloging could be pushed downstream and shared in much the same fashion that the cataloging of books is presently done.

In discussing knowledge management in a higher education setting, Peter Lyman emphasizes several infrastructure dimensions that would be required to make this new kind of educational e-commerce work. He then adds: "This infrastructure, of course, is only a means;