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A Rationale for the Redesign of Scholarly Information Exchange

Ross Atkinson

The disintermediation that will inevitably result from the increased electronic publication of specialized scholarly information affords an excellent opportunity for one of the traditional intermediaries (e.g., libraries, publishers) to assume responsibilities previously held by other intermediaries. Members of the academy should use this opportunity to take back the responsibility for a significant portion of the specialized scholarly publishing that has, in the traditional environment, been placed in the hands of external publishers. The most imposing impediment to such a reapropriation by the academy derives from the inability of institutions to cooperate with each other. If new attitudes could be created within the academy to circumvent that obstruction, then an academy-based process of scholarly information exchange would finally be feasible. One effective model for such a new form of scholarly publishing would be to establish separate domains, or designated channels, for individual disciplines.

It has been more than a decade since Thompson (1988) issued his energetic call for academic librarians to consider the possibility of displacing and assuming the role of specialized scholarly publishers (see also Rogers and Hurt 1989). Since that time, there has been a variety of efforts to increase the participation of libraries in scholarly publishing, probably the most visible and successful being Stanford's High Wire Press (http://highwire.stanford.edu/intro.html) and the ARL SPARC Project (www.arl.org/sparc; see also Frazier 1998). Still, we must admit that the most significant challenge to scholarly trade publishing in the 1990s has come not from libraries but rather from the scholars themselves in the form of Ginsparg's server for preprints of articles on high-energy physics and related subjects (http://xxx.lanl.gov; see also Ginsparg 1998). This innovation has demonstrated beyond a doubt that the formal exchange of specialized scholarly information can thrive outside of traditional publishing channels.

The Ginsparg server at Los Alamos is in some ways a practical manifestation of a theory that some scholars—most notably and effectively Stevan Harnad—have been advocating for much of the decade: the view that computer-mediated communication can and should be used to make specialized scholarly information, properly refereed, freely available via the Internet (Okerson 1995). This "subversive" position assumes that most scholarly communication will shift to electronic form in the relatively near future—which is a very reasonable expectation. Although different disciplines will, to be sure, move to electronic publishing at different rates, the bibliographic and economic advantages of online communication far outweigh the liabilities. While some paper and microform publishing will no doubt continue for some time, mainly for archival purposes, there can be little doubt that most of the action of scholarly information exchange will migrate to online form in the short-term future. (For a current review of the key issues in scholarly electronic publishing, see Buckley 1999.)
Whether or not the academic library community is prepared to play a truly formative role in the reenvisioning and redesign of scholarly information exchange depends not only upon whether academic librarians have the will to take concerted action, but also upon their having a clear and unified position as to what is ultimately in the best interest of scholarship and higher education. It will be my purpose in this essay to consider, in mainly abstract terms, why the academy must move to reappropriate (i.e., take back from external publishers) at least some responsibility for specialized scholarly publishing; why the academy has been so slow to accept this responsibility; how an academy-controlled system for specialized scholarly publishing might be designed; and what function the academic library should be prepared to assume in that process.

The Future of Intermediation

The transfer of information across space and time entails intermediation. Someone, some agency, some mechanism must conduct the information from sender to receiver, from writer to reader. For scholarly information exchange, the two principal intermediaries are publishers (mainly working with writers) and libraries (mainly assisting readers). There are obviously many other intermediaries—editors, printers, programmers, vendors—who are indispensable for the formal transfer of scholarly information in the traditional environment. As we move increasingly online, however, the need for such traditional intermediation will surely diminish—if for no other reason than that some of the work traditionally performed by intermediaries can be automated and managed by writers and readers for themselves. Our sense is that the metaphorical space between the writer and the reader will contract, and that there will be less room online for the range of intermediaries now needed in the traditional environment. The realization that some disintermediation is inevitable in the new environment is already engendering considerable competition for Lebensraum in the intermediary space. Intermediaries are eyeing each other suspiciously, recognizing that opportunities for traditional intermediation will decline and that survival may depend upon the ability of one intermediary to assume responsibilities that have traditionally belonged to others.

The unavoidable and inexorable decline in the need for traditional intermediation does not mean, however, that intermediation per se will be generally less important for information exchange in the new environment. Quite the contrary. While it is true, as already noted, that information technology will empower writers and readers to do some things for themselves that intermediaries did for them in the traditional environment, it is also equally likely that intermediaries will provide some services for writers and readers in online circumstances that writers and readers now provide for themselves in the traditional environment. The more we move online, in fact, the more intermediation (admittedly of a very different kind than in the traditional environment) will likely be needed to transfer information from writers to readers. (For a parallel example in banking, see Allen 1997.) We might label this syndrome hyperintermediation. Much of this new service will admittedly be transparent to the user and will take the form of technology and network maintenance, but some of the new intermediation will be highly visible and will derive from the special quality of digital information, which consists of both a content—the database—and a highly flexible modality, let us call it the software, which provides access to and manipulation of the content.

That flexible modality is one of the key differences between traditional and online information exchange; it enhances but also necessarily complicates the exchange process. One obviously does not open an electronic publication as simply as one opens a book. The whole concept of "opening" changes—different databases necessarily "open" differently—and there may be several ways to access or apply a single database, depending upon what one wants to do with it. While more can be done therefore with information in digital form, more intermediary assistance will likely be needed to do it. All intermediaries in the new environment, including libraries, will compete with each other to provide that new assistance.

The distinction between the content and the modality, the database and the software, is one that demands much more consideration. All information services can in a way be reduced to those two elements: (1) building and maintaining the database, and (2) providing the ability to find and manipulate what has been built and maintained. Libraries supply the same or similar services in the traditional environment—collection development and preservation on the one hand, organization (cataloging) and access assistance on the other—and to some extent, society no doubt expects libraries to continue to provide those same services, after much currently needed information shifts online. But will librarians—or, more to the point, should librarians—take up that responsibility in support of scholarly information exchange?

Disintermediation is not merely an inevitability of the new environment and a challenge to traditional intermediaries; it is also an unprecedented opportunity to reconfigure information services. From the standpoint of academic libraries, such disintermediation can be used as a tool to improve information exchange by promoting the redesign and streamlining of the process by which scholarly information moves from writer to reader. This effort will entail in part working to reduce or eliminate those aspects of the traditional process that have severely hampered such exchange.
Because one of the most significant impediments to scholarly information exchange in the traditional environment has been the outsourcing of some major segments of scholarly publishing to for-profit publishers (Association of Research Libraries 1998), the academy needs to use disintermediation as a tool to reappropriate responsibility for formal scholarly communication that in the past has been the exclusive domain of scholarly publishers. Such reappropriation is in effect a form of vertical integration—the assumption of responsibility by one producer for multiple stages of the production process—that displaces other producers previously responsible for those other stages. In this case, it will be a matter of one intermediary exploiting the process of disintermediation to displace and assume the function of other intermediaries.

But which intermediaries will (and should) do the displacing, and which will be displaced? We must not be so naive as to expect that librarians will naturally or automatically prevail in this inevitable contest. Publishers—or at least those wise enough to realize that no intermediary is likely to survive the transition to the new environment intact—are doubtless also examining the same process from their own perspective. At the moment, publishers depend upon libraries for the effective dissemination of their products. Such dependence need not last much longer, however, and as soon as publishers see opportunities to maintain or increase revenue by selling directly to users rather than through libraries (or as soon as libraries become more trouble than they are worth to publishers for whatever reason), publishers will initiate such direct services. This direct selling would work particularly well in the academic community. The chances that publishers would be willing, as Gherman (1999) has recently advocated, to relinquish their ownership of scholarly and serve as editorial bureaus are therefore very remote. Publishers will necessarily and understandably work to increase their role in scholarly information exchange.

Odlyzko (1999) has argued skillfully that, in the competition for survival between publishers and librarians, it will be the publishers who prevail. They will do this by convincing the academy that the unnecessary costs of moving information from writer to reader are not those of publishing but rather those of libraries:

What keeps the publishers' situation from being hopeless is the tremendous inertia of the scholarly community, which impedes the transition to free or inexpensive electronic journals. Another factor in the publishers' favor is that there are other unnecessary costs that can be squeezed, namely those of the libraries. Moreover, the unnecessary library costs are far greater than those of publishers, which creates an opportunity for the latter to exploit and thereby to retain their positions. (Odlyzko 1999, 3)

Odlyzko, like many scholars and academic administrators, apparently sees the library mainly as a big box of books, and the library's budget as being devoted primarily to tending them. If publication moves entirely online, the cost of maintaining a paper collection, which is to say (from this perspective) the cost of running the library, can be eliminated, or at least substantially reduced, and the savings can go to the publishers—or can be divided between the publishers and the institutional administration.

Many research librarians may well naively assume that this will never happen—that as long as they continue to provide (mutatis mutandis in the new environment) the same excellent services they always have, their presence on campus will be needed and sustained. This is, of course, absurd. If the academic institutional administration could be convinced that it would be economically advantageous to outsource library services to publishers or other information entrepreneurs, then institutions would likely move—with some justification—to eliminate libraries altogether (beyond presumably a vestigial warehousing function). Institutions might take such action, not realizing the implications of outsourcing many library services, because librarians have never succeeded in explaining those implications effectively. Or, more problematically, institutions could conceivably take such a step, if the academic community were to conclude that the economic advantages of substantially disintermediating academic libraries outweigh the pedagogical and research liabilities. Librarians must move now therefore to understand and confront both of these prospects.

The Rationale for Libraries in the New Environment
Technology and Ideology

We have noted that, in the traditional environment, intermediaries are distinguished from each other for the most part by their place in the production process, i.e., their role in the transfer of information from the writer to the reader. Publishers work with writers, editors, printers, and distributors, in order to bring the work of the writer to market. Librarians work with readers and vendors, in order to ensure that needed information is rapidly available to local users. While we can perhaps anticipate that some aspects of this division of labor will continue as we move increasingly online, it is nevertheless the case that the new technology and the resulting hyperintermediation afford a single intermediary or intermediary group the ability to assume responsibility for ever broader ranges of the transfer process.

As efforts at such vertical integration increase, and all intermediaries—librarians, publishers, booksellers, and others—scramble to assume an ever more comprehensive role in moving information from writers to readers, they will all
likely begin to adopt similar processes and to make use of the same basic technology. This means that many, if not most, intermediaries may ultimately become for a time in the course of the transition technologically similar—perhaps even indistinguishable; they may well all be competing, including librarians, to offer the same general set of services. What will then, under such circumstances, distinguish one intermediary from another? It will be not merely the services provided and their costs, for these may all be very similar, but rather the values that drive and inform that provision of those services—in short, the service ideology. Librarians have a very special service ideology, and as librarians now begin their journey into the new online environment with all of its complexities and uncertainties, they must take care to bring with them above all else that defining ideological perspective.

It is for this reason that we are now entering such a critically significant juncture in the history of scholarship. While publishers and librarians may in the new environment compete and end up offering similar or identical services, the long-term evolution and nature of information services will depend finally upon the intermediary ideology that ultimately prevails. In the case of academic information services, the fundamental ideological question is quite simply whether specialized academic information should be understood as a commodity, intended primarily for (and judged in each case by the extent to which it succeeds in generating) revenue—or whether access to scholarly information is a social good that must be freely available. The defining quality of modern academic (and public) libraries is not that they provide access to certain types of information using particular service methods, but rather that such access, facilitated by such methods, is available to the individual without significant financial charge and is supported for the most part by public or collective funding. What characterizes the modern library is above all else its assumption that access to information, like access to other key social goods and services, is a right of all citizens and not a privilege of the few. It is that cardinal assumption, that ideological position, rather than any technical or bibliographical skills or facilities, that separates librarians from most other information service providers, including especially many publishers of specialized scholarly information. If there were no ideological differences between publishers and librarians, then there would be in fact very little sense in trying to continue to distinguish them in the new environment.

In many respects, therefore, the ideology of the library is the service. The only problem, of course, is that we live in an age in which choices are seldom viewed in primarily ideological terms. Even academic institutions, which should and do serve as a key source of ideological definition and debate, are obliged to base many of their essential decisions on a range of considerations beyond the purely ideological. It is unlikely at the present time, therefore, that either society at large or the academy in particular will be persuaded to take a course of action on the basis of ideology alone. Is there then a more functional argument that could be used effectively to support the position that librarians should continue to operate and prevail in the new information environment?

Agency

All information service providers are agents of some kind. Ross (1973, 134) states: "We will say that an agency relationship has arisen between two (or more) parties when one, designated as the agent, acts for, on behalf of, or as representative for the other, designated the principal, in a particular domain of decision problems." In order to define or understand agency better, let us posit a universe of resource—the set of all extant resources at any point in time (see figure 1). Let us say that a resource is anything that will facilitate action. It is stored labor, raw material, power, potential, energy—the capacity to do work. It takes a great many forms. It can have exchange value, or it can have use value. It can be money. It can be information. It can be some kind of formative or base material. It can even be some person's, or some group's, attention. But what all resources have in common is their scarcity—for to be scarce (let us stipulate) is a quality of a resource.

Because resources are scarce, individuals or groups needing resources often contract with specialists for assistance in obtaining access to such resources. Those specialists then become the agents of those principals or clients for whom the resources are being obtained. Such agents are hired by clients, therefore, to compete with other agents representing other clients. Agents are expected to act always in the best interest of their clients, and their success is measured by the extent to which they succeed in supplying their clients with the resources that have been targeted. The only complication is the classic and natural tendency for agencies to prefer themselves to their clients: if it occasionally comes to a decision between doing something of value for the client and doing something of value for themselves, agents tend sometimes understandably and predictably to select the latter. One manifestation of this problem—let us call it the agency delusion—is the false assumption on the part of the agent that whatever is beneficial to the agent is necessarily beneficial to the client. No agent is immune to this delusion, no matter how pure its goals—and this includes librarians. The best we can do is to be aware of it and try to circumvent it in our decision making whenever possible.

Let us further posit a distinction between primary and auxiliary resources. Clientele and competitors. The primary resource is the one the client has contracted with the agent to obtain. An auxiliary resource is one that is used (e.g., for
purposes of exchange) as part of the process in obtaining the primary resource. Money is therefore a frequent ancillary resource—although money can certainly also be, and often is, a primary resource. For librarians, information is the primary resource, while money is the ancillary resource; in the case of for-profit publishers, the opposite is true.

We should also distinguish between primary and ancillary clientele. Ancillary clientele often evolve as a result of agents contracting with each other. If, in figure 1, Agent 2 believes Agent 3 can provide access to some resources more effectively, then Agent 2 can contract with Agent 3 to provide access—through Agent 2—to Client 2. In that case, Client 3 remains Agent 3’s primary client, while Client 2 becomes Agent 3’s ancillary client. The danger for Agent 2 in such a process is, of course, disintermediation: Agent 3 might at some point move to provide resources directly to Client 2, without any longer involving Agent 2. In many respects, librarians are in the situation of Agent 2, contracting with Agent 3, the publisher, to provide users (Client 2) with access to needed scholarly resources.

Finally, there can also be primary and ancillary competitors. Primary competitors are those agents that are competing for essentially identical resources, in order to pass those resources to different (or in some cases conceivably even the same) clientele. Ancillary competitors are those agents that are competing only for similar resources. Ancillary competitors can therefore occasionally join forces temporarily, if such partnerships will enhance the capacity of each to compete with its primary competitor.

With this very simple model in mind, we can return to our original question: why should (academic) librarians, aside from ideological reasons, not simply step aside, as information moves increasingly online, and urge academic institutions to outsource their information services? Are not businesses often more efficient than public institutions and their supporting information services? Are not academic librarians falling victim to the agent’s delusion by insisting that their continued existence is in the best interest of scholarship and higher education? Would librarians serve students and scholars best by simply getting out of the way and turning over all information services to publisher-aggregators or other commercial information entrepreneurs?

No, of course not. To outsource most information resources to commercial agents would be a substantial, strategic error for the academy—mainly because of the distinction between primary and ancillary clientele. The primary clientele of academic libraries are local scholars and students. The primary clientele of publishers are their owners—often their shareholders. When it comes to making decisions between the two, publishers will inevitably, understandably, and justifiably make those decisions that are in the best interest of their primary clientele. We are used to this, of course, in the traditional environment—its chief manifestation being the so-called serials crisis; but the difficulty caused by this syndrome in the traditional environment, the extent to which it impedes scholars and students from being able to access the information they need for their work, is surely minor when compared to what we must expect to happen in an online environment. Those who own information control access to it. Information technology greatly enhances that control. If it is in the primary client’s best interest for the publisher to use that control to restrict access to needed information as much as possible, in order to make such information scarce and to drive up its price, then that is exactly what will happen—and there is certainly no evidence in the behavior of specialized scholarly publishers in the traditional environment to lead us to believe that anything other than this will occur, when the majority of scholarly communication shifts online.

There is only one solution therefore to this problem, which we must keep repeating: it is the reappropriation of (at least a substantial portion of) specialized scholarly publishing by the academy. That there is really no other answer has been clear for many years. Despite a few notable but still limited attempts, however, success in achieving such reappropriation
continues to elude us. Why is it that academic librarians are having such difficulty promoting this crucial decision in the academy?

One reason for the delay is certainly the difficulty librarians have experienced in explaining the issues to working scholars, and it is those scholars who must ultimately endorse and effect such changes. Reappropriation will require, to be sure, deep-seated cultural adjustments within the academy—redefinitions, in effect, of what scholarship is, how it is done, how it is evaluated, and even what it means to be a scholar. The heavy dependence of the academy upon convention makes any such broad, cultural, or behavioral adjustment controversial and problematic.

Another reason for the academic library community's difficulty in leading the way toward reappropriation may be the naiveté that librarians occasionally exhibit with respect to publishing. Some librarians may tend to assume that the primary, if not only, purpose of publishing is information transfer—but there are in fact many reasons academic information is written and read, not all of which have directly to do with the topical information conveyed (see Rowland 1997).

