

TOWARDS 2001: ELECTRONIC WORKSTATIONS AND THE FUTURE OF ACADEMIC ARCHIVES

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ABSTRACT: The electronic workstation will enable researchers to pull together at a single workstation information from a variety of sources, including the campus archives. One consequence of the workstation is that users will be overwhelmed by the extent of what can be retrieved. As a result, information retrieval systems will increase the precision of retrieval. Indexing and systems of artificial intelligence will guide the user from afar in selecting from the wealth of information available.

Archival participation in the evolution of information technology of the future will not happen automatically. Nevertheless, there will be several opportunities for archivists to convince resource allocators of the value of investing in technological improvements for institutional archives.

Forecasting the future is a perilous undertaking, especially for professions more accustomed to the tangible remnants of yesterday than the uncertainties of tomorrow.¹ One archivist, Randall Jimerson, offered a particularly gloomy forecast. He reported that the Ghost of Archives Yet to Come had visited him. Together, they toured first the data archives of the university and then the university archives. The data archives had bright lights, numerous terminals surrounded by faculty and students, and fax machines and printers that buzzed noisily. In contrast, the university archives occupied a dimly lit basement and contained stacks of ancient Hollinger boxes. Over a table piled with unprocessed papers peered a lonely archivist who had not seen a researcher, or answered a reference request, in some time.

In the tradition of a jeremiad, Jimerson provided not only a view of the future (archivists in the hands of an angry Allocator) but also a guide to actions for a rebirth or regeneration of archival programs. What was needed, according to Jimerson, was a clear strategic vision for improving services and responsiveness to archival customers. Archivists must adopt a marketing orientation for their services. Like entrepreneurs selling a product, they need to identify what information people need or want, determine how to provide it, and find the resources necessary to accomplish that objective.²

What follows are two sets of strategic considerations for academic archives in planning for the future. One concerns an information technology soon to be common: the electronic workstation. It will create opportunities for managing information that will raise new expectations in its users. These expectations, in turn, will have consequences for information providers. In Jimerson's vision, the lonely archivist failed to identify and meet the needs and expectations of information users. In the end he became isolated both from users and from developments in information technology.

The other set of considerations comes from the institutional environment—especially fiscal resources and budgetary priorities—within which academic archivists function. No academic department can identify objectives and marshal resources without acting in concert with others, usually deans or vice-presidents. For most archivists at colleges and universities that institutional context is the library. The future will present several opportunities for archivists to become participants, rather than spectators, in information retrieval innovation.

The Electronic Workstation

The electronic workstation will be a significant technology of the future. Increasingly, it is apparent that faculty, students, and administrators at research universities will rely upon workstations to create, receive, and disseminate information. From a single station, a person will browse through both library catalogs and commercial or institutional databases. Technically speaking, all information in digital form—pictures, text, and even audio signals as well as electronic databases—will be summoned and then appear almost instantly. Only software and hardware will set the boundaries of the new frontier of information management. Even as the printing press and movable type changed the world of Gutenberg, so, too, electronic workstations will change our world as they distribute more types of information in digital form to more people in different places.³

After examining this information at the same terminal, the user may draft documents, manipulate data, or create a customized data base. Then, he or she will distribute this information electronically to colleagues across campus or across the world.⁴ All of this can be done without leaving the home or office.⁵

Impact of the Electronic Workstation

As more data—textual, numeric, graphic, and so forth—reaches the workstation, information overload will become a significant user problem.⁶ To cope with the abundance of information, researchers will expect that information providers and their retrieval systems will display answers that are directly meaningful to their queries. Thus, precision of information, or the proportion of responses directly relevant to the query, will be more important than the number of "hits" or items retrieved. Researchers may even expect that the responses to their queries will be listed not by call number or by record number but in the order that the computer determines is most suited to the inquiry.⁷ Information services, now common to archives, that do little more than tease the user of a terminal with a message "finding aid is available locally," will disappoint patrons and undermine the credibility of archivists as information providers.⁸

Precision of information retrieval can be achieved in three ways: providing more detailed description about information, indexing in ways to highlight the useful, and furnishing the retrieval system with intelligence to guide the patron. Already, researchers at remote workstations can access bibliographic databases and scan abstracts of books or articles. Some databases contain titles of articles in journals, not just the names of the journals. Access to chapter headings of monographs themselves seems likely.