Librarians may also overlook or underestimate the real role played by publishers. Contrary to what we may sometimes be inclined to think, the primary function of the scholarly publisher is not to provide access to content—that is not the value that publishers add and sell. We do not really pay for what is in their publications; what we pay for is rather that what is in their publications acquires a certain status and attracts a certain attention by virtue of its location in those publications. Attention, as noted above, is an important resource—and that capacity to draw attention is what is being sold and what we are buying. Drawing attention to a writing by virtue of its location in a particular journal or in a book published by a particular publisher is of enormous value both to the writer, because it brings prestige and notoriety, and to the reader, because it answers the reader's most important question: what to read, in what order. If therefore the academy in general and academic librarians in particular are truly interested in reappropriating some significant responsibility for specialized scholarly publishing, then the system created to replace the current publisher-based method must add the same or similar values for both writers and readers that publishers add now. Until methods are devised for adding such values, the goal of reappropriation will remain unfulfilled.

These then are a few reasons why librarians have not yet succeeded in bringing about the changes in the ownership of scholarly information that must take place if scholarship and higher education are to continue to flourish in an online environment. But even if such impediments were to be overcome—even if we could create an academy-based process of scholarly information exchange that provided similar compensations to writers and similar services to readers as those offered by the current publisher-based process—is reappropriation of scholarly publishing by the academy a realistic and practical objective from the institutional perspective?

The Academy and the Politics of Implementation

The modern academy is, of course, many things—but certainly one of its key, defining dynamics is the tension or dichotomy between the institution and the scholarly disciplines. This dichotomy is most clearly manifested in the dual role of faculty as teachers, an institutional responsibility, and scholars, an activity undertaken normally within a discipline. While most scholars are certainly loyal to their institutions, it is probably the disciplines that generally have the higher status and attention. The discipline determines what the scholar does—and what he or she is: one is first and foremost a mathematician, an historian, a sociologist. The institution determines mainly where such scholarship is practiced.

On the other hand, there can be no question that the institution serves as the primary economic base for the whole academic enterprise. The individual institution markets a service: higher education. The compensation the institution receives, often from multiple sources, for that service normally exceeds the cost of providing it—and it is that surplus that forms a major part of the support for disciplinary research. From this purely economic perspective, therefore, the institution is always the base, and the disciplines are the superstructure (see figure 2).

What distinguishes institutions from disciplines? One of the basic qualities of the institution is its locale. It is situated in one or more physical, i.e., geographical, spaces where people come together. The discipline, on the other hand, is not local, but is rather topical—which is to say that it also resides in places, but those places are bibliographical rather than geographical. They are places in the literature—in bibliographical resources. To be a scholar in the discipline is to be recognized as one who knows such places, who defers to them as authorities, and who participates in their continued evolution. The institution, therefore, with its emphasis on instruction as primary service and its nature as a geographical location where people gather, can be viewed as a more subjective entity with a strong emphasis (even despite the advent of e-mail) on oral communication.

Orality provides a much more intense and active form of expression than graphic communication. It is far preferable for many forms of information exchange, especially instruction. The discipline, on the other hand, is primarily objective, in the sense that it is focused primarily upon the
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Figure 2. Attributes of Institutions and Disciplines

topic that resides in a bibliographic place; and while disciplines certainly engage in some oral exchange, their primary means of formal communication is graphic, because graphic communication is most conducive to study, archiving, and "objective" analysis. Ong (1982, 46) writes: "Writing separates the knower from the known and thus sets up conditions for 'objectivity,' in the sense of personal disengagement or distancing."

One further distinction that might be drawn between the institution and the discipline is what could be called focus. Because the institution is essentially a nonprofit business with a primary service (higher education) to market, its success depends upon its ability to focus on a great deal of its attention outside of itself. This is not to deny that there is much internal action in the institution (the political competition for scarce resources inside any institution can certainly be consuming and contentious), but the successful institution must and does make many of its key decisions based upon an assessment of things outside of itself: its potential clientele, its funding sources and prospects, and especially its competitors. By contrast, the discipline is far better or worse much more internally focused. It looks mainly at itself. There is, to be sure, always a certain evolving interdisciplinarity, but the view of the topical place as authority, as starting point for all discussion and research, means that the discipline, unlike the institution, is concerned mainly with its own values and objectives.

Having noted some of the characteristics of this dichotomy between institution and disciplines, we must also concede that the inexorable transition from the traditional to the online environment is markedly changing at least some aspects of this defining distinction. Geographical location as a fundamental feature of the institution is certainly challenged by the increasing shift toward distance education—for this is a form of education bounded less by geographical location than by something more closely resembling topical or bibliographical space. The atmosphere or tone of distance education may therefore be rather more objective than subjective.

Another change, as formal disciplinary communication moves increasingly online, may well be a substantial decline in the disciplinary preference for graphic communication. If it is indeed true that oral, or audio-visual, communication is a richer and more potent method of conveying information, then we should expect more use of audio-visual communication for serious scholarly publication. Graphic language, writing, evolved almost certainly because oral language could not be transferred across space and time. Information technology has now to a great extent solved that problem, so that we can transfer audio-visual or multimedia communication across space and time as easily as graphic language—providing it with equal potential for storing and analysis. This does not mean that graphic language will have no place in formal, scholarly communication, of course—only that its dominance will likely subside. This trend will certainly be hastened by advances in information technology, because we must assume that voice activated computers—that both hear and speak to the user—will soon become common. Typing is very likely a twentieth century skill (Aket 1998). Information services, moreover, will also need to respond to this new multimedia communication with appropriate metadata—and this means not only better metadata to describe multimedia objects, but also probably the creation of multimedia metadata.

Despite all of these probable changes, however, it is highly unlikely that the educational institution as geographical entity is in any real jeopardy, despite the increasing significance of distance learning. Education requires a geographical location for people to gather—not only for students to interact with scholars but also for students to interact with each other. Effective education is always in part a peer social experience—and the support of that experience is likely a primary future purpose of libraries as well. The future function of libraries as geographical places, in other words, will presumably not be so much to connect people with resources—subject with objects—as is the case in the traditional environment, for that can be done virtually anywhere in a networked society. The main purpose of the library as geographical place may rather be to serve as a location for students to gather and to interact as groups with information objects.

The concept of "simultaneous users" will change, therefore, from individuals using the same database in separate places to individuals using the same database together in the same place and learning from each other. Perhaps the most important implication of such a scenario is that if this does indeed happen, the distinction between the library and the classroom must necessarily begin to blur. In some distance-learning situations, students will come together in a place—the library/classroom—to work with distant scholars and with interactive information objects, and we must expect that their ability to shift back and forth between these will be enhanced by the continued evolution of information technology.
Will the outward focus of institutions (and the inward focus of disciplines) be altered by the electronic revolution? Probably not. Institutions remain fundamentally economic entities, so that their continued success requires an external focus. It is precisely this unavoidably outward perspective, however, which has perhaps the most serious implications for the long-term future of scholarship and higher education and their supporting information services. Institutions are externally focused in part because they recognize correctly that they are in competition with each other—for students, faculty, funding, prestige. Institutions use many of their available resources to engage in such competition and their libraries are certainly one of their most visible and comparable resources. It is essential that we recognize, however, that some actions or positions taken by the institution—which make complete sense for purposes of interinstitutional competition—can be antithetical and even detrimental to the broader mission of the academy, scholarship, and higher education. This problem is in fact one institutional manifestation of the agency delusion: it is the occasional assumption by the institution that anything that benefits the institution also benefits its scholars and students and even the academy as a whole. But that is not always the case.

One of the most striking, recent examples of this contradiction from the library perspective can be found in the adoption of new integrated library management systems by academic libraries around the country. There are a number of such systems commercially available—and there are at least six different commercial systems at this particular time that two or more prominent ARL libraries have purchased and installed.

The problem, of course, is that the market for such large library management systems is relatively small, even if expanded internationally—probably too small, in fact, to support so many different commercial systems. If that is indeed the case, then there can be no doubt that some of these systems may well soon go out of business, and the institutions that have invested in them may well lose millions of dollars. Librarians at each research library know, therefore, that the survival of the system that has been chosen depends in effect on the demise of other systems selected elsewhere. But why is this happening? To use large research libraries as an example, let us suppose that each ARL library ends up spending on average $2 million to implement its new system fully.

If that assumption is correct, it means that all ARL libraries together may well end up spending nearly a quarter of a billion dollars. One cannot help thinking what a fine library management system ARL libraries, working together, could have built for that amount. Such a system, designed jointly by all of the ARL libraries, would not be subject to the extreme vicissitudes of the marketplace, as all commercial systems are now and will continue to be in future. And for that kind of money, the system could have been designed with sufficient flexibility that each institution could have undertaken the substantial customization needed to fit its particular local requirements. There are no doubt many reasons why research libraries have not pooled their resources to design a single, optimal system; but surely the most fundamental reason is that research libraries cannot in fact cooperate to any meaningful extent, because the institutions those libraries represent are engaged in a profound competition with one another, and libraries are key components of that competitive process.

Returning to figure 1 above, we must now acknowledge that, from an institutional standpoint, it is academic institutions that are the primary competitors. The primary competition is not between the academic institution and the commercial service provider, but rather, between one academic institution and another. Commercial information service providers function at most as ancillary competitors. What this means is that institutions, rather than partnering with each other in order to counter the detrimental practices of some external service providers such as specialized commercial scholarly publishers, are instead choosing in effect to partner with such external providers, in order to compete more effectively with each other. It is this institutional competition, therefore, that likely forms the single most significant impediment to the reappropriation of scholarly publishing by the academy.

One of the most pressing questions facing academic librarians at this time is how to relate to such a situation ideologically. If it is indeed ideology that will in future distinguish libraries from other services, such as commercial publishing, and if one of the library's most basic ideological tenets is the position that access to information should be a right and not a privilege, and if academic institutions use such access as a tool for competition with each other, then how should academic librarians respond?

Certainly librarians should not be opposed generally to interinstitutional competition—for to try to eliminate such competition would surely tear the very fabric of the academy and would ultimately result in a severe decline in the potential for disciplinary research. But we must at the same time somehow urge that the damage deriving from such a culture be acknowledged and that some restrictions be placed on the objects of interinstitutional competition.

If some forms of competition are ultimately injurious to scholarship and higher education, as is the case in the competition for access to scholarly information, then librarians must be prepared (if they are ideologically committed) to do whatever is necessary to create a structure in which information access is not counted as a tool in the competitive struggle among institutions. We must aim to create an academic culture in which the availability of needed information is guaranteed—so that interinstitutional competition
centers not, as it does now, on access to information, but rather exclusively upon the use to which such equitably accessible information is put. In order to promote action that will achieve this objective, the academy must move to redesign the process by which scholarly information is exchanged.

An Example of One Rational Process: The Designated Channel

Suppose we had the opportunity to design from scratch the primary means of scholarly communication in an online environment: what would it look like? Because of the disciplinary culture that dominates the academy, and because of the essentially inward focus of the disciplines, the most effective approach would be to create a designated channel or domain for each discipline. One large channel encompassing all disciplines, such as a National Electronic Article Repository as advocated by Schultenberg (1998) might serve as a place to start, but such a megachannel would still need to be organized into disciplinary subdivisions. Such channels would have both a political and a bibliographical value.

Politically the channels would serve to separate information access from the institution—although it would clearly be essential for institutions, as the economic base for scholarship, to provide financial support in some kind of membership capacity. To be a member—and all academic institutions would need to be members—would be to support full public access to all contents of the channels. Institutions would be able to provide the financial support necessary for such a network of channels, because institutions would no longer be compelled to purchase publications written by academic scholars.

A primary bibliographical value of the channel would be to provide the long sought one-stop shopping. Any reader wanting to understand what is known (in the sense of what is being published, what is being said publicly) in a discipline would consult the content of that channel. And if a scholar has a formal contribution to make about some aspect of the discipline, that is where he or she would place it. Far from impeding interdisciplinarity, such a system could promote borrowing from one discipline by another—especially if the kind of interoperability now being proposed by the Open Archives Initiative is achieved (see www.openarchives.org).

The key requirement for publication in any such channel would remain, as in the traditional environment, quality control. That is presently provided through peer review—a practice that works well for scholarly communication and which should be maintained and protected in the online environment. A trusted group of scholars in the discipline should take responsibility, probably on a rotating basis, for deciding which materials inserted into the designated channel should be certified. Certification should have two implications. First, it should mean that reputed scholars have decided that the item does indeed add substantial knowledge to the discipline. Second, certification should mean that academic information services, the library community, will take responsibility for the item, and will guarantee its access over time.

The organization, software, metadata, and archiving of such a designated channel should be the responsibility of academic information services. If an item submitted is not certified, that does not mean it would not be accessible through the channel, but only that it is not viewed as significant by the current peer reviewers, and that means it would not become the responsibility of information services.

If a writing is not certified, therefore, its maintenance remains the responsibility of the author. Certification of a publication should define it as a “core” item, in the sense that users should normally be encouraged to read it before uncertified materials. Normative metadata, informing the reader that certain items are currently viewed as being more important than others, should lead the reader to certified materials. While the uncertified publication might be found through keyword searching, the certified publication should be subject to indexing based upon a carefully controlled vocabulary, preferably arrived at in consultation with the author.

In all likelihood, most scholars today would admittedly object to such a process of publication, because it purposefully eliminates individual journals and publishers. The objection would derive from the fact that every discipline, as noted above, has a hierarchy of journals and publishers well known to all members of the discipline—and that hierarchy is presently used by writers to gain prestige and by readers to decide what to read in what order. How, then, could the designated channel replace (from the standpoint of both writers and readers) that service now provided by the separation and hierarchy of journals and publishers? The answer must be use-tracking.

We need to convince scholars that the quality of their work should be judged not by whether a few editors decide it is worth publishing in a particular journal—but rather by the extent and quality of its use by the scholarly community once it is published. To provide this level of use-tracking, the channel manager—academic information services—will need to create a method of tracking and computing the degree to which different publications are used in different ways. While privacy would obviously need to be protected, a use-tracking system should be designed to allow an author and all members of the discipline to know the extent to which other scholars in the discipline (or scholars in other disciplines, students, and members of the general public) access the publication. Metadata describing various aspects of the use of a particular certified publication should probably
include citation data, so that together such information can be used to estimate (or define) the publication's current and continued utility—although there is admittedly still much work to be done on how such user information is to be evaluated, for mere quantity of use does not necessarily indicate value (Cronin 1999).

While the author may provide an abstract of the uncertified publication, the library, in assuming responsibility for making the publication accessible, should perform what may possibly be its most important bibliographical function, the creation of a synopsis—although we must supply this term with a special meaning. By synopsis I mean a description of how the certified publication fits into or relates to all of the other publications that have been certified in the channel, i.e., the certified whole (see figure 3). The purpose of the synopsis should be in effect to stipulate what is new or unique in the publication.

As the designated channel grows in size, its use will become more complicated and congested. Information services will inevitably need to produce a new form of cumulative metadata, which we can call the surrogate whole. This surrogate whole provides a summary of the discipline, in effect presenting the user with an overview of all aspects of the discipline and permitting the user to move selectively from the surrogate whole into the certified whole to read particular publications. One primary function of synopses should be, therefore, to merge together in such a way as to form in their aggregate the surrogate whole. The base or model bibliographical format must shift under such circumstances from the catalog or bibliography, which dominates in the traditional environment, to the encyclopedia. The primary purpose of information services must be not to list publications by name, but rather to provide a narrative context for their content, while at the same time ensuring direct access to those publications at the user's discretion.

In the same way that we must expect the library and the classroom to merge in an increasingly online, distance education environment, we must also work to link more effectively the work of the scholar and information services. While it should be the work of information services in the future to define the discipline and its parameters (including the creation of such synoptic resources as textbooks), the work of the scholar should focus on extending such disciplinary parameters through the certification and creation of new publications.

Were the academy to decide to create such a network of designated channels, librarians would need to take the lead in partnering above all with university presses and probably unavoidably with scholarly societies. While some scholarly societies at the present time may not be interested in such partnerships, we should bear in mind that the "shareholders" of such societies are often mainly scholars in academic institutions. Here, as elsewhere, success will depend directly upon the academic library community's ability to explain the options and the vision to individual working scholars.

This concept of the designated channel is, needless to say, only one simple model of an academy-based process for scholarly information exchange in a primarily online environment. Which model is ultimately selected is of less importance. What matters, regardless of the method eventually chosen, is that scholarly information in the future be freely and openly accessible to all who need and want it, and that the natural competition among institutions be based upon the application of that information rather than access to it. It is only by such a refocusing of the processes and priorities of scholarly information exchange that the academy will be able to ensure that its primary clientele will continue to have in future the specialized information that it needs and deserves.

**Works Cited**


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<table>
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<tr>
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<th>Surrogate Whole</th>
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</thead>
<tbody>
<tr>
<td>(abstract)</td>
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</table>

<table>
<thead>
<tr>
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<th>Certified Whole (canon)</th>
</tr>
</thead>
</table>

**Figure 3.** Designated Channel Model


Cataloging Staff Costs Revisited

Dilys E. Morris, Collin B. Hobert, Lori Osmus, and Gregory Wool

Staff costs for cataloging have declined at Iowa State University Library. This is demonstrated by data from a longitudinal time and cost study begun in 1987. We discuss the national developments, technological advancements, and reengineering efforts that have supported greater cataloging effectiveness and quality. We use the ISU findings as an example of a nationwide phenomenon resulting from the remarkable ability of catalogers to share work through national bibliographic utilities.

In 1987 the Technical Services Division of the Iowa State University (ISU) Library initiated a time and cost study to investigate the impact of automation on services and products. This study, now in its thirteenth year, has resulted in a number of reports in the literature. The earliest of these provided an overview of cataloging costs (Morris 1992) and a comparison of costs for serials and monographs cataloging (Morris and Osmus 1992). Since then, refinements in the analysis of tasks and costs (and especially in the application of staff overhead) have made more sophisticated and focused reporting possible. At the same time, however, these refinements preclude easy comparison of the earliest three years of the study to the years following.

In the present article, then, we report changes in cataloging costs and productivity since 1990 and discuss the factors contributing to these changes. Morris, Rebarcar, and Rowley (1996) previously noted some of the trends presented here. Morris and Wool (1999) presented a brief discussion of these trends in relation to the value of cataloging.

Literature Review

The literature on cost studies for technical services operations is extensive—as is evident in bibliographies from Dougherty and Leonard (1970) and Tavenner (1985)—but for the most part it is fragmentary, limited in scope, and short on detail. In much of this literature, researchers either estimate in-house operating costs for comparison with prices for vendor-supplied services or offer models for cost-benefit analysis. Of the rest, Lancaster (1977, 265) provides this assessment:

A number of studies on technical processing costs have already been published. ... While several... appear to be very thorough and complete, cost analyses of this type generally have two basic limitations: (a) although many data are presented, it is not always clear how these data were derived, and it is thus impossible for a second investigator to duplicate the methodology to obtain truly comparable data for a second institution or group of institutions, and (b) directly related to the first point, there are no generally accepted standards for what should be measured.
in these cost studies and for how the costs should be derived and presented.

This statement is just as trenchant with regard to the subsequent literature, highlights of which include Getz and Phelps (1984); Valentine and McDonald (1986); Leung (1985); Oldfield (1987); and Fiegen, Heitshu, and Miller (1980). Harris (1988) offers an interesting survey of publications on cataloging costs, along with an estimate that cataloging costs between 1870 and 1980 rose 4200%, much faster than general inflation but slower than librarian salaries.

Relatively few examinations of cataloging costs have appeared since Morris (1992). In the most extensive report, Jenda (1992) presents a workflow analysis and time/cost study made to support a decision at the University of Botswana on continuing the library's subscription to Library of Congress (LC) catalog cards. In this study, times for cataloging tasks were measured in an experimental setting. Byrd and Sornty (1993) document a significant time/cost analysis of authority work at Indiana University. El-Sherbini (1995), in an evaluation of outsourcing the cataloging of Slavic-alphabet materials at Ohio State University, includes a brief cost analysis of doing the work in-house. Rider and Hamilton (1996) report tests of the OCLC Online Computer Library Center, Inc. PromptCat service at Michigan State and Ohio State universities, with a cost/benefit analysis based on estimates of staff time and costs as well as other data.

**Time and Cost Method**

A detailed description of the method employed in this study appears in Morris (1992). A more concise description, reflecting the changes made in 1990, can be found in Rebarcak and Morris (1996). Highlights are recapitulated and more recent developments in the method are presented here.

**Data Collection**

Five times each year, every technical services staff member, including hourly student employees, tracks all time worked for an entire week. Time is recorded at a task level. Since the first report of this study in 1992, the number of tasks has been reduced through consolidation. Cataloging, for instance, is now divided into nine tasks rather than fourteen. Task consolidation makes data collection easier for staff and supports more meaningful analysis.

Tasks are organized into eight cost centers. Five are product centers, which create products and services: Acquisitions, Cataloging, Catalog Maintenance, Volume Preparation and Preservation, and a special project center, Conversion. The three other centers are overhead centers, which do not create products: Paid Leave, Automation, and Support Services. The latter two merit some explanation.

The Automation Center includes the time of one staff member who provides information technology support for Technical Services. This includes management of servers, software and hardware ordering and installation, software application development (e.g., cataloger’s workstation), and reengineering support. It also includes the time all staff spend learning to use general application software (mail systems, operating systems, word processing, etc.) and managing their personal computers. The Support Services Center includes all administration, meetings, professional activities, secretarial support, nondi visional work (such as materials selection or service on librarywide committees), and professional reading.

When participants self-report, there is always a potential for error. Yet there is really no way to control for error, because observation creates an artificial work environment that may not reflect normal work practices. Statisticians rarely recommend correcting for measurement error, because there is no way of knowing the error and any corrections may introduce other errors. Defining tasks clearly and making them reflect actual work processes makes record keeping for participants much easier and improves the chances of reliability. Also, data collection for this study has continued for more than ten years, and examination of the data shows results that reflect changes in library priorities. For instance, after a major serials cancellation program, the data showed increases in serials recataloging. Similarly when staffing was increased to support greater retrospective conversion, associated task time increased. The same is true for major system changes and upgrades; here the data show increases in training and documentation time. Finally, in the study we are not seeking precise data but rather more generalized data; thus staff are asked to estimate time spent at tasks, not to try to record it exactly.

**Product vs. Overhead Centers**

The division between product and overhead centers allows us to examine separately the time and cost of these different areas. Additionally, it allows layering on, by administrative levels, staff overhead costs to product center costs and demonstrates clearly the effect on product costs of staff time spent in paid leave, meetings, nondi visional work, professional and administrative activities, and automation. Since the earlier reports on this study, an improved approach has been developed for allocating overhead center costs to product center costs.

The software used for data analysis allows sorting of employee data into the various work units. For cataloging,
these are: Monographs Copy Catalogers, Monographs Faculty Catalogers, Serials Copy Catalogers, and Serials Faculty Catalogers. Each of these units spends time in various product centers (e.g., Cataloging, Ordering, Conversion). All units also spend time in the overhead centers (Leave, Support Services, Automation). The total cost for the overhead centers is allocated back to the product centers proportionately to the cost of each product center in a series of steps. First, the overhead costs of a work unit are allocated to its product centers (e.g., the cost of the time copy catalogers spend in Leave, Support Services, and Automation is allocated back to their product center costs). Then the department head overhead costs are allocated to the product centers of all the units supervised. Finally, the technical services office administrative overhead costs are allocated to all units in the division.

Thus costs are presented at four different levels: (1) center and tasks only; (2) center with the work unit overhead costs allocated; (3) center with the work unit and department head overhead costs allocated; (4) center with the work unit, department head, and technical services administrative office overhead costs allocated. This granularity is possible when looking at any group of employees.

Costs and Production Statistics

The salary with benefits of each employee is calculated for every sample week, and hourly salaries are determined. The hourly salary of each employee is multiplied by task time to arrive at a task cost for each employee. Task times and costs, which form the basis of all analysis, are also summed into centers. Production statistics are collected for each sample week and are used to determine unit costs. For cataloging, the production unit is titles cataloged. Cataloging statistics and time are collected in four tasks: copy cataloging, full original cataloging, minimal original cataloging, and recataloging.

Unit Costs

Unit costs are calculated by first taking a task (e.g., copy cataloging) or a group of tasks (e.g., copy, original, and recataloging) and dividing them by the production statistics (e.g., number of titles cataloged). This gives the cost of doing a task or a group of tasks. Then the other center task costs (training, policies and procedures, authority work, consulting, and problems) are allocated to the cataloging task cost. Staff overhead costs are added to the unit cost also in a series of steps. First, the overhead cost of the catalogers is allocated within their work units. Then the costs of each administrative level above the catalogers is added incrementally. Departmental administration is the overhead cost of two department heads. Each department head has costs spread to centers other than Cataloging. The technical services administration overhead costs are allocated across all centers to all units. This process could continue upwards through as many levels of administration as exist, each adding a further cost.

Results

Center Time and Costs

Table 1 shows the weekly relative time and costs of the eight ISU technical services centers during 1997/98 and gives historical data for time only. In 1997/98, product centers represent 64% of technical services time and 55% of total divisional staff costs. Conversely, the overhead center represents only 36% of the divisional time, but 43% of the cost, reflecting the high proportion of time spent by administrative positions in the Support Services Center. Since 1990/91, time in overhead centers has grown somewhat because of increases in Leave and Automation.

Within the product centers, Cataloging ranks second in hours after Acquisitions. Since the beginning of the study in 1987, Acquisitions has consistently been the largest center and Cataloging the second largest. Cataloging Center and Preservation is the third largest center. Conversion is in fourth place and is declining as a major card catalog conversion project nears its conclusion. Catalog Maintenance is the smallest product center and shows the greatest reduction over time.

Cataloging Center Tasks

The task times and costs in table 2 include all types of cataloging and all formats, including monographs and serials, nonbook formats, and electronic resources. As one might expect, copy cataloging is the largest task, even while it does not include OCLC PromptCat title processing, which is done as part of Acquisitions. Authority work is counted as a separate task only when it is done as a separate task. If it is completed during the actual process of cataloging, the time is collected in the cataloging task. Most of the authority task time results from post-cataloging authority work completed from system-supplied lists of new, changed, and conflicting headings. Authority work done apart from these processes on catalogers averages a mere three hours and $69 per week.

Recataloging is the third largest task: most serials cataloging is recataloging and accounts for much of the task time. Full and minimal original cataloging are not large tasks. The consulting and problems task covers work that requires special handling or investigation. The training, revision, and documentation task includes all the instructional elements from documenting new policies and procedures to
Table 1. Technical Service Centers: Weekly Averages

<table>
<thead>
<tr>
<th>Product Centers</th>
<th>Time</th>
<th>Costs</th>
<th>Costs with Overhead</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours</td>
<td>%</td>
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<tr>
<td>Acquisitions</td>
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<th>Costs</th>
<th>Costs with Overhead</th>
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<td>Leave</td>
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<td>Volume Preparation and Preservation</td>
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<td><strong>31</strong></td>
<td><strong>33</strong></td>
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Table 2. Cataloging Center Tasks: Weekly Averages, 1997–98

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<td></td>
<td>Hours</td>
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<td>Recataloging</td>
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<td>924</td>
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<td>Consulting/Problems</td>
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<td>651</td>
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<tr>
<td>Minimal Original</td>
<td>18</td>
<td>323</td>
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<tr>
<td>Training/Revision/Documentation</td>
<td>15</td>
<td>402</td>
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<tr>
<td>Other</td>
<td>13</td>
<td>243</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>384</strong></td>
<td><strong>8,054</strong></td>
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Note: Professional staff may work more than 40 hours in a week but are not paid for these "over 40 hours." The total cost is calculated as if staff were paid for the over 40 hours. When the nonpaid costs hours are removed the total drops to $8,010 (cost in table 1).

Productivity and Copy Cataloging

Annual cataloging statistics at ISU (monographs and serials) show that production rose from 31,225 titles cataloged in 1990/91 to 44,158 titles in 1997/98, a 41% increase. At the same time, as shown in table 3, average weekly Cataloging Center hours dropped by 30%. The data also shows that the percentage of time spent cataloging (copy, recataloging, and original) grew while the time spent at other Cataloging Center tasks dropped.

Table 4 shows statistics only for monographs cataloging and shows the changes in the types of records used in cataloging and the growth in original cataloging since 1990/91. Use of Cataloging in Publication (CIP) records dropped by 95% and member records increased by 86%. Copy cataloging increased overall by 27%. The PromptCat Service supplied LC records for an additional 6,325 monographs. These titles were received in Acquisitions and bypassed.
Table 3. Cataloging Center, 1990-98

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual No. Titles Cataloged</th>
<th>Weekly Hours</th>
<th>Copy %</th>
<th>Recatalog %</th>
<th>Original Full %</th>
<th>Original Minimal %</th>
<th>Total %</th>
<th>Authority %</th>
<th>Other %</th>
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<td>1990/91</td>
<td>31,225</td>
<td>550</td>
<td>34</td>
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<td>5</td>
<td>2</td>
<td>54</td>
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<td>1992/93</td>
<td>29,566</td>
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<td>3</td>
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<td>28</td>
<td>20</td>
</tr>
<tr>
<td>1993/94</td>
<td>34,367</td>
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<td>19</td>
<td>4</td>
<td>2</td>
<td>65</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>1994/95</td>
<td>40,022</td>
<td>393</td>
<td>35</td>
<td>15</td>
<td>5</td>
<td>3</td>
<td>58</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>1995/96</td>
<td>40,801</td>
<td>400</td>
<td>43</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>62</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>1996/97</td>
<td>41,241</td>
<td>410</td>
<td>46</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>66</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>1997/98</td>
<td>44,158</td>
<td>384</td>
<td>51</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>74</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

Note: Difference between 1990/91 and 1997/98 figures: 12,933 titles (41%), -166 weekly hours (-30%)

Table 4. Monographs Cataloging Records

<table>
<thead>
<tr>
<th>Copy Cataloging</th>
<th>DLC No. %</th>
<th>CIP No. %</th>
<th>Member No. %</th>
<th>Total No. %</th>
<th>Total PromptCat No. %</th>
<th>Titles No. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>17,809</td>
<td>59</td>
<td>326</td>
<td>1</td>
<td>12,034</td>
<td>6,325</td>
</tr>
<tr>
<td>1990-91</td>
<td>10,890</td>
<td>46</td>
<td>6,467</td>
<td>27</td>
<td>6,483</td>
<td>23,840</td>
</tr>
<tr>
<td>Change</td>
<td>6,919</td>
<td>64</td>
<td>-6141</td>
<td>-95</td>
<td>5,551</td>
<td>6,329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Original Cataloging</th>
<th>Full No. %</th>
<th>Minimal No. %</th>
<th>Total Titles No. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>1,121</td>
<td>40</td>
<td>1,679 60</td>
</tr>
<tr>
<td>1990-91</td>
<td>554</td>
<td>36</td>
<td>966 64</td>
</tr>
<tr>
<td>Change</td>
<td>567</td>
<td>102</td>
<td>713 74</td>
</tr>
</tbody>
</table>

cataloging. Full original cataloging production doubled while minimal level cataloging increased by nearly 75%.

Cataloging Per-Title Costs

In 1997/98 the average cost of cataloging a title at ISU was $16.25 (table 5). This cost covers all material formats and all levels of cataloging and recataloging, including PromptCat titles. Just seven years earlier the cost was $20.83 (or $24.95 in constant dollars), representing a 22% drop, or a 34% drop when adjusted for inflation.

The time a cataloger actually engages in creating and editing records costs about $6.13 per title. When the associated costs of authority work, training, conferring, policy development, and documentation are added, the cost increases to $7.49 to catalog any type of publication. With all staff overhead costs (Leave, Support Services, and Automation) through the assistant director level added, the price doubles to $15.07. With the addition of post-cataloging authority work, the total is $16.25.

The 6,325 PromptCat titles, which bypassed cataloging, are included in calculating the $16.25 cost. However, there is no handling time (and thus cost) recorded in the Cataloging Center. If the PromptCat titles are excluded from the per-title cost calculations, the bottom-line cost increases to $18.28. This means that when considering total titles cataloged, the PromptCat service decreases the overall per-title cost by about $2 a title.

Costs vary between sample weeks, depending on the mix of cataloging done during the week and the relative time spent cataloging as opposed to developing new procedures, attending to professional activities or vacationing. Copy cataloging shows the greatest cost stability and original cataloging the least. Serials cataloging at $59.33 per title
Table 5. All Cataloging Costs Per Title: Weekly Average

<table>
<thead>
<tr>
<th>Seven-Year Comparison</th>
<th>1997/98</th>
<th>1990/91</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant Dollars</td>
<td>CPI Adjusted to 1997/98 Dollars</td>
</tr>
<tr>
<td></td>
<td>16.25</td>
<td>20.83</td>
</tr>
</tbody>
</table>

1997/1998 Only

<table>
<thead>
<tr>
<th>Cataloging Center</th>
<th>All</th>
<th>Monographs</th>
<th>Serials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataloging Tasks</td>
<td>6.13</td>
<td>4.97</td>
<td>18.11</td>
</tr>
<tr>
<td>Other Tasks</td>
<td>1.36</td>
<td>1.17</td>
<td>4.61</td>
</tr>
<tr>
<td><strong>Total Cataloging Costs</strong></td>
<td><strong>7.49</strong></td>
<td><strong>6.14</strong></td>
<td><strong>22.72</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overhead Centers</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalogers</td>
<td>4.57</td>
<td>3.50</td>
<td>27.50</td>
</tr>
<tr>
<td>Department Administration</td>
<td>1.67</td>
<td>1.36</td>
<td>5.03</td>
</tr>
<tr>
<td>TS Administration</td>
<td>1.34</td>
<td>1.11</td>
<td>4.08</td>
</tr>
<tr>
<td><strong>Total Overhead Costs</strong></td>
<td><strong>7.58</strong></td>
<td><strong>5.97</strong></td>
<td><strong>36.61</strong></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>15.07</strong></td>
<td><strong>12.11</strong></td>
<td><strong>59.33</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-Cataloging Authority Work</th>
<th>1.18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>16.25</strong></td>
</tr>
</tbody>
</table>

PromptCat Titles Excluded: 18.28

(including recataloging) is five times more expensive than monographs cataloging ($12.11 per title). The 1997/98 salary ranges and benefits percentages for faculty librarians and library assistants are shown in Table 6.

Copy Cataloging Costs

In Table 7 it is demonstrated that monographs copy cataloging is considerably less expensive than serials copy cataloging. It shows an average cost of $12.22 to copy-catalog a monograph as opposed to $88.24 for a serial. No PromptCat titles are included in these calculations.

Table 8 shows that for monographs copy cataloging, the total task cost is four times higher at ISU if it is completed by a faculty cataloger rather than a library assistant. It also demonstrates that it is twice as expensive for a faculty cataloger to catalog a monograph originally than to revise copy.

Original Cataloging: Full and Minimal

Table 9 shows the cost of all staff doing full original cataloging. On average it costs $70.54 per title to catalog any format originally. The cost includes some original records contributed by library assistants. Full original cataloging not only is the most expensive cataloging, it shows greater fluctuations in cost between sample weeks. It is about 3.5 times more expensive to catalog a serial originally than a monograph.

Minimal level cataloging (Table 10) is used mostly for serial analytics and ISU theses. Minimal level records are normally K-level records and include all fields required in the OCLC Bibliographic Formats and Standards, 2d edition. The monograph minimal level cataloging cost of $80.90 is almost half the $58.72 cost for full-level original cataloging.