From this perspective, it is not foolishly visionary to foresee that the same retrieval system that provides abstracts of published sources also could display more description about archival information. On the screen the user could find the tools—administrative histories and authority files, biographical statements or organizational histories, and scope and content notes—needed to add precision to the retrieval of archival records.

A second approach to reaching greater precision involves indexing. For more than a century, researchers of catalogs have found books or journals by means of author, title, and subject. Workstations now and in the future will expose researchers remote from a repository to information of different kinds—photographs, statistical and bibliographical databases, as well as catalogs of research libraries near and far. In the process, the evolution of the “Library without Walls,” the environment of the workstation, will weave the traditional bibliographic records of the catalogers with the indexing records of abstracting and indexing agencies into an electronic cloth of information retrieval.⁹

Indexing, it must be noted, is neither an art nor a science. It is a calculated judgment about specific information and the needs of those who would seek it. What drives the indexer is an expectation of how a user will employ words to find an item of greatest relevance to a need for information. Choices of what and how to index are fundamental to the work of the indexer.¹⁰

Concerns about indexing can, and do, take place in academic archives. Record groups and series that contain the most comprehensive documentation of the activities of the institution may merit indexing at the folder level or even the item level. In other words, the files of the president, vice-presidents, and deans may appear in detail on the screen at the workstation, while those of chairpersons and directors may have only a single catalog entry.

Another choice of indexing might be to identify files or items whose presence seems out of administrative context based on function and position in the institutional hierarchy. As an example, much of the work of an academic institution is done by committees, whose membership may be diverse and whose record-keeping practices less than pristine. In this circumstance, the vice president for research may serve on a committee to study athletic scholarships. The chair of that committee then moves to take a position as president of a football franchise and takes the records with him. As it happens, the only record of the deliberations of that committee are in the files of the vice president for research. Here is a case where indexing of the individual folders may be appropriate. With the enhanced powers of the workstation to retrieve information and the consequent problem of information overload for the user, archivists will need to pay more attention to indexing policies and strategies.

Ultimately, the archives will need to identify in the electronic description the intensity of computer indexing of a particular collection. If record groups, series, or even accessions are indexed at different levels of intensity—even as

collections may be processed with differing intensity of arrangement and description—this should be communicated to the patron, especially one whose only point of contact with archival description is from a remote workstation. The researcher of tomorrow is likely to assume that what is on the screen is the most complete information available. In the end, the user should be aware of which record groups or series require use of a finding aid that is not online. Thus in the future the words “finding aid is available locally” would serve as a warning, not simply a notice, that users need to request another source of information for an intensive description of the record group or series.¹¹

A third way to enhance precision is to make the retrieval system more adaptable to the skills of the information seeker. Users differ greatly in their understanding of information environments. Archivists have been aware for some time that users have difficulty using provenance-based retrieval systems. They require a knowledge of administrative organization and history that most researchers do not have.¹² In a reference interview, the archivist or reference assistance guides the researcher through the administrative trails, mazes, and reporting relationships that characterize provenance-based systems. Only through the intercession of someone knowledgeable in provenance is it possible to reach the series, boxes, folders, and items of potential usefulness to the researcher. From a workstation distant from a reference archivist, access to relevant archival information will be a particularly daunting task.