Recataloging

It costs $31.03 (Table 11) to recatalog any title. Serials recataloging ($42.25) is about 3.5 times more expensive than

Table 6. Salary Ranges in Dollars, 1997–98

<table>
<thead>
<tr>
<th>Library Assistant 1</th>
<th>Minimum</th>
<th>21,632</th>
<th>Maximum</th>
<th>21,632</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Assistant 2</td>
<td>24,847</td>
<td>28,856</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library Assistant 3</td>
<td>26,601</td>
<td>31,508</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library Assistant 4</td>
<td>29,775</td>
<td>34,703</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Benefits Rate: 30%

Faculty Librarians: 38,555 to 53,735
Benefits Rate: 22%

Table 7. Copy Cataloging Cost Per Title: Weekly Average, 1997–98

<table>
<thead>
<tr>
<th>Cataloging Center</th>
<th>Monographs</th>
<th>Serials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy Cataloging Task</td>
<td>5.05</td>
<td>26.83</td>
</tr>
<tr>
<td>Other Tasks</td>
<td>1.18</td>
<td>7.09</td>
</tr>
<tr>
<td><strong>Total Cataloging Costs</strong></td>
<td><strong>6.23</strong></td>
<td><strong>33.92</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overhead Centers</th>
<th>Monographs</th>
<th>Serials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalogers</td>
<td>3.5</td>
<td>40.78</td>
</tr>
<tr>
<td>Dept Administration</td>
<td>1.37</td>
<td>7.51</td>
</tr>
<tr>
<td>TS Administration</td>
<td>1.12</td>
<td>6.03</td>
</tr>
<tr>
<td><strong>Total Overhead Costs</strong></td>
<td><strong>5.99</strong></td>
<td><strong>54.32</strong></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>12.22</strong></td>
<td><strong>88.24</strong></td>
</tr>
</tbody>
</table>
Monographs Cataloging Cost Per Title: Weekly Average, 1997-98

<table>
<thead>
<tr>
<th></th>
<th>Library Assistant</th>
<th>Faculty Cataloger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copy S%</td>
<td>Copy S%</td>
</tr>
<tr>
<td><strong>Cataloging Center</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cataloging Tasks</td>
<td>4.26 48</td>
<td>12.08 34</td>
</tr>
<tr>
<td>Other Tasks</td>
<td>1.04 12</td>
<td>2.11 6</td>
</tr>
<tr>
<td><strong>Total Cataloging Costs</strong></td>
<td>5.3 60</td>
<td>14.19 40</td>
</tr>
<tr>
<td><strong>Overhead Centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catalogers</td>
<td>1.45 15</td>
<td>3.18 4.46</td>
</tr>
<tr>
<td>Department Administration</td>
<td>0.97 2.55</td>
<td></td>
</tr>
<tr>
<td>TS Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Overhead Costs</strong></td>
<td>3.57 40</td>
<td>21.63 60</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>8.87 35.82</td>
<td>75.43</td>
</tr>
</tbody>
</table>

Monographs recataloging ($11,968) and represents nearly 43% of all recataloging. In 1997/98, recataloging represented only 9% of all technical services cataloging but 64% of serials cataloging.

**Analysis**

During the 1990s the ISU Technical Services Division flattened its organizational structure, driving decision-making downward and reducing revisions and handling. Additionally, many jobs were reclassified upwards as positions were reduced. While salaries increased, cataloging costs dropped, quality remained high, productivity and speed increased, and new services were offered. The flattening of the organizational structure at ISU shifted much decision-making to lower-level supervisors and catalogers, reducing divisional overhead and costs. It also conferred more policy development responsibilities on the faculty catalogers, reduced their involvement in production work, and freed time for them to pursue new cataloging initiatives. While contributing to cost savings, this process was itself made possible by the efficiencies stemming from shared cataloging and process automation.

These developments are not unique to ISU, but are occurring in academic libraries across the country. The ISU findings can therefore be seen as an example of a nationwide phenomenon based on the remarkable ability of catalogers to share work through national bibliographic utilities.

**Center Time and Costs**

It is important to examine product center costs both with and without staff overhead (see table 1). Looking at the product centers alone shows the average weekly time spent in a center and the resulting cost. Centers can be examined and compared over time. By tracking the overhead centers’ time separately and allocating their costs back to the product centers, the real staff costs of doing business (and the very significant impact of time spent in Automation, Leave, and Support Services) can be seen. Such knowledge can guide administrators in making decisions about assignments and structure.

With staff overhead allocated, the average weekly expenditures for the Acquisitions Center in 1997/98 increased nearly 50% from $11,326 to $16,968. Volume Preparation and Preservation shows an 85% increase, Conversion, 80%, and Catalog Maintenance, 73%. Cataloging, however, increased nearly 100%, from $5,810 to $13,790. Cataloging has a higher staff overhead cost because there is a larger ratio of faculty librarians to library assistants than in any of the other product centers.

ISU data consistently demonstrate that faculty librarians have much higher overhead costs than other staff. As faculty members eligible for tenure, they are subject to high expectations for library, universal
Table 10. Minimal Level Original Cataloging Cost Per Title: Weekly Averages, 1997-98

<table>
<thead>
<tr>
<th>Cataloging Center</th>
<th>Monographs</th>
<th></th>
<th>ISU Theses Only</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>%</td>
<td>$</td>
<td>%</td>
</tr>
<tr>
<td>Cataloging Task</td>
<td>12.75</td>
<td>41</td>
<td>8.93</td>
<td>49</td>
</tr>
<tr>
<td>Other Tasks</td>
<td>2.78</td>
<td>9</td>
<td>1.94</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total Cataloging Costs</strong></td>
<td><strong>15.53</strong></td>
<td><strong>50</strong></td>
<td><strong>10.87</strong></td>
<td><strong>60</strong></td>
</tr>
<tr>
<td>Overhead Centers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catologers</td>
<td>9.27</td>
<td></td>
<td>3.25</td>
<td></td>
</tr>
<tr>
<td>Department Administration</td>
<td>3.34</td>
<td></td>
<td>2.06</td>
<td></td>
</tr>
<tr>
<td>TS Administration</td>
<td>2.76</td>
<td></td>
<td>1.91</td>
<td></td>
</tr>
<tr>
<td><strong>Total Overhead Costs</strong></td>
<td><strong>15.37</strong></td>
<td><strong>50</strong></td>
<td><strong>7.22</strong></td>
<td><strong>40</strong></td>
</tr>
<tr>
<td>Total Cost</td>
<td>30.90</td>
<td></td>
<td>18.09</td>
<td></td>
</tr>
</tbody>
</table>

Table 11. Recataloging Cost Per Title: Weekly Average, 1997-98

<table>
<thead>
<tr>
<th>Cataloging Center</th>
<th>All</th>
<th>Monographs</th>
<th>Serials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Cataloging Task</td>
<td>12.59</td>
<td>5.18</td>
<td>12.75</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>43</td>
<td>30</td>
</tr>
<tr>
<td>Other Tasks</td>
<td>2.77</td>
<td>1.09</td>
<td>3.23</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Cataloging Costs</strong></td>
<td><strong>15.36</strong></td>
<td><strong>6.27</strong></td>
<td><strong>15.98</strong></td>
</tr>
<tr>
<td></td>
<td><strong>50</strong></td>
<td><strong>52</strong></td>
<td><strong>38</strong></td>
</tr>
<tr>
<td>Overhead Centers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catologers</td>
<td>9.53</td>
<td>3.37</td>
<td>19.83</td>
</tr>
<tr>
<td></td>
<td>3.66</td>
<td>1.25</td>
<td>3.55</td>
</tr>
<tr>
<td>Department Administration</td>
<td>2.78</td>
<td>1.07</td>
<td>2.89</td>
</tr>
<tr>
<td>TS Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Overhead Costs</strong></td>
<td><strong>15.67</strong></td>
<td><strong>5.69</strong></td>
<td><strong>26.27</strong></td>
</tr>
<tr>
<td></td>
<td><strong>50</strong></td>
<td><strong>48</strong></td>
<td><strong>62</strong></td>
</tr>
<tr>
<td>Total Cost</td>
<td>31.03</td>
<td>11.96</td>
<td>42.25</td>
</tr>
</tbody>
</table>

During the year, the university and professional service, consequently, they serve on more committees and task forces and attend more conferences than other staff. They are much more likely to carry supervisory or administrative responsibilities. Furthermore, all are expected to meet standards for research and publication that justify the granting of tenure. This means that less of their time is spent in activities that create a product or service (product centers) and more of their time is spent in the Support Services Center. This pattern demonstrates why, as far as possible, employees with professional status should only do work others cannot. Anything a professional does will be at a much higher cost when it is examined on a per-item basis.

Historically, the figures for leave time reflect an anomaly in the time sampling. Beginning in 1994/95 one sample week for each year always includes a university holiday. The 1996/97 sample weeks unexpectedly included two holidays.

The Catalog Maintenance Center dramatically decreased in time and costs. The steadily improving capabilities of the online catalog, coupled with the conversion of cataloging to machine-readable form, have eliminated paper work forms and reduced the number of steps necessary for maintaining records. The improving quality of shared cataloging records has reduced the need for much catalog maintenance. Work centers around the transfer and withdrawal of materials. ISU discontinued the last vestige of card files with the closing of the shelf list in January 1998.

A reorganization in 1997 added the Preservation department to technical services and accounts for the unusual increase the following year in the Volume Preparation and Preservation Center time and costs.

Cataloging Center Tasks

Improved online catalog systems and the conversion of paper records have allowed staff to spend more time cataloging and less time on cataloging support tasks (see table 2). It is more effective to solve problems online rather than batching problems to do remote resolution (e.g., walking to the shelf list). Authority work has declined as the number of authority records online has increased. Time formerly spent on authority work is now spent on cataloging. A larger percentage of student employees are employed in post-cataloging authority work, producing a relatively low cost percentage (9% of total center costs but 13% of total time).

Now that library assistants accept and edit OCLC member records at the first receipt of titles, the time spent rechecking titles for LC copy has dropped dramatically. In 1990/91 searching for copy consumed 19 hours a week. Because of the more streamlined workflow resulting from PromptCat and the use of OCLC member records by copy catalogers, the time catalogers spend sorting and referring work has also dropped. In 1990/91 this task averaged 30 hours a week. The file maintenance time for material in process also dropped from 6 hours a week in 1990/91. Today all three of these tasks are collected in the "Other" task with an average of 13 hours a week or 3% of the center time.

An important factor in reducing per-title cataloging cost is increasing the proportion of time spent cataloging and reducing the time in problem solving, revision, or other miscellaneous tasks such as searching for copy, file maintenance, and sorting for later handling. In 1997/98, 74% of the Cataloging Center time was spent in the four cataloging tasks (copy, minimal and full original, and recataloging) that
result in titles cataloged, whereas in 1990/91 only 54% was spent in these tasks.

Productivity and Copy Cataloging

Cataloging productivity has increased because of task automation and the improved quality and fullness of cataloging records available through OCLC (see tables 3 and 4). Improvements in these two areas supported reengineering, which changed work flows and cataloging assignments.

Technology has reduced costs by speeding up work processes and thus increasing productivity. Catalogers’ workstations overcome local system idiosyncrasies, reduce keying, and increase accuracy. Desktop access to files saves time and allows greater control over work routines. Online authority files and shelf lists allow quicker problem resolution. The advent of new tools such as LC’s Cataloger's Desktop and Classification Plus has brought quicker access to many of the rulebooks and reference tools catalogers consult.

A more timely upgrading of CIP records in recent years, especially by the OCLC CIP Upgrade Program, has allowed a high percentage of trade books to be covered in the PromptCat service. By making full-level LC records available for check-in by acquisitions staff, PromptCat effectively diverts a large percentage of new materials out of the cataloging workflow. As at other libraries, the Acquisitions Department at ISU was able to absorb PromptCat processing with no increases in staffing, giving copy catalogers time to handle OCLC member records that require review. However, during the year that PromptCat was introduced and the following year during which new cataloging assignments were assimilated, copy cataloging costs rose as time was spent monitoring the PromptCat titles and training copy catalogers in OCLC member copy cataloging policies. Table 3 shows a dramatic drop in “all other tasks” time once the reengineering was completed.

Technology also supports the flattening of organizational structures, further reducing costs. To use technology effectively, work is completed with limited referrals or revisions. This requires staff with broader knowledge working more independently at higher salaries. Such an approach reduces the need for supervisory staff and allows the flattening of the organizational structure and position reductions. A reorganization of technical services at ISU during 1991/92 eliminated an entire level of middle management. This significantly reduced overhead costs, but it would not have been possible without the technological support made available for more independent work throughout the operation.

Copy catalogers are expected to accept without change as many records as possible and to identify for examination and enhancement only the more problematic records. Automated authority systems that identify new headings and conflicts defer much authority work, which both speeds the copy cataloging process and contributes to the acceptance of shared cataloging. Copy catalogers judge whether investigation of headings is required or whether a record can be accepted as is. Copy cataloging is an authorization and enhancement process that adds value to the catalog by making it more consistent and logical for users.

Copy catalogers refer to faculty catalogers only those records for which they lack the necessary knowledge or expertise to complete the cataloging. In addition, they have fewer other responsibilities and can dedicate more time to cataloging, thus reducing overhead costs. Cataloging is done more quickly, productivity increases, and costs drop.

As a result, faculty catalogers now have more time for original cataloging and for pursuing new initiatives that both improve local services and move the profession forward. They catalog all Web resources selected for the ISU Library Web site. They also have developed mechanisms to transfer information from the Machine Readable Catalog (MARC) record in order to create the Web page, streamlining and moving to cataloging a time-consuming activity formerly handled by reference librarians and selectors. They are investigating enhanced subject access for the Web site to provide better access for users. These developments were possible because of the special skills and knowledge of these professionals.

Cataloging of electronic resources is taking an increasingly large percentage of faculty cataloger time as these catalogers work with acquisitions and public services staff to develop policies and procedures in this constantly changing format. Because of the growth and the high level of interest in electronic journals, serials faculty catalogers are especially heavily involved with electronic resources. As format stability increases and local policies and procedures are better established, much of the work with electronic resources will be delegated to library assistants because an increasing percentage of these publications have cataloging copy in OCLC.

Cataloging Per-Title Costs

After Morris (1992), a more accurate and detailed approach to allocating staff overhead costs was developed and costs were recalcualted. The overhead costs for Cataloging increased while the other product centers experienced a drop in costs. The recalculated per-title cataloging costs also increased.

As table 5 demonstrates, the overhead centers increase the per-title cataloging costs substantially. At the same time, it is important to note that the overhead costs at ISU may be higher than at other institutions because professional librarians at ISU are members of the faculty and are expected to conduct research and contribute to the knowledge base of library science. Technical services faculty also engage in demonstration projects that develop prototypes for new or improved services, helping to move the profession forward.
All the costs of these activities contribute to the per-title cost when overhead is included.

**Online Authority Files**

The growth of cooperative authority work has contributed to cataloging effectiveness as well. During fiscal year 1997 the Name Authority Cooperative Program (NACO) contributed 146,585 new records to the national authority file available through OCLC. In NACO's twenty-year history this was the first year that participants contributed more new headings than LC, and the trend continues (Morris 1998). Such increases in the number of personal and corporate names under authority control simplify the cataloger’s task of ensuring the consistent use of names within the catalog. They also constitute a major improvement in linking users' entry vocabulary to catalog records.

At ISU, the OCLC online authority files, the NOTIS library system, and the Peter Ward authority tapes were used to build and maintain authority records. Based on the number of titles cataloged, it costs $1.18 per title in staff time to do post-cataloging authority work. This includes the checking and problem resolution of all new and conflicting headings identified by NOTIS. This post-cataloging authority work also includes all Marcive-cataloged government publications and retrospectively converted titles, but their count is not included in the number of titles cataloged. If they were, the per title cost of post-authority work would be lower.

**Copy Cataloging**

With monographs, most shared cataloging is handled by copy catalogers, whereas with serials, a higher percentage of copy cataloging is done by faculty librarians (see table 7). At ISU the presence or absence of a call number determines who handles a serial record. Also, because serials are constantly changing, their records require more updating. Copy cataloging for serials ($88.24 per title) is less cost-effective than for monographs ($12.22). If there is cataloging copy for a serial title, the cataloger must deal with resolving discrepancies between current issues and what is recorded. This is only slightly less time-consuming than cataloging a serial originally. At ISU much effort is spent connecting related serials and providing full authority work, so that library users can successfully find the titles they need. It will be important to determine whether similar cost differences between serials and monographs copy cataloging exist at other institutions. It would also be important to determine what further can be done to upgrade serial titles continuously in OCLC in order to reduce local costs.

Monographs copy cataloging, too, may be performed by faculty librarians or library assistants. Nearly all library assistants cataloging monographs at ISU are classified at the highest level, Library Assistant IV. They handle both LC and OCLC member records and use their judgment in referring materials to faculty catalogers. The referral costs are included in the library assistant’s cataloging costs. Table 8 shows that it is four times more expensive for a faculty cataloger to catalog a monograph with copy than for a library assistant. Cataloging by library assistants is less expensive for two reasons: (1) they spend a higher percentage of their time in the Cataloging Center, thus less time in overhead centers, and (2) they catalog more titles in an hour.

Looking at the Cataloging Center costs only, a library assistant’s cataloging of a monograph costs $5.30, but a faculty librarian’s costs $14.19. The faculty librarian is handling the more difficult cataloging, which requires classification, more problem resolution, and record editing. Faculty librarian costs are further driven up by their overhead costs. A library assistant’s overhead cost is 16% of the total cost of cataloging a monograph, whereas for a faculty librarian it is 44%. As noted earlier, this cost is not unique to catalogers; every faculty librarian carries much greater overhead costs because of institutional expectations placed on professionals. This is true of selecting a book, answering a reference question, or any other library service.

**Original Cataloging**

At the same time, the transfer of most OCLC member copy cataloging to library assistants allows faculty catalogers more time to contribute quality records to the OCLC database (see tables 9 and 10). Now that LC uses contributed records, there is more incentive to do original cataloging locally, because catalogers can now expect that their work will be used and enhanced by LC instead of being bumped from the national database by a subsequent LC record. Table 4 demonstrates that full original cataloging of monographs at ISU doubled in seven years, minimal level records increased by nearly 75%, and overall original cataloging increased by 84%. As more libraries contribute quality records promptly, the benefits to LC and other libraries continue to grow.

Serials original cataloging is a lengthy and expensive process ($202 per title). Because serials cataloging is usually not straightforward, a cataloger could begin work on a difficult title during cost study week but not complete the cataloging until the following week. Thus the time and costs of the effort would be recorded but no product (cataloging statistic) would result. Even though serials original cataloging is a highly expensive activity at ISU, the overall cost of all cataloging is only $16.25 per title. This demonstrates that a library can keep its cataloging costs low and support expensive original work that benefits many libraries.

Minimal level original cataloging is limited to monographs and included 1,679 titles in 1997/98. This type of
cataloging has proven to be more expensive than anticipated. Both library assistants and faculty catalogers contribute minimal level records but it is primarily a task performed by library assistants.

The cataloging of ISU theses comprises 41% of this category. This cataloging is completed by a library assistant using local subject headings and classification and with some authority work involved in establishing names. To reduce costs much of the work has since been delegated to students with revision by a library assistant.

Another 31% of minimal original records consist of serial analytics created by a higher-level library assistant. A monographs cataloging record is made for selected serial issues to increase access to unindexed contents. Many are special topical issues or proceedings of conferences. The analyzed serial issue remains part of the serial run, and the analytic cataloging directs the user to the serial call number and specific issue numbering. The OCLC K-level standard is exceeded in providing transcription of the series statement as well as the series tracing. Notes of an explanatory or informational nature are supplied when the name or title entry needs supplementary information for clarification, most often conference name, date, or place information.

Recataloging

Sixty-six percent of monographs recataloging consists of adding copies and volumes (see table 11). Added volume recataloging frequently requires additions of contents and editor information. The remaining monographs recataloging includes reclassifications and other enhancements requested by public services. Serial recataloging includes title changes; cessations; closing of records due to subscription cancellations; adding notes; changing and adding access points to other names, titles, or formats; as well as added copies and added volumes. Recataloging of serials is more likely to result in complete revision of a cataloging record than is monographs recataloging, although monographic sets may pose similar challenges. Library assistants completed 68% of the serials recataloging in 1997/98. The faculty serials catalogers were more likely to do the most complex recataloging and to add notes about availability of the serial in electronic form.

Serials Cataloging

ISU, with a strong scientific serials collection, has a tradition reaching back to the early part of the century to create and maintain complete and clear serial records and to connect related publications. Underpinning this philosophy is the awareness that serials cataloging is used for the life of the serial by other staff who perpetually receive and maintain the serial issues. It is expected that serials cataloging will reduce problems and work in other areas. Public services staff regularly request enhancements to serials cataloging to resolve any public access problems. As a result, serials cataloging (copy, original, and recataloging) at ISU is the most expensive cataloging activity. It is nearly five times more expensive to catalog a serial than to catalog a monograph. Because other libraries may put a smaller effort into serials cataloging, examples follow that demonstrate ISU's attention to this service.

For both original and copy cataloging, issues are checked and variances noted. Issuing bodies are determined, dates of involvement given, and authority work completed to establish appropriate forms of names and cross-references. Certain supplements, special issues, and indexes are noted. All holdings statements identify missing issues, location of issues, and any issues split between locations. If the title is not unique, it is qualified and given a uniform title according to national standards; this is done even when editing cataloging copy. If the serial is related to other titles, these titles are linked together with notes and appropriate fields. The serials catalogers make circulation decisions for serials according to the kind of serial and its location. In 1997/98, they still labeled issues with the call number, marked the inside of bound volumes, and filled out forms to have pamphlet boxes made for shelving of loose issues and also to route information to other units; these activities have since been discontinued due to greater use of online records. While minimal level cataloging is used for monographs, it is not for serials.

Time and Cost Analysis in the Multi-Institution Environment

Library technical services operations at four other universities (California-Santa Barbara, Cornell, Missouri-Kansas City, and Vanderbilt) have recently joined with ISU to develop an instrument for comparative time and cost analysis. Uniform cost centers and tasks have been agreed upon and production statistics have been identified to be used for unit costing. A systematic sampling process is used, drawing sample weeks from a normalized list of weeks. Weeks with holidays and short weeks at the beginning and end of the fiscal year are excluded. Data for six sample weeks in 1998/99 were gathered and another six weeks are being sampled in 1999/2000. Software is in development to produce reports for analysis of data.

Conclusions

At ISU, cataloging costs per title have declined consistently (even without adjusting for inflation) over the past seven years. This has happened primarily because of the long-
term, unique collaborative efforts of catalogers, which allow them to share work globally. This sharing began long before online catalogs and modern telecommunications, but the powerful and constant technological developments of recent years, combined with pressure for improved cost-effectiveness and new services, have leveraged this collaboration to revolutionize cataloging.

The number of ready-to-use catalog records in the utilities grows with each passing year. Quality control measures at OCLC combine with initiatives such as the Program for Cooperative Cataloging (PCC) to enhance the overall quality of available records. These developments allow catalogers to accept, with less examination and editing, records contributed by libraries other than LC. Meanwhile, the more timely upgrading of CIP records in recent years allows more automatic acceptance of LC records through programs like OCLC’s PromptCat. As a result, ISU has been able to shift its monographs copy catalogers from handling LC records to editing records from other libraries. Faculty catalogers then have time to create more original records and develop new services in the changing information environment.

Because the factors that are driving cost reductions at ISU (shared cataloging, internal process automation, expanding role of support staff) characterize cataloging operations throughout North America, we believe the findings of this study could have been replicated to a considerable degree at any large or medium-sized academic library during the past decade. In fact, any library keeping cataloging and personnel budget statistics should be able to perform a rough per-title cost analysis over time, which would contribute to a more comprehensive view of cataloging cost trends during the 1990s.

Such an analysis, however, cannot take the place of systematic time and cost data gathering as a means for tracking the use of personnel resources. As both the need to improve cost effectiveness in technical services and the emergence of new technologies to improve efficiency continue, the information obtained in this type of study can prove invaluable to administrative planning. So, too, can similar information derived from other libraries, but only if task categories and time samples are similar enough across institutions to make meaningful comparison possible. This can be difficult to achieve without considerable coordination of effort.

The development of a multi-institution cost and time analysis tool based on the ISU model will support comparisons between libraries and identify differences and similarities. More data on the use of technical services staff will help all libraries in meeting expectations for continuous improvement and will also support further collaborative efforts.

Works Cited
Morris, Susan Rae. 1998. Correspondence with the Assistant to the Director for Cataloging at the Library of Congress provided NACO data on authority records and their origins for fiscal years 1996, 1997, 1998. This correspondence corrects an error in LC’s Cooperative Cataloging Team’s annual report for 1997 which cited 1996 as the first year NACO participants contributed more new headings than LC. LC did not issue an official retraction to the error of the report. This error was then cited in the OCLC Newsletter Nov/Dec 1996, p.10.
Appendix

Cataloging Center Tasks

Training, Revision, Procedures, and Policies

- Training: Used by individuals training others and staff being trained who are accomplishing no work. If work is accomplished, time is counted in appropriate task.
- Demonstrations and presentations
- Procedure and policy documentation
- Revising of others’ work when done as a separate task

Consulting and Problems

- Consulting and responding to inquiries and questionnaires, including e-mail
- Problem solving falling outside of normal procedures and guidelines. Often work is referred because an individual did not know how to proceed. Does not refer to complex investigation or verification which is part of an assigned task.
- Processing requests to review cataloging and requests to expedite/find in-process material
- Liaison work with public service and collection development staff

Authority Work

- Searching, verifying, and establishing names, subjects, series, and uniform titles for new title cataloging and recataloging. Use only if performed as separate task, otherwise count in cataloging task.
- Establishing or revising existing authority records for local use or NACO participation
- Communication with LC on authority issues

Other

- Sorting, shelving, boxing, distributing, and retrieving and any file maintenance
- Searching and printing cataloging copy, if done as separate task; if not, count as cataloging task
- OCLC updates, if done as separate task

Copy Cataloging

- Verification and modification (description and classification) of an existing catalog record, including adding call numbers and subject headings. Does not include recataloging of a local record.
- Item record creation and bar coding if done as part of cataloging task
- Verification of call numbers if done as part of cataloging task
- Passing records into the local system if done as part of cataloging task

Full Level Original Cataloging

- Creation of cataloging records (description and classification) which meet national standards for full cataloging; includes new records derived from variant edition records
- Item record creation and bar coding if done as part of cataloging task
- Verification of call numbers if done as part of cataloging task
- Passing records into the local system if done as part of cataloging task
Minimal Level Original Cataloging

- Creation of cataloging records (description and classifications) which does not meet national standards for full level cataloging
- Creation of local provisional records
- Item record creation and bar coding if done as part of cataloging task
- Verification of call numbers if done as part of cataloging task
- Passing records into the local system if done as part of cataloging task

Recataloging

- Subsequent changes to a cataloging record (description or classification); for serials, include cessations, title changes, and addition of notes
- Adding additional copies and volumes to a cataloging record
- Item record creation and bar coding if done as part of cataloging task
- Verification of call numbers if done as part of cataloging task
- Passing records into the local system if done as part of cataloging task
The Acquisition of Faculty Member Publications at Their University Libraries

Beau David Case

In this paper I present a case study to test whether two large ARL libraries adequately collect the monographic publications of their local faculty members. The university libraries' consistently low acquisition rates of publications of their faculty members over time and across the publishing industry cannot be attributed to any single cause. I discuss the many difficulties in acquiring faculty member publications and conclude by suggesting means to improve the acquisition of faculty member publications. Implications and applicability of these two case studies for other academic libraries also are discussed.

Academic libraries certainly collect campus faculty member publications, yet few collection development policies address the issue of these publications. Futas (1984, 8) presents the example of San Diego State University Library:

The Library acquires faculty publications according to the collection policies that determine book and periodical selection in general. That is, those works that are appropriate for an academic library are acquired as they are published. The campus publication The Weekly is reviewed by Technical Service staff routinely for faculty publication notices, but bibliographers are encouraged to give early notice of faculty publications in their subject areas. Textbooks published by the faculty must be purchased under the same criteria as textbooks in general.

This example is quite explicit in its description of the scope of collecting faculty member publications as well as in its detail about acquisition procedures; such emphasis, however, is rare. If faculty member publications are mentioned in collection development policies, often acquisition methods or procedures are not presented. The University of Detroit Library policy, for instance, simply states that local faculty authorship is an acceptable criterion for monograph selection (Futas 1984). The library collection development policies of Eastern Illinois University (Futas 1977) and Iowa State University (Futas 1984), on the other hand, place the responsibility for acquisition of campus faculty member publications upon the university archives. Some policy statements even dictate highly selective archives of faculty member publications. For example, the College of St. Catherine collects only faculty member theses, and the University of Wisconsin-Stout collects only faculty members' personal papers (Futas 1984). In many more college and university libraries, there are no guidelines at all for collecting faculty member publications.
I am working under the assumption that faculty member publications should be collected by the authors’ own academic libraries. Although the library literature is devoid of any discussion on the topic, there are myriad common-sense reasons for the acquisition of campus faculty member publications, including:

- faculty members publish in disciplines supported by the university and its library, and so the subjects of the publications should be within the scope of the library collection;
- the university has an obligation to maintain a record of the intellectual achievements of its faculty members, and the library is an appropriate location to house their works, given its existing acquisition, cataloging, reference, storage, and retrieval systems;
- faculty members place their publications on course syllabi, so students need access to the works;
- students are interested in reading the publications of their instructors;
- other faculty members are interested in reading the work of their colleagues;
- tenure and promotion, accreditation, or internal review processes require quick and extensive access to faculty member publications;
- scholars and interlibrary loan librarians often look to the institution of a faculty author for access to the latter’s scholarship;
- faculty members want their publications collected by the library for personal gratification, or because access to their work leads to further scholarship, citations, internal promotion, and international recognition; and
- it just makes good public-relations sense for a library to collect the publications of its faculty members.

Many prospective faculty members accept or decline job offers based upon the quality of the academic library. For example, Cluff and Murrah (1987) polled faculty members at the four largest public universities in Texas. They found that 49.7% of faculty members surveyed considered the library a significant factor in accepting their present position, 49.7% visited the library on their own during on-site interviews, and 68.2% of the faculty members surveyed considered the importance of library resources in research efforts “considerable” or “very high.” Hart (1955) and Hamlin (1981) also provide anecdotal and historical evidence respectively for the value that faculty members place on their libraries in making job decisions. The way in which faculty members typically evaluate libraries is significant in our discussion. The saying goes that academics often evaluate a library by performing two searches in the catalog: first for the essential reference tool or journal in their field, and then for their own publications. Perhaps this is so because bibliographers already know that faculty members want the library to acquire their publications. Faculty members will alert bibliographers to their new publications, usually after the library has failed to acquire those publications in a timely manner. My own informal queries to several bibliographers nationally confirm this. One librarian noted that his faculty members put their requests in terms of comparative library evaluation: “Library X and Y have my new book, so why doesn’t our library have it?”

Authors in the library literature treat faculty member publications only in terms of libraries creating campus faculty member bibliographies (e.g., MacCorkle 1991; Popovic 1985). The reasons for creating the bibliographies vary. Key and Sholtz (1973), Lee, Gratz, and White (1976), McKee and Feng (1979), and Mansheet and Thompson (1994) cite the bibliography’s importance to library directors and school deans and faculty members in writing annual reports or newsletters, and for public relations efforts. Key and Potter (1987) also point out that the bibliography is an important record of an institution’s scientific achievement. Dess (1997) and Hughes (1995) use bibliographies as a factor in journal cancellation projects. Only Fenichel (1990) and Jenkins (1995) use the bibliography for collection development. Fenichel uses the bibliography as an aid in journal selection. Jenkins promotes the creation of bibliographies as a way for college librarians to better understand the faculty and thus to enhance collection development. None of these authors discusses either the rigor or the success of the results of acquiring faculty members’ publications. In this paper I address these issues in the acquisitions of faculty publications by academic libraries.

Method

For this study, two top-twenty ARL libraries were chosen based on their similarities in size, scope, and geographic proximity. Both libraries, henceforth called Library A and Library B, are members of the Committee on Institutional Cooperation (CIC), which comprises the Big Ten athletic conference plus the University of Chicago. Two libraries were studied for reasons of economy; by means of two case studies, I will be able to provide a preliminary investigation into the collection habits of similar academic libraries, the results of which may be applicable to other ARL libraries, if not academic libraries in general. The two libraries in this study are also similar in their lack of collection development policies or procedures addressing faculty member publications. Each university provided alphabetical lists of faculty members by rank. All faculty members were included in the lists, including the faculty members of professional schools.

Numbers were assigned to authors, and 10%-samples were randomly generated from each faculty member rank...
list using a simple Unix-based C++ program. The figure of 10% was chosen, again, for economy; the figure is small enough to make the study a manageable size (hundreds of faculty members and thousands of publications were taken into account), while at the same time being large enough to yield statistically valid results. The OCLC Online Computer Library Center WorldCat was used to compile faculty member bibliographies. Included were monographs (designated by the OCLC MARC fixed field) authored by the faculty members or monographs with the faculty members as an added entry author.

Excluded were all other MARC-delineated formats (journals, audio-visuals, computer files, and archives). By this definition of monograph, included in this study were books, government documents, pamphlets, and other printed publications. Manually excluded from this category were article offprints, issue mimeograph items, theses and other unpublished works, and translations of faculty members' own titles into other languages. In cases of titles with same author names but different subject areas, the faculty members were asked to verify that the publications were theirs.

The author bibliographies then were checked against the holdings of the faculty members' own academic libraries, producing a ratio of published materials to actual materials acquired. Both online and card catalogs were consulted, due to incomplete catalog retroconversion. In cases of multiple imprints or editions, the library was considered to hold a title if it had at least one of the variations in their collection. Next, the results for each library's faculty member publications holdings were classified by imprint date and publisher type. Finally, the data were subjected to several statistical analyses.

Results

The breakdown of faculty rank for both libraries is given in table 1. WorldCat searches revealed that a number of faculty members had no titles; these faculty members were dropped from the sample. The final numbers of faculty members examined also are presented in table 1. WorldCat searches for Library A faculty members yielded 40 titles by assistant professors, 90 titles by associate professors, and 691 titles by professors. WorldCat searches for Library B faculty members yielded 63 titles by assistant professors, 246 titles by associate professors, and 626 titles by professors. The proportions of faculty members publications to holdings are presented in tables 2 and 3.

The statistical analysis of these figures is presented in table 4. From these analyses, we can conclude with 95% confidence that the probability of Library A owning a campus faculty members publication is 72.2%, and of Library B is 59.2%.

<table>
<thead>
<tr>
<th>Initial Sample</th>
<th>Assistant Professors</th>
<th>Associate Professors</th>
<th>Professors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library A</td>
<td>48</td>
<td>49</td>
<td>116</td>
</tr>
<tr>
<td>Library B</td>
<td>97</td>
<td>140</td>
<td>207</td>
</tr>
</tbody>
</table>

Sample with Zero-Publication Faculty Removed

<table>
<thead>
<tr>
<th></th>
<th>Library A</th>
<th>Library B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Professors</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>Professors</td>
<td>88</td>
<td>128</td>
</tr>
</tbody>
</table>

It is possible that assistant professors, because they are new to campus and thus not well known by bibliographers, have a lesser chance to have their publications acquired by the library. Conversely, professors may have a better chance. Similarly, Library A's faculty members may have a better chance of having their publications acquired than by Library B's faculty members, or vice versa. In order to test whether faculty member rank alone, faculty member affiliation, or faculty member rank plus institutional affiliation influences the rate of acquisition, the data were applied to a fixed effect logistic regression analysis with overdispersion, followed by a Wald Type 3 analysis using the GENMOD procedure in SAS. The results returned values of P=0.415 for faculty members rank, P=0.061 for institution, and P=0.944 for the interaction between rank and institution. Figure 1 summarizes the analysis. The confidence intervals at each rank overlap one another, and hence the analysis did not reveal a
statistically significant difference in the acquisition rates across the three professorial ranks (P=0.415). The mean profiles are parallel, reflecting no interaction between rank and institution (P=0.944). In other words, the analysis rejects the hypotheses that rank, institutional affiliation, or a combination of the two influenced the acquisition of faculty members’ publications. However, the value for institution (P=0.061) suggests a tendency for Library A to be more successful than Library B in acquiring faculty member publications.

**Discussion**

The most striking finding is that the overall acquisitions rates are quite low. The results are perhaps more surprising if the data are presented slightly differently. If we take the total number of titles not acquired for each faculty member’s rank, and divide by the total number of faculty members in the ranked sample, we can determine the average number of titles the library lacks per faculty member. At Library A, for each assistant professor, the library lacks an average of 1.1 titles; for each associate professor, the library lacks an average of 0.7 titles; for each professor, an average of 2.1 titles. In other words, if a professor of engineering had published four titles, Library A most likely would have acquired only two of them. These figures seem surprisingly low both to me and to collection development librarians at the two libraries, who were interviewed following this study. Literature bibliographers, for example, noted that they had collected the entire works by both major and minor world writers, and at least 80% of the international criticism on those same authors. They thus were surprised that they had only collected approximately two-thirds of their own faculty members’ scholarly output.