One technological development seems likely to be helpful in both making remote users aware of archival information and enhancing the precision of retrieval: information systems with artificial intelligence to guide researchers. The systems themselves will be to respond to researchers in ways commensurate with different skills in library usage. In other words, the information retrieval system reacts intelligently to the user and to the database to render the novice an informed user.¹³

A pioneering example of artificial intelligence in the education of library users is at The Ohio State University. Known as “Gateway to Information,” this is a microcomputer program designed by the libraries to teach and guide students in the application of information search strategies. Each time users explore the online catalog of the OSU libraries for information about a subject, they will interact with Gateway. As the name implies, Gateway is a point of access to numerous sources of information. These include CD-ROMS, encyclopedias, dictionaries, online data bases, and even reference sources in print. It is also a navigator that directs users to both identify and evaluate the potential relevance of different sources of information.¹⁴ So helpful is Gateway that it even includes a menu of maps showing routes to the stacks or to other libraries in different areas of the campus. The point is not the sophistication of Gateway but rather the development of intelligent machines to assist patrons in the search for information. As intelligent machines interact with researchers they will expose sources of information formerly hidden by the limits of conventional library cataloging practices.

One of the sources of information on Gateway could be the holdings of special research collections and of academic archives. A researcher might approach Gateway or similar system with a query about the history of theater in Columbus since 1945. The computer might provide a listing of books and titles of articles in journals, along with tables of contents and abstracts. Ideally, it will

also note that archival information about the theatrical activities of the campus is also available and ask if descriptions should appear on the screen. Typical entries might include reference to biographical files or papers of faculty, records of student drama groups, photographs, administrative files of the theater department, and collections of plays and artifactual materials, including costumes and sets.¹⁵ Even if researchers could not scan the documents themselves electronically from a workstation, they could come to the archives with a broader base of knowledge than has been possible in the past.

Strategic Considerations

The continuing development of information retrieval systems can bring new opportunities for automated retrieval in archival collections. What is important, however, is not what is technologically possible. More often than not, the problems of development are not technological but human and social. As one observer of both libraries and archives has stated, "The really difficult problems [of librarians and archivists], often unrecognized and therefore unresolved, are methodological and managerial, intellectual and philosophical, professional and political, and all too human."¹⁶ Archivists will need to develop strategies for persuading resource allocators and planners to include archival information in sophisticated retrieval systems.

Each campus will have its own context of people and pressures within which to convince library or university administrators of the importance of archives.¹⁷ No single strategy may have universal application. Three sets of strategic considerations follow. All may take place simultaneously at a single institution.

Strategy of Technological Development Based on Use

Users of academic archives vary greatly in their need for information. Typically, undergraduates who write term papers or stories for the campus newspaper need and desire far less original documentation than scholars, who are far fewer in number. Administrators, in general, do not invest the time to review voluminous files of archival records. More often than not, their needs are immediate and precise rather than speculative.

On the basis of the usage of the record, it may be appropriate to make strategic decisions about connections to Gateway-type retrieval systems. Sources of information most frequently used will have higher priority for workstation access than those seldom used. What archivist has not assigned a higher priority for processing to a collection likely to be used soon and frequently? On the other hand, what archivist is not aware of collections that may have met appraisal requirements but are unlikely to draw numerous researchers, regardless of how well indexed or abstracted the finding aids are? It doesn't make strategic sense from a marketing point of view to invest time and money in providing detailed access to collections of primary source materials that are likely to be used by those few researchers in an institutional archives who need to read original sources. In these cases, a MARC-AMC record that provides a collection level description would be sufficient, not detailed abstracts and indexes of authors and subjects.

More valuable from a strategic point of view might be sources of archival information that already are used frequently. Many of the reference questions posed by students and administrators are answered from secondary sources. Numerous patrons are content with statistics from catalogs and registrar's reports, articles copied from newspapers and magazines, press releases, and histories of colleges and departments. A market-oriented information provider will view the users of secondary sources as a target audience. The goal is to identify these users as representing the base of a larger constituency that will be drawn to use archival services if the particularly useful holdings are better known.

From this entrepreneurial perspective, academic archives may fashion a range of information products that have been market-tested by a history of use. A researcher at a workstation in the office or in the library or at home may have access to a set of archival data files as a menu of options of information sources. Examples may include biographical statements about former faculty and administrators, brief administrative histories, or tables of enrollment. Optical character recognition devices may be used to scan and digitize into machine-readable form the information judged by the archivist as useful to many.