Several factors might be behind the low acquisitions rates. First, the library may not have had the necessary funds to purchase the publications, although this is unlikely given that these particular libraries have among the largest acquisitions budgets in the United States. Mobility of scholars might be a factor. For example, many faculty members of all ranks accept new positions, and so it could be that upon arrival at their new institution, the library was unable to acquire the faculty member’s earlier, out-of-print publications. However, today the acquisition of out-of-print materials is greatly facilitated by online collective second-hand store catalogs such as Advanced Book Exchange, and by companies such as Acme Bookbinding, which can produce bound, acid-free photoduplicates of out-of-print books.

In other cases, materials of an ephemeral or popular nature might not have been acquired because they were
inappropriate for the collection. Textbooks, for example, are anathema to many academic libraries (although in this study many more textbooks were acquired than not). In some cases, it may be that the librarians did acquire certain titles, but by the time of this study, the items had been withdrawn from the library catalog due to damage or loss. Tenure of collection development librarians could also be a factor. The more years a bibliographer spends as the liaison to an academic department, the more familiar she becomes with the faculty members, bibliographically and socially, which helps to bring faculty member publications into the library.

Tables 5 through 8 are presented in order to examine more closely the low acquisition rates at Library A (tables 5 and 6) and Library B (tables 7 and 8) respectively. Tables 5 and 7 present acquisitions by class of publisher. The categories included the following: U.S., U.K., and Canadian university presses; other domestic academic publishers, such as university departments, schools, or independent institutes; domestic commercial presses, including those with foreign and domestic offices (John Benjamins, for example, which produces Amsterdam and Philadelphia imprints); professional associations, think tanks, and museums; U.S., U.N., and N.G.O. government documents; and other foreign presses.

An examination of individual publishers and types of publications for most categories provided inconclusive results as to the reason for acquisition failure. For example, there were no specific publishers accounting for a majority of the unacquired commercial titles. There were nearly as many Macmillan titles acquired as there were unacquired; the same can be said of Heinle & Heinle (a textbook publisher), the Free Press, and so on. An approval plan with a vendor who includes many domestic commercial houses would help to increase the acquisition rate in this category. Acquisition failure in other categories was more conclusive, however. For example, in table 5 the acquisition rates for academic (50.9%), association (57.5%), and government (70.7%) publications all are below the overall acquisition rate (72.2%) for Library A. Similarly, in table 7 the acquisition rates for academic (57.5%), association (44.7%), and government (42.0%) publications all are below the overall acquisition rate (59.2%) for Library B.

Regular library processes like approval plans and standing orders usually do not provide for the acquisition of these publications. Generally these materials are not advertised widely and may not be available commercially. Most of the academic publications not acquired on the part of Library B were working papers of professional schools at major universities. Interestingly, the library had many issues of some working paper series, but lacked a comprehensive collection. A standing order to a few of the series would have increased the acquisition rate in this category. Regarding association publications, many of the failures were published by major national or international societies, such as the Association for Computing Machinery, and some were from more specialized organizations such as the American Entomological Institute. Overall, there were few truly obscure publishers in this category for either library.

Government documents posed a particular problem for both libraries. First, even if a library acquires government publications, they may be lost to users, as some libraries do not catalog them (both libraries in this study; however, catalog most government documents; and government document libraries were consulted to determine whether the libraries held the uncataloged materials). Between 33% and 90% of government documents may never be obtained due to the immense size of governments and their lack of adequate distribution and notification systems for their documents (Bower 1980). Moreover, both libraries in this study are only selective federal depository libraries, acquiring only about one-third of materials. Some of the publications that were not acquired probably would have been obtained had the libraries been full depositories. Yet, many of the government publications in question would not have been distributed to depository libraries. For this reason, both libraries in this study cannot hope to rely on their state libraries (each of which is a full federal depository) to acquire campus faculty member publications. A higher acquisition rate for government publications will require an extremely zealous bibliographer.

Foreign publications did not pose a problem, undoubtedly owing to the emphasis of area studies at the libraries and the long presence of area studies librarians at the institutions. Date of publication did pose a problem, however. Table 6 shows the 1940s (16.7%), 1960s (53.4%), and 1970s (69.7%) all below the overall acquisition rate (72.4%) for Library A. Similarly, table 8 shows the 1950s (39.1%), 1960s (63.8%), and 1970s (54.8%) all below the overall acquisition rate (59.2%) for Library B. The low rate in the 1940s and 1950s may be explained by lack, as discussed above; however, the sample size is small and thus may not indicate much.

The rates for 1960s and 1970s may be low for several reasons. First, we should note the tremendous increase in scholarly output beginning in the 1950s as a result of the C.I. Bill, the Cold War, and the National Defense Education Act of 1958. As Osburn (1979) points out, total higher education expenditures accounted for 0.8% of the Gross National Product in 1950. That share jumped to 1.1% in 1960 and to 2.1% in 1970. Higher education saw a similar dramatic increase: 6,633 doctorate degrees were conferred in the United States in 1950; 9,360 in 1960; and 29,872 in 1970. The number of books published in America rose dramatically during the same period. An estimated 124,675 titles were published in the 1950s. That number leapt to 251,584 titles in the 1960s and to 373,658 titles in the 1970s (U. S. Bureau of the Census 1951, 1961, 1971; Bowker 1961–80: Publishers Weekly 1952). The below-average acquisitions rates for the 1960s and 1970s may indicate that the library was unable to
Table 5. Library A Acquisition Rate by Class of Publisher

<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Other</th>
<th>Commercial</th>
<th>Association</th>
<th>Government</th>
<th>Foreign</th>
<th>Totals</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>No. %</td>
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<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
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<td>6/6 100</td>
<td>2/10  20</td>
<td>8/10  80</td>
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<td>6/9  67</td>
<td>5/3  100</td>
<td>25/46  63</td>
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<tr>
<td>Associate</td>
<td>15/16 94</td>
<td>10/18 36</td>
<td>19/25 76</td>
<td>7/12 48</td>
<td>14/17 82</td>
<td>2/2  100</td>
<td>67/90  74</td>
</tr>
<tr>
<td>Professor</td>
<td>137/151</td>
<td>91  69/131</td>
<td>53  171/277</td>
<td>75  171/277</td>
<td>59  21/32 66</td>
<td>69/91 76</td>
<td>502/691 73</td>
</tr>
<tr>
<td>Totals</td>
<td>158/173</td>
<td>91  81/159</td>
<td>51  1980/262</td>
<td>76  42/73</td>
<td>58  41/58 71</td>
<td>74/96 77</td>
<td>594/821 72</td>
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</table>

Table 6. Library A Acquisition Rate by Decade of Publication

<table>
<thead>
<tr>
<th>Rank</th>
<th>1930s</th>
<th>1940s</th>
<th>1950s</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
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</tr>
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<tr>
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<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
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<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Assistant</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>12/19</td>
<td>63</td>
<td>13/21</td>
<td>62</td>
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<tr>
<td>Associate</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>1/1  100</td>
<td>1/3  33</td>
<td>11/18</td>
<td>61</td>
<td>30/36</td>
<td>83</td>
</tr>
<tr>
<td>Professor</td>
<td>2/2  100</td>
<td>1/6  17</td>
<td>14/18 78</td>
<td>54/100</td>
<td>54  127/180</td>
<td>71  186/228</td>
<td>82  118/157</td>
<td>75</td>
</tr>
<tr>
<td>Totals</td>
<td>2/2  100</td>
<td>1/6  17</td>
<td>15/19 79</td>
<td>55/103</td>
<td>53  138/198</td>
<td>70  228/283</td>
<td>81  155/210</td>
<td>74</td>
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</table>

Table 7. Library B Acquisition Rate by Class of Publisher

<table>
<thead>
<tr>
<th>Rank</th>
<th>University Press</th>
<th>Academic</th>
<th>Commercial</th>
<th>Association</th>
<th>Government</th>
<th>Foreign</th>
<th>Totals</th>
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</thead>
<tbody>
<tr>
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<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Assistant</td>
<td>3/3 100</td>
<td>41</td>
<td>12/29</td>
<td>7/10</td>
<td>70</td>
<td>3/4</td>
<td>75</td>
</tr>
<tr>
<td>Associate</td>
<td>19/19 100</td>
<td>57</td>
<td>65/115</td>
<td>41/65</td>
<td>63</td>
<td>4/8</td>
<td>50</td>
</tr>
<tr>
<td>Professor</td>
<td>65/70 93</td>
<td>59</td>
<td>259/440</td>
<td>185/267</td>
<td>69</td>
<td>35/82</td>
<td>43</td>
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<tr>
<td>Totals</td>
<td>87/92 95</td>
<td>58</td>
<td>336/584</td>
<td>233/342</td>
<td>68</td>
<td>42/94</td>
<td>45</td>
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</tbody>
</table>

Table 8. Library B Acquisition Rate by Decade of Publication

<table>
<thead>
<tr>
<th>Rank</th>
<th>1930s</th>
<th>1940s</th>
<th>1950s</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Assistant</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>1/4  25</td>
<td>6/8</td>
<td>75</td>
<td>11/24</td>
<td>46</td>
</tr>
<tr>
<td>Associate</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>0/0  N/A</td>
<td>2/6  33</td>
<td>25/44</td>
<td>57</td>
<td>67/97</td>
<td>69</td>
</tr>
<tr>
<td>Professor</td>
<td>2/2  100</td>
<td>1/3  33</td>
<td>9/23</td>
<td>39</td>
<td>41/59</td>
<td>70</td>
<td>106/198</td>
<td>54</td>
</tr>
<tr>
<td>Totals</td>
<td>2/2  100</td>
<td>1/3  33</td>
<td>9/23</td>
<td>39</td>
<td>44/69</td>
<td>64</td>
<td>137/250</td>
<td>55</td>
</tr>
</tbody>
</table>

adapt quickly enough to the changes in scholarship and in the publishing industry. Another explanation could be that the newly hired bibliographers who replaced faculty members selectors beginning in the 1960s: these new professionals may not yet have known well enough the faculty members or their subject areas.

Conclusion

Although in this paper I examined only two large ARL libraries, the results may well be applicable to other academic libraries with similar collection policies and campus faculties, because the basic problem confronting the libraries is the large number of faculty members and their publications. Large academic libraries thus may exhibit acquisition rates results similar to the case studies presented here. Indeed, many academic librarians can replicate results similar to the Pittsburgh Study (Kent 1979) and Trueswell's 80/20 ratio (1969).

Certainly the 95% pooled confidence intervals for the acquisition rates of Library A (72.2%) and Library B (59.2%) can be higher. Improvement will require excellent communication between faculty members and librarians and a greater
reliance upon full-time bibliographers with responsibility and time for pursuit of such publications. Other measures, such as publisher or author-based approval plans, standing orders for university departmental publications, collection development policies and procedures, and assistance from the university administration, all may help to bring in a higher acquisition rate of faculty member publications. All academic librarians desiring to increase the acquisition of faculty member publications could benefit from such measures. Of utmost importance, however, is greater vigilance on the part of bibliographers. For example, bibliographers can ask the departments with whom they have liaison responsibilities to regularly send lists of faculty member publications. Some departments or schools already maintain such lists for faculty members' annual reviews or external accreditation.

It is also likely that departments or schools publish newsletters in which new faculty member publications are listed. Departmental Web sites may be another source of information. In follow-up interviews with bibliographers, none indicated practicing such methods. In fact, one librarian indicated that such activities were for new bibliographers uncomfortable with their position and unknowledgeable of their faculty members. Furthermore, Library As reference department received every issue of “Bibliography of Publications by the Faculty Members,” published by the university administration between June 1941 and August 1971. This bibliography listed all new faculty member publications, including book chapters, articles, books, reviews, scores, technical reports, and others; however, apparently it was never used as a collection development tool. The pages are not annotated, and a cursory search of citations in the library catalog revealed many titles lacking. Interviews with older and retired bibliographers indicate that the periodical was either unknown altogether or simply not used as a collection development tool. Bibliographers themselves ultimately will increase the acquisition rate of faculty members' publications.

Is it possible for a large university library to acquire 100% of its faculty member publications? If nothing else, the law of diminishing returns probably will prevent this from happening. Take for example Bastille and Mankin (1980), who determined that 90% user satisfaction for document retrieval at Massachusetts General Hospital Library would require subscribing to 303 journal titles, but that 100% satisfaction would require 1,999 titles. Thus, the effort required, both financially and humanly, may prohibit a library from becoming a 100% library for faculty member publications. Yet, it is possible to acquire more faculty member publications. In many studies in the library literature, researchers discuss the “90% library” (Abbott 1990; Bourne 1966; Buzzard and New 1983; Carrigan 1985; Gore 1981; Lipetz 1972; Saracevic, Shaw Jr., and Kantor 1977). If the library can supply 90% of the materials for faculty member research, it seems to follow that that library should be able to, and should strive to, acquire 90% of the final product of that faculty member research. Indeed, these same faculty member publications are part of the body of knowledge upon which further research will be built and thus should fall within the scope of an academic library's collection. The other reasons for collecting faculty member publications presented in the introduction to this paper also should convince the library to attempt to be a 90% library for the publications of its own faculty members. Although further study is required to determine whether indeed faculty members place their own publications on syllabi, if those publications circulate, or if the faculty members even care to have their publications acquired, nonetheless the reasons for collecting these materials are compelling.

In this study I only addressed monographic publications, including monographs proper, government documents, society pamphlets, and other printed materials. Not addressed were other formats such as journal articles, audio-visuals, computer files, and archival materials. I do not propose that large academic libraries strive to be 90% libraries for all faculty member publications (although in a perfect world of unlimited resources and space the notion is attractive). Looking at journal articles alone, this would be impossible—Bastille and Mankin (1980) illustrate the financial folly of such an endeavor, and their results are even more relevant today, two decades and several serials inflation crises later. Rather I propose that libraries strive to be 90% libraries in terms of some formats, such as monographs proper, if not monographic publications as defined in this paper (i.e., monographs, pamphlets, government reports, etc.). Academic libraries need not rebuild the Library of Alexandria, nor strive any longer to be just-in-case libraries. Academic libraries strive more and more to serve local needs. Attention to acquiring local faculty member publications certainly supports this goal.

Works Cited


Notes on Operations

A Simple Method for Producing Core Scientific and Technical Journal Title Lists

Stanley J. Wilder

The objective of this paper is to present a simple method for constructing core journal title lists in scientific and technical (ST) disciplines. This method is the invention of Bensman and is based on the theoretical foundation outlined in Bensman and Wilder (1998). The method requires the creation of a new measure of value called the Estimated Annual Citation Rate (EACR), which is derived from the Journal Citation Reports' total citation variable. EACR allows researchers to compare the relative value of ST journals, and because it is an annual estimate of citations, it can be compared directly to subscription price to produce a measure of cost-effectiveness. The method is described along with an illustrative exercise using journals in physics and chemistry, and the value and cost results are presented.

The work of Bensman and Wilder (1998) on optimizing scientific and technical serials holdings in an inefficient market is first and foremost theoretical in nature and intended to provide a model for understanding the social and economic dynamics of scientific and technical (ST) journal literatures. The essence of their work lies in their assertion that each ST discipline operates within its own social stratification system. These systems are marked by a high degree of consensus on what is important research, which individuals and institutions produce it, and what journals publish it. Bensman and Wilder established that this systemwide consensus exists, that it is measurable, and highly stable over time.

Given that the consensus within ST disciplines includes journal literatures, we may speak of the "value" of individual ST journal titles as an objective, quantifiable attribute. Further, the stability of journal value over time suggests that today's important journals will tend to remain important in the future. This in turn suggests the possibility of developing meaningful "core collection" lists for ST journals. Such lists would be discipline specific, not institution specific, hence they would apply equally well to colleges and universities without regard to size or academic rank.

Simple value rankings for ST journals would have obvious benefits for scientists and university administrators interested in focusing their promotion and tenure efforts and boosting their departmental rankings. For librarians, however, the double-digit inflation over the last decade in ST journal prices creates another, more immediate use for such lists, provided that the ranking method also allows for comparison of value to price. Bensman and Wilder (1998) found, as others have previously (e.g., Barschall 1988), that ST titles high in value are many times more cost effective than lower value titles. This finding suggests that cost effectiveness data have the potential to give library administrators an important new tool in their struggle to control costs while safeguarding the measurable scientific value of their collections.

In this paper I will present a simple method, invented by Bensman, for developing lists that accomplish both...
objectives: the creation of value rankings for discipline specific journal titles and the production of cost-effectiveness data for these titles. I will also illustrate the use of this method using physics and chemistry journals from the 1997 Journal Citation Reports (JCR).

Subject Sets, Value Measures, and a New Measure of Journal Value

The method for producing ST core lists relies on a set of basic assumptions in regard to the subject groupings for journal titles and the value measures used to rank them. Both issues have an important bearing on how the eventual core list results should be interpreted. Therefore, before discussing the production of ST core lists, I first address the basic building blocks of subject sets, value measures, and the development of a new measure of journal value.

Subject Sets

The definition of subject sets is of critical importance to the development of core ST journal lists. Subject groupings that are either too broad or too narrow allow outliers to negate significant relationships and produce unusable results. The solution presented in Bensman and Wilder (1998) made use of Library of Congress subject schedules and the Louisiana State University course catalog to create 33 subject groupings for the range of ST disciplines.

But any system for producing subject sets that offers similar refinement could presumably return similar results. The JCR contains such a subject system, one that has the advantage of being ready-made and available in electronic format for easy manipulation. The JCR’s system is the result of a complex mapping analysis conducted each year, drawing the journals that cite each other most often into subject clusters (Small and Garfield 1985). This approach gives the JCR subject sets a dynamic quality that allows them to keep up with the pace of change among ST disciplines.

There is no escaping, however, the “fuzzy” nature of sets in library and information science. These sets are “fuzzy” in the sense that overlapping disciplines do not allow for clear boundaries. The fuzziness of subject sets creates an important element of subjectivity in the creation of core title lists, and this subjectivity should be acknowledged and used to establish a good fit with institutional goals. The basic quality and cost relationships of ST journals are stable and predictable but differences in set definition inevitably produce differences in results.

Value Measures

Journal value is fundamentally a human construct. Bensman and Wilder (1998) suggest that faculty perception of the scientific value of journals is an amalgam of the following five elements:

- Subjective judgment as to value or utility
- The social status of the scientists publishing in the journals
- Size in both the physical and temporal aspect
- Subjective comprehensiveness dictating its importance to a wider range of faculty
- Personal advantage of whether the rater could publish his work there

When quantified, faculty perceptions produce journal rankings that are startlingly similar to those derived through analysis of library use (Bensman and Wilder 1998), and to those derived using the JCR’s total citation variable (Bensman 1996; Bensman and Wilder 1998). The strength of the correlation between the three measures is fundamental to the assertion that value exists, and that these variables measure it.

Of the three measures—faculty perceptions, library use, and total citation—the last mentioned, total citation, has several advantages. First, it reflects the judgement of the most actively publishing scientists, from virtually the entire universe of scientific endeavor. Total citation is also easily collected and manipulated using the Web version of the JCR. It is by far the least expensive data to collect, and it produces fewer adverse political side effects than faculty surveys. Finally, total citation is attractive because the JCR also includes invaluable data such as journal half-life, ISSN, and detailed subject categories. For these reasons, the method for preparing core title lists presented here is based on total citation. The JCR’s impact factor variable was not considered as a potential value measure because it corrects for size, an important component of both journal cost and value.

There are two important problems, however, with using raw total citation figures to derive core title lists. First, the JCR does not track title changes in the manner prescribed by the Anglo-American Cataloguing Rules, hence working with total citation requires the researcher to adjust total citation to account for each title’s entire backfile, through title changes, mergers, and divisions. Second, raw total citation data cannot be compared to price data, as total citation covers the entire length of a title’s existence, while each journal’s price reflects the cost of a single year’s publication.

A New Measure of Journal Value

Although Bensman and Wilder (1998) analyzed JCR and total citation, the development of a simple method called for the development of a new
and easier to apply measure of journal value. The Estimated Annual Citation Rate (EACR) was created to correct for the deficiencies in raw total citation data and be a measure that would reduce the need to adjust the citation count over the life of the title and enable direct comparison with annual price data. The formula for calculating EACR is as follows:

\[ \text{EACR} = \frac{\text{total citation/2}}{\text{half-life}} \]

The vast majority of titles have an established half-life value that is found in the JCR data, but adjustments are required for two sorts of exceptions. First, the JCR does not calculate half-lives greater than 10, hence a further modification is needed to estimate these half-lives:

Citations needed to reach half-life total (CHL) = (total citation/2) - total citation for period 1988–97

Average Citation Rate for the last 3 years (ACR3) = total citation for period 1995–97/3

Years needed to half life (YN) = CHL/ACR3

Estimated half life (EHL) = YN + 10

Estimated annual citation rate = (total citation/2) / EHL

This adjustment is much easier to perform using the Web version of the JCR.

Second, the JCR does not calculate half-lives for journals that receive fewer than 100 citations per year, hence these titles are listed in the JCR with no half-life data. These titles should first be checked to determine whether their low citation count was the result of a recent title change. If not, these low-value titles, which are determined by a low number of citations, can be eliminated from the data sets rather than attempting to estimate the half-life of a very small number of citations.

The EACR calculation is analogous to the JCR’s impact factor variable in that it produces a citation rating and shows how the journal is used, but it has important differences. It is derived using the JCR’s half-life variable, which measures the number of years necessary to reach one half of a journal’s total citation figure. Incorporating half life thus allows EACR to correct for the differing temporal frameworks of ST disciplines (math journals typically have much longer half-lives than physics journals) and for different types of journals (review and applied journals are not cited in the same way as basic research journals). Further, in almost every instance, 50% of citations constitutes a bigger and thus more stable sample than the two years used to derive impact factor. This is particularly important given that a single key article can have an enormous but short-lived impact on a journal’s citation patterns (Garfield 1997).

Having created a new variable intended to measure journal quality, it is necessary to validate it statistically. The Spearman rank correlation, a simple, nonparametric statistical test, was selected to establish the degree of correlation between total citation and EACR. To conduct the Spearman tests, the data were ranked in descending order by total citation and EACR. The Spearman rank formula is as follows:

\[ R_S = 1 - \frac{6 \sum d^2}{N(N^2-1)} \]

In the above formula, \( R_S \) is the Spearman rank, \( d \) is the difference in the ranks of total citation and EACR, and \( N \) is the number of pairs of ranks. The results of the Spearman test fall between -1 and 1, with -1 indicating a perfect negative relationship between the two variables, and 1 indicating a perfect positive one. The results of the total citation/EACR Spearman tests for the physics and chemistry data sets are shown in Table 1.

All of the correlations are significant at the 0.01 level. Clearly, EACR is very highly correlated with total citation in every subject grouping.

EACR is a useful measure because the data are easy to collect, the result is easy to calculate and there is a direct comparison to annual price. Also, the results are not confounded by an adjustment for size and there is no elimination of titles with fewer than 100 citations annually.

### The Method

To construct core journal lists using the EACR variable, one begins with the most recent electronic edition of the JCR to collect the data that go into the

<table>
<thead>
<tr>
<th>Table 1. Total Citation/EACR Spearman Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physics</strong></td>
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<td><strong>Physics Applied</strong></td>
</tr>
<tr>
<td><strong>Physics Atomic Molecular</strong></td>
</tr>
<tr>
<td><strong>Physics Condensed Matter</strong></td>
</tr>
<tr>
<td><strong>Physics Fluids Plasmas</strong></td>
</tr>
<tr>
<td><strong>Physics Mathematical</strong></td>
</tr>
<tr>
<td><strong>Physics Nuclear</strong></td>
</tr>
<tr>
<td><strong>Physics Particles Fields</strong></td>
</tr>
<tr>
<td><strong>Chemistry</strong></td>
</tr>
<tr>
<td><strong>Chemistry Analytical</strong></td>
</tr>
<tr>
<td><strong>Chemistry Inorganic and nuclear</strong></td>
</tr>
<tr>
<td><strong>Chemistry Medicinal</strong></td>
</tr>
<tr>
<td><strong>Chemistry Organic</strong></td>
</tr>
<tr>
<td><strong>Chemistry Physical</strong></td>
</tr>
</tbody>
</table>
not deemed politically realistic to satisfy less than the top 75% of ST value. As a practical matter, however, consensus on the worth of ST journal titles largely disappeared after the top 50% of journals in Bensman and Wilder subject groupings.

The second cutoff considered is the average EACR for each subject group. The advantage of this approach is its conceptual simplicity: it says that core journals are those that rank in the top half of each JCR subject grouping. The effects of these cutoffs will be discussed in relation to the exercise presented below.

An Exercise Using Physics and Chemistry Journals

To illustrate the method, journals in the 1997 JCR's physics and chemistry subject groupings were chosen. These subject areas were chosen because they are the most expensive journals in the U.S. Periodical Price Index (Dingledy and Alexander 1998). Table 2 shows the JCR listings of narrower disciplines for physics and chemistry.

It is important to note that these subject sets do not reflect the full range of journal literatures of interest to physicists and chemists. For example, the JCR maintains a biochemistry subject grouping that falls outside the general chemistry group. Further, it is not uncommon for a single title to appear in more than one subject set, and a title that is not core in one subject area may well be core in another.

Summary of Highlights from the Exercise

Skew in value: 20% of titles account for 82% of total EACR in the combined physics list, and 22% of titles account for 78% of total EACR in the combined chemistry lists. The skew in value at the top end is equally evident among the subgroups, where the average EACR of core titles is many times higher than noncore groups. The skew in value is nonetheless understated in these data for two reasons: first, some low-value titles in the JCR data were excluded as described above. Second, many titles that would fall in these subject groupings are not sufficiently valuable to be included in

<table>
<thead>
<tr>
<th>Table 2. JCR Disciplines for Physics and Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Chemistry Analytical</td>
</tr>
<tr>
<td>Chemistry Inorganic and Nuclear</td>
</tr>
<tr>
<td>Chemistry Medicinal</td>
</tr>
<tr>
<td>Chemistry Organic</td>
</tr>
<tr>
<td>Chemistry Physical</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Physics Applied</td>
</tr>
<tr>
<td>Physics Atomic Molecular</td>
</tr>
<tr>
<td>Physics Condensed Matter</td>
</tr>
<tr>
<td>Physics Fluids Plasmas</td>
</tr>
<tr>
<td>Physics Mathematical</td>
</tr>
<tr>
<td>Physics Nuclear</td>
</tr>
<tr>
<td>Physics Particles Fields</td>
</tr>
</tbody>
</table>
Table 3: Summary Results

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>No. of Titles</th>
<th>Avg S/EACR</th>
<th>Total Cost</th>
<th>Avg EACR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Core</td>
<td>Noncore</td>
<td>Core</td>
<td>Noncore</td>
</tr>
<tr>
<td>Physics</td>
<td>7</td>
<td>48</td>
<td>1.95</td>
<td>12.61</td>
</tr>
<tr>
<td>Physics Applied</td>
<td>14</td>
<td>44</td>
<td>1.98</td>
<td>16.95</td>
</tr>
<tr>
<td>Physics Atomic Molecular</td>
<td>6</td>
<td>23</td>
<td>3.85</td>
<td>16.48</td>
</tr>
<tr>
<td>Physics Condensed Matter</td>
<td>10</td>
<td>35</td>
<td>5.11</td>
<td>23.53</td>
</tr>
<tr>
<td>Physics Fluids Plasms</td>
<td>3</td>
<td>15</td>
<td>1.58</td>
<td>22.64</td>
</tr>
<tr>
<td>Physics Mathematical</td>
<td>7</td>
<td>16</td>
<td>5.89</td>
<td>17.48</td>
</tr>
<tr>
<td>Physics Nuclear</td>
<td>4</td>
<td>16</td>
<td>4.70</td>
<td>32.46</td>
</tr>
<tr>
<td>Physics Particles Fields</td>
<td>4</td>
<td>11</td>
<td>4.35</td>
<td>43.45</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>208</td>
<td>182,073</td>
<td>258,303</td>
</tr>
</tbody>
</table>

Chemistry                              | 15   | 70      | 1.29 | 9.93  | 13.266 | 43.079 | 50.972 | 996     | 110   |
Chemistry Analytical                   | 12   | 41      | 4.87 | 20.85 | 40.136 | 50.972 | 996   | 110     |
Chemistry Inorganic and nuclear        | 8    | 23      | 4.19 | 35.34 | 24.044 | 46.174 | 1.123 | 92      |
Chemistry Medicinal                    | 7    | 19      | 1.77 | 10.34 | 5.911  | 14.770 | 603   | 88      |
Chemistry Organic                      | 9    | 23      | 2.40 | 9.21  | 30.591 | 27.142 | 1.777 | 181     |
Chemistry Physical                     | 20   | 59      | 4.12 | 17.41 | 51.397 | 81.994 | 1.021 | 120     |
| Total                                 | 71   | 235     | 165,345 | 264,131 | 1.021 | 120     |

the JCR to begin with. Were it possible to include the universe of available titles in each subject group, the skew in titles would be still more dramatic.

**Subscription cost:** In this exercise, core titles cost less than noncore titles. The chemistry core titles cost 60% of the noncore titles, and the physics core titles cost 76% of the noncore titles. Due to the disparity in the number of titles, however, the average cost of a core title is about two times that of a noncore title in chemistry, and about three times as high in physics. The advantage in average cost of the noncore titles is deceptive, however, because these lists contain many foreign association titles that are low in value and even lower in cost.

By the same token, there are some very expensive titles among the core lists. This is to be expected: the exercise is intended to identify the highest value titles in each subject area, and while high cost titles tend also to be low in value, there are exceptions.

**Cost/EACR:** A more revealing unit of comparison is cost per EACR. As table 3 demonstrates, core titles are many times more cost-effective than noncore titles throughout the subject groupings. The relative cost-effectiveness of the core lists constitute an additional incentive for using value-based core lists as the basis for collection decisions. It is also important because it echoes Bensman and Wilder's (1998) finding that high value titles are cheaper in terms of cost per use.

**Conclusion**

Core lists should never be used to make collection decisions in a mechanical way, absent judgement and local considerations. In addition, one must always be conscious of the inherent difficulty of set definition among fuzzy ST disciplines, and the difficulty in making fine distinctions between journals that fall just above or below the cutoff point. That said, one is left with the unavoidable fact that when ST journals are properly grouped according to subject, value is highly concentrated among a small number of titles. Further, the high value titles are many times more cost effective than the remaining titles. In this environment, core title lists seem almost to suggest themselves. This is fortunate for librarians and other academicians faced with making real-world judgements about quality and resource allocation in ST disciplines.

**Works Cited**


Selection for Preservation in the Digital Age

An Overview

Janet Gertz

In this article, I address three sets of issues. First, is digital conversion a preservation technique or is selection for digitization fundamentally an issue of access? Second, how does the process of selection for digitization differ from selection for traditional preservation activities? What selection criteria apply? Finally, what effect might digitization have on preservation as a field?

In this paper, I consider three issues: whether conversion to digital form is a preservation action, the contrasts between selection for digital conversion and selection for traditional preservation, and the potential effects on the field of preservation. All of these issues are under active debate by, among others, Atkinson (1998), Conway (1996b), Hazen et al. (1998), and Smith (1999). While consensus is growing, many points remain unsettled.

Is Digitization a Real Option for Preservation?

It is given that in order to achieve preservation, we must provide a long-term version of at least the intellectual content of the item. Ideally we preserve the original object itself, appropriately repaired and properly housed. Driven by necessity in the form of irreversible deterioration, we produce surrogates. While it is of course impossible to guarantee permanent survival (O’Toole 1989), preservation relies on the use of stable media with long life expectancy, properly made and properly stored, to prolong the existence of the information.

Once created, permanent and durable paper copies and preservation-quality microfilm will endure for hundreds of years, barring disaster or vandalism. To date no one can prove that any digital version will survive and still be accessible beyond a few decades, despite much talk about migration and emulation, especially considering the repeated intervention these will require. Further, the accuracy and authenticity of a digital version may be open to question. Was the original object accurately and completely represented in the digital version at the time of image capture? Can we be assured of its authenticity over time—that is, can we be sure that it is still complete and has not suffered undocumented change? Lacking agreed-upon mechanisms for this assurance, and lacking longevity, digital copies alone cannot constitute preservation.

It is also given that preservation without access is futile. Digitization offers enhanced, wider, easier access than microforms or photocopies, and it can capture color, sound, movement, and other features that traditional preservation reformatting has not handled well. The term “hybrid approach” (Willis 1992) expresses the idea that digitization in combination with traditional preservation activities provides a way to accomplish both sides of the preservation/access dyad: longevity via traditional means and
improved use through digital means. We now have the option to microfilm an item, then scan the film (Conway 1996a); scan the item then produce computer output microfilm or print out to acid-free paper instead of making photocopies or copyflio (Kenney 1997); or we can scan the original item, retain it, and use the online version as a facsimile or surrogate to protect the original from unnecessary handling. All of this forms part of a continuum with preservation at one end and digitization purely for access purposes at the other. The issue for selection is deciding when best to employ digitization.

**Is the Process of Selection for Digitization Significantly Different From Selection for Traditional Preservation Activities?**

The process of selection for traditional preservation reformatting and the criteria on which decisions are based are well established (see Williams and Lunde 1997 for an historical overview). The decision process is not linear. No single selection criterion suffices; it is only valid in combination with others, as the decision-maker steps through a series of complex, interconnected questions where each answer influences the others. Further, answers to these questions are situational. Given my institution’s specific mission and history, is this item old enough, useful enough, important enough to keep? Given the size of my preservation budget and the number of items that need care, is it damaged or endangered enough to warrant expenditure? Selectors at different institutions frequently give different answers when faced with copies of the same book.

Physical condition drives traditional preservation decision-making. An item added to the collection sometime in the past is now in fragile, damaged, or threatened physical condition. We evaluate its value for continuing scholarship. Decisions follow to determine how preservation should and can be achieved, based on the item’s value, its physical properties, and the nature of its current and anticipated use, as in the following criteria:

- Is the item or collection damaged or endangered?
- Does it have sufficient enduring value to justify preservation? This can include but is not limited to: artificial features, e.g. bindings, illustrations; uniqueness or historic importance; distinguished broad or deep long-term intellectual content, with potential long-term value for teaching or research; conformance with the mission of the institution; and contribution to or support for historically important areas at the institution.
- Which preservation options are available, given the physical nature of the item or collection, and its current and predicted future use? Can we repair it? If not, can a preservation copy successfully capture its content, and support current and predicted future use? Are there factors like use of color, poor contrast, or missing pages that might make traditional reformatting inappropriate?
- What is the cost of each preservation option? Which best matches the monetary and intellectual value of the item or collection?

Many of the same criteria hold for selection for digital conversion but with changed emphasis. The fundamental difference is that the selection process most often starts from a desire for better access rather than due to physical deterioration. This is only to be expected with a technology whose primary characteristic is ease and breadth of access rather than longevity. The primary criterion of enduring value is the same for preservation and digital conversion, but user demand gains in importance, and issues such as intellectual property rights and technological potential receive more attention than is the case with traditional methods.

As with traditional preservation selection, identifying an item or collection as a possible candidate for digital conversion means determining both whether the technology can do what is wanted and whether it is worth doing. And like selection for traditional preservation, selection for digital conversion also functions through local interpretation of general principles. There are no absolute answers, only questions that must be answered within the local context. A number of libraries and organizations have developed criteria for selection for digital conversion, among them Arizona State University Library (1998), Columbia University Libraries (1997), Library of Congress (1999), Smithsonian Institution Libraries (1997), Society of American Archivists (1997), University of California (1997), and University of Illinois (1998). Fuller discussion and quotations from a number of them are available in Gertz (1998); see also Hazen et al. (1998). All of the authors of these documents agree fairly closely on the criteria for selection that they propose, and they share the goal of selection to match the strengths of digitization with the materials it handles best.

The most often cited criteria can be summed up as follows:

- Does the item or collection have sufficient value to and demand from a current audience to justify digitization?
- Do we have the legal right to create a digital version?
- Do we have the legal right to disseminate it?
Can the materials be digitized successfully?
- Do we have the infrastructure to carry out a digital project?
- Does or can digitization add something beyond simply creating a copy?
- Is the cost appropriate?