These encyclopedia-like files will lead users to sources of original documentation. Researchers who need to know when the administration building was constructed and what it cost will be made aware of the existence of photographs, architectural drawings, and programs of requirements and specifications in other collections that may require a visit or call to the archives. Similarly, a file of articles about women's athletics will link to the record series of the director of women's athletics, as well as to folders or annual reports available in other collections of original material. Decisions about what might be abstracted or indexed or available in full text will be based upon resources and justification of potential usage.

From a strategic point of view, a record on an information retrieval system that enables remote access is an advertisement, not simply a statement of inventory. An entry on a public access catalog or a file on a Gateway system is a form of promotion or outreach from the information provider to information users. Making accessible information in a way that provides indexes, abstracts, and numerous points of access to users near and far is a decision with significant costs for machinery, software, and labor. To justify the costs of indexing and abstracting, there must be reasonable likelihood that it will have a favorable impact upon usage and upon program development of the archives.¹⁸

This strategy for acquiring technological support may be controversial. It places a higher priority upon making available information likely to be used soon by many than upon information that may be used in the future by few. In this scenario, for example, more effort will be put into making available a potentially popular online encyclopedia of historic facts than into indexing the grant files of a research foundation.

Fundamental to the strategy is the belief that information technology, like space technology, has spin-offs or secondary consequences. Even as the space program caused the investment of research dollars in materials research, electronics, and computers, experimentation in rendering information about the past more accessible will lead to improvements in access to all documentation, primary and secondary. The first goal is to establish a base for technological devel-

opment in archives by drawing support from resource allocators with imaginative and potentially popular projects.

Strategy of Like-Minded Allies

Another approach to finding institutional support for developing the technology of archival information is to enlist allies in the library who are as dissatisfied with the content and precision of the online catalog as the archivists. It may be unrealistic to expect resource-allocators to respond to archivists alone as they compete for budgetary support for automation.¹⁹

The research library is a large and diverse community of information specialists. In fact, there are librarians who share with archivists similar problems of access and description of materials that are more complex than conventional bibliographic systems allow. These potential allies include rare book librarians, curators of special collections, analytical bibliographers and government documents librarians. They have needs for access to information by genre, form, and date that are similar to those of archivists.²⁰ For them and for archivists, the record in the online catalog is a marker, not a map, of the landscape of information available in their collections.

One example to illustrate the dynamics of and potential for alliance among special collections occurred at The Ohio State University. In 1982 the curators of rare books and manuscripts, the Charvat Collection of American Fiction, the Hilandar Collection, the Cartoon Graphic Arts Library, and the University Archives—collections that were separated physically and had no common reporting line—formed a Special Collections Roundtable. Its purpose was to discuss regularly issues of common concern. The motivating force behind the creation of this forum of curators was their sense of isolation from the “mainstream” of the libraries. All had unique or rare research materials different from books and journals, acquired in different ways, requiring special handling, intellectually and physically. Ultimately an assistant director of libraries would serve as chair and as the point of access to library administration.

A particularly relevant example of the group’s effect has been a project to create a special collections database. All of the curators shared the problem that the online catalog did not provide sufficient access points beyond those of author, title, and a few subjects. Faced with a common problem, a subgroup of the roundtable whose collections related closely to popular culture developed a program of requirements for an information retrieval system—the Special Collections Database—that would be part of but supplement the online catalog of the libraries. Patrons in pursuit of a particular subject or topic would find MARC-AMC records in the general catalog and then search for items (pieces, folders, boxes, series as designated by the curator) in the database. In the Special Collections Database, a variety of access points would be available to assist in searching for information—type of material, form, date, and so forth.²¹

Although the database failed to draw funding at the federal level, the proposal itself was an accomplishment. The curators worked together to express common concerns, and their expectations of what information technology should accomplish took shape. In the process, all of the special collections drew the attention of others in the library, including the automation officer of the libraries and the

cataloging section. Ultimately, this group also won the endorsement of the director of libraries. Only by working together was it possible to achieve this level of recognition.

Strategies of Administrative Allies

The quest for money to develop information retrieval in general may represent another strategic opportunity for archivists to build alliances. Demands for enhancing the technology of access will strain financial resources annually. Hardware and software will need to be updated more frequently as information increases and as users demand more precision. In fact, the budget of the library itself will change proportionately. A greater portion will be for hardware and software and less for acquisition of library materials. To institutional archivists who have had relatively little need to purchase books and serials in the past, this impending shift in internal budgeting will present new opportunities for financing information technology.²²

Previously, archivists have been skeptical that funding for the automation of libraries will benefit archival collections. Too much money, it has been said, would be required to upgrade online catalogs to reach the level of access desired by archivists. In this all too familiar scenario, the concerns of archivists fall victim to other priorities of the library.²³

In reality, the financial needs of libraries and of universities may provide an opportunity for academic archivists to demonstrate their value. Archival resources have and will continue to draw the attention of alumni, a traditional source of fiscal strength for colleges and universities. Slide shows, videos, special publications, and other promotional tools will make use of the past for purposes of fundraising as well as education and entertainment. As directors of libraries become soldiers in never-ending campaigns to raise money, archivists have valuable arsenals of historical resources.

An archival program also can play a significant role in representing the library as an information resource and service of administrative value. Typically, directors of libraries or information services request budgetary and programmatic improvements from a university administrator. That person may have only distant familiarity with the information resources and the technology available in the libraries. Few administrators who were once professors can find the time to be active in research and publishing. In fact the memory of the library may be unpleasant if the information proved difficult to find.

The gap between the libraries and administration was bridged temporarily at California State University—Chico. There the library worked with university administrators in developing as a pilot program an information service especially for university administration. The objective was to improve the quality of administration by assigning librarians to do research and provide information requested by designated university administrators. One of the sources of information in the library was the university archives. Others included government publications, online databases, and laws and regulations governing higher education. As a result of the information service, it was expected that administrators would have a better appreciation of the libraries' resources and librarians' ability to provide information useful for administrative purposes.

Generally speaking, the temporary experiment did win praise for the libraries. As the authors described it, "We feel it important to convey to library managers and administrators the warmth and enthusiasm with which the idea and the test itself, were received. In a word, the recipients were ecstatic (their term, on more than one occasion)." Beneficiaries of this service included the president and the provost, to whom the library reported.²⁴

Archivists who receive records from administrators and work with them in answering requests are particularly familiar with administrative needs for information. So, too, are librarians in corporate settings. As one librarian put it, "But to be active players in this new environment, library professionals must stand out as experts in the application of information to issues facing management."²⁵

The experiment at Chico State may represent the effort of libraries to cultivate resource allocators, i.e., higher administration, in new ways. If this is a trend, then the future for archivists, with special knowledge and experience of administrative needs and resources available, should be especially promising. An archival service available from workstations at all hours every day may have even greater and more lasting impact.

Conclusion

Returning to the vision of the future, the Ghost of Archives Yet to Come seems less threatening, even collegial. Academic archivists have reasons to be optimistic in reviewing the technological circumstances that are likely to impact their programs. The emerging electronic workstations will, in all likelihood, connect archival collections with a new kind of user. They will access archival information without visiting the archives or interacting with a reference department. From a single workstation, patrons may call upon the resources of the archives even as they connect with the university computer center, the library, and catalogs and databases remote from the campus.

At the same time, the users will require of information systems a greater precision of retrieval to cope with the volume of information available to them. Developments in indexing, abstracting, and artificial intelligence will render retrieval systems for all kinds of information, including archival, more precise for the end user. Archivists will direct more attention to what information, in addition to bibliographic records in the catalog, should be available electronically.

Participation of archivists in the changing technology of access to information will not happen automatically. Decisions about the allocation of resources in the purchase of new technologies now and in the future take place in an institutional context of planning and of resource allocation. Academic archivists need to work with others, especially academic librarians and administrators, and convince them that archival collections be included in pushing back the limits of technological access to information.

Several strategies are possible for academic archivists. One is to develop information products that will be available on work stations and that make use of historic information. The goal is to build a base of technological support by making more available information that is already known to be sought by many. Another is to find allies, especially in the library, who will join with the

archives in making administrators more aware of the need to develop more access points to information than the current system of information retrieval permits. A third is for archivists to figure prominently in the use of the institution's history for fundraising purposes. Finally, archivists who have comprehensive knowledge of administrative needs for information can play a central role in a library that seeks to build bridges to resource allocators by offering special information services to administrators.

If the future has technological opportunities for academic archivists, then archivists must develop strategies within their institutions. To know the users and the use of archival information, both current and potential, is a place to begin. It is also essential in strategic planning to have a sense of the direction and priorities within the institutional environment. From that perspective, it will be possible to identify opportunities for archival development. Being an entrepreneur means not only identifying customers, i.e., users. It also means finding backers, or resource allocators, to develop the archival program within the context of institutional priorities.²⁶

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NOTES

1. I am indebted to Frank Boles and Ann Bowers for their help in writing this manuscript. Frank Boles heard the first version as a paper presented to the Lake Erie Area Conference of Archivists in September of 1990 and patiently shepherded me through succeeding versions. Ann Bowers worked with me in blending the comments of readers and my own writing into this published article.
2. Randall C. Jimeron, "Redefining Archival Identity: Meeting User Needs in the Information Society," *American Archivist* 52 (Summer 1989): 335.
3. John Aris, "Animating the Archives," *Aslib Proceedings* 42 (January 1990): 4.
4. Lawrence J. McCrank, "The Impact of Automation: Integrating Archival and Bibliographic Systems," *Journal of Library Administration* 7 (Summer/Fall 1986): 69. Some particularly radical visionaries predict that the remote workstation will make the library as a central repository obsolete. Others argue that the workstation will be one of several ways, along with visiting the stacks of the library itself, in which users will gather information preserved and described by libraries. See Irene Hoadley, "The World that Awaits Us: Libraries of Tomorrow," *Wilson Library Bulletin* 61 (October 1986): 22-5; Maurice B. Line, "Libraries and Information Services in a Post-technological Society" *Journal of Library Automation* 14 (December 1981): 252-67; William H. Melody, "The Context of Change in the Information Professions," *Aslib Proceedings* (August 1986): 223-30; Theophil M. Otto, "The Academic Librarian of the 21st Century: Public Service and Library Education in the Year 2000," *Journal of Academic Librarianship* 8 (May 1982): 85-8; Allen B. Veaner, "1985 to 1995: The Next Decade in Academic Librarianship, Part I," *College and Research Libraries* (May 1985): 209-29; Allen B. Veaner, "1985 to 1995: The Next Decade in Academic Librarianship, Part II," *College and Research Libraries* (July 1985): 295-313; and Anne Woodworth, Nancy Allen, Irene Hoadley, Junes Lester, Pat Molholt, Danuta Nitecki, and Lou Wetherbee, "The Model Research Library: Planning for the Future," *Journal of Academic Librarianship* 15 (July 1989): 132-38.

5. Of course, technological change will take place at different rates at different institutions. Some departments will have workstations earlier than others. In the past, this has been true of the distribution and utilization of microcomputers. It is likely to be even more so with the distribution of the costly and more sophisticated workstations. Eventually, workstations will be everywhere, in large part because academic institutions that are dedicated to the transmission and advancement of knowledge have an ethical tradition of providing equality of access to information. See Rosemary Ruhig Du Mont, "Responsible Librarianship: Looking Toward the 21st Century," *Serials Librarian* 13 (October-November 1987): 13. What matters here is not the pace of technological development but its impact upon information users and providers.
6. William H. Melody, "The Context of Change in the Information Professions," *Aslib Proceedings* 38 (August 1986): 227.
7. Lawrence E. Murr and James B. Williams, "The Roles of the Future Library," *Library Hi Tech* 5 (Fall 1987): 11; Pat Molholt, "On Converging Paths: The Computing Center and the Library," *Journal of Academic Librarianship* 11 (November 1985): 285.
8. Jill M. Tatem, "Beyond USMARC AMC: The Context of a Data Exchange Format," *Midwestern Archivist* 14:1 (1989): 40-41.
9. Prudence W. Dalrymple and Jennifer A. Younger, "From Authority Control to Informed Retrieval: Framing the Expanded Domain of Subject Access," *College and Research Libraries* (March 1991): 141.
10. A summary and history of indexing is Allen Kent, Jay E. Daily, Harold Lancourt, eds., *Encyclopedia of Library and Information Science*, vol. 11 (New York: Marcel Dekker, Inc., 1974), 287-8. See also comments about indexing in Avra Michelson, "Description and Reference in the Age of Automation," *American Archivist* 50 (Spring 1987): 192-201.
11. One solution may be to provide a term in the collection description that would describe the intensity of indexing that ranged on a continuum from telescopic (collection level description only) to microscopic (folder or item).
12. Mary Jo Pugh, "The Illusion of Omniscience: Subject Access and the Reference Archivist," *American Archivist* 45 (Winter 1982): 37-9.
13. Prudence W. Dalrymple and Jennifer A. Younger, "From Authority Control to Informed Retrieval," 145.
14. Brian Nelson, "PC Monitor," *Database* 12 (December 1989): 105-06.
15. The level of detail provided at the workstation will depend upon the extent of abstracting and indexing as determined by the archivist or curator and upon the limits imposed by the designers of the information retrieval system.
16. Lawrence J. McCrank, "The Impact of Automation," 64.
17. William J. Maher, "Improving Archives-Library Relations: User-Centered Solutions to a Sibling Rivalry," *Journal of Academic Librarianship* 15 (January 1990): 360.
18. This market-driven strategy for information retrieval is one that library administrators themselves are embracing. Many predict that costs of hardware and software for information are likely to be imposed upon users according to usage. In other words, the sciences may pay more for automated services and have a greater range of opportunities for automated searching than other disciplines.
19. The literature about librarians and archivists is too numerous to cite. Particularly insightful is the observation that librarians have borrowed relatively little from archivists and have infrequently published articles by archivists. See Lawrence J. McCrank, "The Impact of Automation," 62; and Paul H. McCarthy, "Archives Under Library Administration: Points of Convergence and Conflict," *Journal of Library Administration* 7 (Summer/Fall 1986): 17-34.
20. See Richard J. Cox, *American Archival Analysis: The Recent Development of the Archival Profession in the United States* (Metuchen, N.Y.: Scarecrow Press, 1990), 261-90.
21. Lucy S. Caswell, Karen A. Smith, and Hannah Thomas, "Innovations: An Automated Finding Aid for Special Collections—The SCDB Proposal," *College and Research Libraries News* 49 (June 1988): 368-73. Included were subject areas of theatre, music, and the cartoon arts. University Archives remained an interested observer but not a participant because of the desire to build the pilot database upon collections with overlapping subject areas.
22. Anne Woodworth, et al., "The Model Research Library," 134.
23. William Maher, "Improving Archives-Library Relations," 360.
24. Peter G. Watson and Rebecca A. Boone, "Information Support for Academic Administrators: A New Role for the Library," *College and Research Libraries* 50:1 (January 1989): 71.
25. Jack Borberly, "A Perspective on the Challenges Facing Special Libraries," *Online* (July 1986): 109.

26. Barbara Floyd, "The Archivist as Public Administrator," *Midwestern Archivist* 15:1 (1990): 20; Sidney J. Levy and Albert G. Robles, *The Image of Archivists: Resource Allocators' Perceptions* (Chicago: Society of American Archivists), iv.