**Value and Demand**

The first criterion is the same basic question that holds for selection of new acquisitions, collection review, or preservation—whether the content of the materials has enduring value. In the case of digitization, a high level of current demand for the materials or likelihood to undergo significant use once they are digitized adds weight to the decision. Among the selection guidelines mentioned above, phrases such as these appear frequently:

- Does the proposed item or collection have active current users?
- Is there greater demand than can be served by the original or a traditional type of copy?
- Does it support high priority activities such as teaching of core courses that have large enrollments?
- Is it marketable to a group of specialists widely dispersed who need access?
- Do limitations on handling of fragile or valuable originals create a source of demand for high quality surrogates?
- How does it fit with other materials on the same subject?
- Does it help build a distributed online collection?

Materials that are truly in high demand tend to be converted by commercial agencies, because they offer a likely source of profit, while libraries and other cultural institutions tend to focus more on the unique items that they hold and on the lesser-used materials that do not attract commercial interest. Brittle books (many unused for the past several decades) raise particular questions. A great deal of preservation energy goes into microfilming very low-demand brittle books that are selected specifically because they have potential research value for some future scholar—and so ought to be preserved—but are not high priority for many (if any) current researchers. They can reasonably be put on a successful storage medium like film, even though it is a slow, awkward access medium.

Projects like Making of America (Crist and Price-Wilkin 1996) move brittle books into the digital arena, raising the question of whether or to what extent digitization is appropriate for such materials. Atkinson (1996) articulates the concept of the distance between the scholar and information. The book on the shelf is a certain physical distance from the scholar; microfilm moves it further away physically by interposing the need for equipment and psychologically through dislike of the medium. Digitizing and mounting the images on the Web brings the content much closer. When is it appropriate to digitize brittle books as well as—or, like the University of Michigan, instead of—microfilming when the immediate demand for such materials is low and preservation is the primary motive for reformatting?

**Intellectual Property Rights**

Once selectors establish that the materials merit digitization, they must then determine whether they have the legal right to make digital copies and disseminate them, and if not, whether they can get clearance from the rights holder. Preservation has largely been focused on microfilming printed matter that is no longer under copyright, and in any case institutions have filmed to replace or protect damaged items for local use or to provide copies clearly for research purposes—all legitimate under copyright law. What is legitimate for digital versions is less obvious. The 1998 changes to the copyright law permit creation of digital preservation copies, but whether and how access to them may be provided remains open to interpretation (ALA Washington Office 1998).

Digitization increasingly focuses on unique archival and visual materials, many of them unpublished and often very desirable for nonresearch applications. We run into unclear histories of ownership and multiple layers of authorship. Intellectual property issues become murkier as online versions join the mix because they are universally accessible and can be infinitely copied and altered without knowledge or permission of the rights holders. To protect intellectual property from unauthorized use, some libraries allow access for institutional affiliates only. Other institutions mount low-resolution images that are inappropriate for printing but which may also be too low for serious research use. The tension between protecting intellectual property rights and broadening access has become a serious issue for the selection process. Adding fuel to the fire, it seems possible that converting these materials into digital form might actually be a profitable activity—which is of course when rights holders start paying attention.

**Technical Feasibility**

As with traditional reformatting, we must ask whether the technology can in fact do what we need. Can the materials be captured adequately? How close can the digital version come toward representing the full content of the original? Can digital versions be made that will serve most if not all of the same functions as the original? If not, can the digital version fill enough functions to justify its creation, and how will the others be
provided for in future? Further, can adequate digital versions be created without damaging the originals? An informed selection decision can only be made with a solid understanding of whether quality images can be captured, stored, delivered legally and conveniently through commonly used equipment and software.

A great deal of work is going into defining quality standards. Ideally, we aim for high quality in most of the digitization we carry out, especially for preservation purposes. However, it is also true that, as with microfilming, we will not always be able to meet guidelines for highest quality due to limiting circumstances. For instance, we may be considering a fragile item that must be retained in original form and cannot be laid flat or disbound. Or, poor quality older film may be the only version of the item left to scan if the original object is badly deteriorated or no longer exists. Is a digital version the best option under the circumstances? When is a lower-quality digital copy better than no copy at all?

Infrastructure

Rational selection decisions cannot be made without understanding whether a project is feasible in terms of the institution's digital infrastructure. In the past, this has meant finding a good filming bureau and learning to catalog microfilm. Digital conversion is inexorably and essentially bound up with levels of work never needed for traditional reformatting: determining the appearance of the page on screen, navigational tools, user interfaces; structuring and indexing; and generating metadata to record information about images and make them usable. Now we must determine not only whether we can adequately prepare the materials and capture their content digitally, but also whether we can create metadata and manage files, handle intellectual control, and make the digital images functional. All of these tasks are basic to an effective product, and the resources needed to achieve them must be factored into selection.

Added Value

The next issue is whether digital conversion can do more than traditional reformatting—whether it can add value rather than simply creating a copy. Some value-added options relate to image quality: can and should images be manipulated to make them more legible than the original items, for instance, by removing discoloration or stains? This has direct bearing on the perceived accuracy and authenticity of the digital version compared to the original, but it may make the digital images substantially more useful. When might it be appropriate and when not?

Other options involve enhanced description and searching, for instance, item-level cataloging for visual materials, or optical character recognition (OCR) to make digital images of texts fully searchable. Simple bit-mapped images of text pages are only marginally more accessible than microfilm, and in fact Smock (1995, B2) has asked, “Why bother to convert a text to electronic form unless one can do more with it than with the printed version?”

Costs

Once we have ascertained that digitization is appropriate and feasible, we return to the familiar issue of money. In this case evaluating the cost of digitization compared with other preservation options. It has been the experience at my institution that digitization is more expensive than microfilming when all costs for image capture, preparing the materials, file management, Web interface design and programming, and intellectual control activities are counted (see appendix).

While hard numbers are not easily available and are in any case difficult to compare across institutions and across projects, Conway (1996) found that when scanning preservation microfilm, 32% of the costs went to indexing, i.e., the tasks needed to tie the file to the correct page number and place in the structure of the book. Neither Conway, Kenney (1997), nor Chapman et al. (1999) include in their costs any higher-level metadata or cataloging work. If one adds in OCR and further “value added” work involved in making digital images searchable and capable of manipulation, it all adds up to much more than the cost of traditional bibliographic control for microfilm, which we have long known constitutes up to 90% of project costs by some calculations (McClimg 1986; Kantor 1986). How much intellectual value and potential for future use does a volume or a collection need to have, or how much more searching and manipulation need to be added online, to justify the expense?

There is also of course the question of whether funding is available. On rare occasions an institution may recoup its expenses by creating a marketable product or by contracting with a publisher who will pay royalties for digital images of high-profile and rare items. But most libraries will be converting materials with little money-making potential. Most project funding comes from grant agencies or cooperative programs, and part of the whole selection process lies in deciding when participation in externally funded projects matches the institution’s overall needs.

Developing Strategies and Priorities for Digitization

All of this said, it is clear that each institution must develop strategic plans and priorities for digital conversion grounded in its mission and goals or risk enormous waste of human and financial resources on projects that use digitization when other technologies
would be more appropriate, or that are poorly designed, or that focus on the wrong materials.

A brief review of selection strategies from two institutions demonstrates how institutional missions lead to divergent priorities for digitization. First, consider the digitization guidelines of the National Agricultural Library (NAL 1986). The NAL is a national library with responsibility as the repository of record. As such, librarians there have developed guidelines that focus on documenting the history of agriculture and the history of the government agencies they serve, through digitization of both brittle printed works and unique items. They give preference to works of historical value that contribute to an understanding of the history of agriculture and fill gaps in the history of the Department of Agriculture, and they digitize materials that are in the core area of their collecting responsibility. High demand is not the primary factor here; rather, it is NAL’s role as the national archive for a specific subject area and the need to preserve and make widely accessible the central materials in that area.

An alternative route is taken by the Beinecke Rare Book and Manuscript Library at Yale, in a recently published description of its institutional strategy for digitization projects appropriate for a special collection holding primary materials and rare books. Bouche (1999, 4) outlines this strategy: “The library sought to clarify a sustainable strategy for an ongoing commitment to a digital component within its established operations. . . . Given . . . that the library could neither afford nor programmatically justify any attempt to scan everything that might be of potential interest to scholars . . . , where ought the library to place its emphasis to yield the maximum benefit?” Librarians there have focused on two types of projects they believe make the best use of the unique strengths of digital technology for their purposes. First are projects to add value to primary research materials “where a case can be made that the study and interpretation of the documents could materially benefit from conversion to digital form, allowing flexibility in viewing and assessing . . . in a manner that cannot be derived readily from a good quality microfilm, photocopy, or photographic duplicate, or possibly even from close inspection of the original itself.” The second focus is visual materials, because of “the overall benefits in access, preservation of fragile originals, and overall reader services” (Bouche 1999, 14–15).

**What Effect Is Digitization Likely to Have on Preservation?**

Digital conversion allows us to satisfy our clients better while carrying out preservation because we can actually create a use medium they like and want to use. This is of course the whole reason we are concerned with digitization in the first place. It has the potential to please our patrons, offers them capacities for research not available before, and broadens the range of media we can deal with because it can capture text, color and continuous tone images, sound, and movement. Instead of “just” trying to solve the brittle paper problem, we now have the potential to convert other media we have avoided for many years, and to do it with a technology that users actively like.

Digital conversion will make us review and refine traditional procedures to improve them and to make the interaction of digital and traditional technologies easier and better. Chapman et al. (1999), Kenney (1997), Conway (1996a), and others suggest modifications to microfilming procedures in order to assure that microfilming and digitization will interact better in future, with a better quality product in both cases. Some of those suggestions involve compromises with current microfilming specifications. If compromise cannot be avoided, then the preservation community must decide when it is appropriate. As we work with audio and visual materials, we will be constantly moving between what we traditionally have been able to achieve and what digitization offers, and making sure we continue to value the core concept of preservation—the primacy of quality and longevity—in both traditional and new technologies.

The current realities of digital conversion will also make us rethink the issue of achieving high image quality by employing capture processes that harm or destroy the original object in order to preserve its content. The clearest scanned images of book pages are currently achieved most cheaply by flatbed scanning from cut pages (Chapman et al. 1999). We need to weigh obtaining a better-quality product for less money against destroying the original object. This is not a new dilemma; see for instance Ogden (1989). Microfilming has always caused some wear and tear on materials, and there was a time when many of us routinely disbound volumes and discarded them after filming. Readers objected strongly not merely because they dislike microfilm, but through genuine concern about the destruction of the original volumes, as stated in the Modern Language Association statement (1965) and perhaps most strenuously expressed by Tanselle (1989, 44), who speaks of “the unnecessary destruction of books in the name of textual ‘preservation.’” Although we have developed better ways to limit filming damage as far as possible, some libraries still face hostile inquiries about withdrawal of materials after filming (Singer 1998). Will readers react less angrily if digitization requires destruction, given that it is an access medium many of them relish? Or do we decide to live with lower
image quality or more expensive digital capture in order to keep originals intact? We can hope that improvements in technology will eliminate the quandary soon.

Digitization has the potential to bring in more resources, because it is a high status activity, and administrators, grant agencies, and donors are perhaps more willing to pay for it than for preservation. On the other hand, higher costs mean that resources will not stretch as far as we would like. We must factor in the costs of indexing, metadata creation, development of navigational aids, Web site design, and the whole package that makes the digital copies useful and accessible to the viewer. Unlike microfilming, where bibliographic control can reasonably be segmented off from image capture, digital image capture is intimately bound up with creation of operational, structural, and administrative metadata. Essential information must be recorded about the conditions and mechanisms of image capture and about the innate structure of the object (page sequences, chapter divisions, grouping of archival materials, and so forth) to permit navigation among related files. Preservation experts must become as knowledgeable about metadata creation us about creation of the images themselves (RLG Working Group 1996).

Digitization absorbs a great deal of managerial attention, which translates into money. It complicates decision-making because there are so many variables: whether to create—and whether it is possible to create—full online facsimiles or else some level of lower resolution index or reference image; decisions about image quality, tonality, enhancement of images; whether to create searchable text and how, what level of complexity of metadata to create, what sort of search tools and user interface, Web site design, what storage media to use—the list goes on and on. It also takes time and energy to develop the necessary infrastructure of guidelines and procedures and tools like Requests for Proposals and contracts, to learn to scan to high standards, and to identify and cultivate vendors.

Digital conversion can divert attention and resources away from preservation to purely access projects. Providing digital resources to library users has become an essential service, both via conversion and through purchase or subscription. Administrators are desperately looking for lower priority operations whose funds and staff can be moved to support digital resources. The strengths of digitization come to the fore in displaying illustrated and visual materials, in providing ready access to high demand materials, and in creating new research tools by combining scattered resources. Digital conversion projects of this type usually have little to do with preservation; rather, they are almost purely access-driven. Do we redefine preservation to justify our roles in such projects or spread our time over a broader area of responsibility beyond preservation?

Finally, digital conversion will increase the amount of preservation that is needed because we will also need to preserve the digital resources we are producing. Whether we carry out digital conversion for preservation or other purposes, there is always an eventual preservation angle. Using digitization to create access to materials of long-term value calls for genuine commitment to preserving the digital files, to development of the infrastructure necessary to preserve those files routinely over the long-term. It is in preservation's best interests to be involved at the selection and digital conversion step to assure that images are of appropriate quality, stored on appropriate media, and accompanied by appropriate metadata.

**Conclusion**

Digitization has the potential to do so much, and there is a great temptation to rush off to create the digital resources we know are possible. Careful decisions and a great deal of money will be needed if we are to do it well. The wonderful capacity for searchable text and identification of images across the Internet can only be bought at a very high price. Digitization gives us a way to make preserved items infinitely more immediate and available to anyone connected to the Internet, not just scholars who can visit our library or borrow a copy of our microfilm. It gives us options far beyond what we had before, and it allows us to make use of a medium that is not merely user-friendly but actively sought by users. In many senses, we cannot afford not to digitize. The essential thing is to use digitization to its, and our, greatest advantage, and to use traditional techniques and digital conversion together to better effect the preservation of our materials by choosing carefully what is most appropriate for the materials and to maximize the strengths of both analog and digital technology.

**Works Cited**


Appendix

Cost Elements of Digital Conversion

We have not yet formally established costs for digital conversion efforts at Columbia, while microfilming costs have been tracked in detail for more than ten years (see Harris et al. 1991). In computing current costs for microfilming projects, we include the activities from initial identification of materials to be reformatted through delivery of the finished product to the user:

- condition survey and inventory of materials
- retrieval from the stacks and circulation tracking of materials
- professional bibliographer title-by-title review for retention and preservation decisions
- bibliographic searching for existing preservation-quality microfilm and for cataloging copy
- page-by-page collation and interlibrary loan or other means of acquiring missing parts
- target creation
- shipping to and from the filming vendor where image capture and creation of copy negative and positive film are carried out
- upgrading or creation of bibliographic records
- technical and frame-by-frame quality control inspection of the film, and arranging for any corrections
- distribution of the positive to the microform reading room and the negatives to off-site storage
- disposition (conservation, boxing, reshelving, or withdrawal) of the original materials.

The process of digital conversion includes all of the above tasks except bibliographic searching for existing microfilm and creation and distribution of film copies. To the above tasks are added:

- initial sampling and benchmarking to determine appropriate capture specifications and decisions on resolution, size, and quantity of derivatives
- creation in-house or by the vendor of derivatives
- creation partly by the vendor and partly in-house of operational, structural, and administrative metadata
- programming and creation of html pages for display and navigation
- quality control not only of each image but also of links to assure that all files open to the correct image
- general file management, storage, and backup.

Where possible, activities are automated, but the additional steps and the involvement of programmers and other technical staff inevitably add significant expense above the costs for tasks shared with microfilming projects.


Since the early 1990s, as the World Wide Web became the chief means of providing access to a larger variety of information resources, there has been a steep learning curve for presenting information on the Web in creative, intuitive, and meaningful ways. Web design has become easier as better editing instruments and tools give Web authors more options for layout and presentation. Good software alone, however, does not ensure good design. These two books, with different but complementary goals, are welcome additions to the proliferating literature for information professionals on how to design Web interfaces for various user communities.

Today most libraries have a Web site that provides access to a wide variety of library services, including digital resources and a gateway to the Internet. Garlock and Piontek have created a guidebook to show library staff how to maximize the Web for communicating with their user communities. They build on their 1996 book, a pioneer on this topic, Building the Service-Based Library Web Site: A Step-by-Step Guide to Design and Options. These authors, who have credible library experience as designers in the JSTOR (Journal Storage) digital archive project, emphasize creativity and listening to users’ experiences to learn how the Web site functions for them—how they use it currently and anticipate using it in the future. If there is valuable content, insightful Web design will enhance the overall success of the Web site, but poor design will have a negative impact on the usability of the site, even when the content is valuable. As library users become more accustomed to navigating digital resources, they expect features and technical conveniences that make information retrieval from the Web more efficient and responsive to their needs. The authors assume that their readers are literate in HTML, and they conclude that most library Web sites are basically functional. They focus on how to make practical improvements that add excitement and uniqueness to a library Web site.

Library Web sites serve the combined functions of presenting an image for the organization and providing service to library users. There is an educational or instructional mission inherent in most library Web sites, because users need to be able to follow the layout of the Web site to retrieve information. Usually the goal is to reduce the need for external support to use the Web site successfully. Today a high level of sophistication and expectation surrounds Web design, with the potential for combining not only contextual layout, graphics, and color, but also mixed media and the opportunity for interaction via e-mail, interactive video, digital relay, and other options. Garlock and Piontek’s chapter on new developments is not leading edge; they introduce the reader to only a few examples of techniques and technologies that are, in fact, not new at all. Adobe Acrobat, Shockwave, Flash and RealAudio, and JavaScripting have been in the forefront for several years. What Web managers really want to know is what technology is in the pipeline.

There are many books on how to create Web sites, but Garlock and Piontek’s easy-to-use book is specific to the library environment. For libraries that have had several years’ experience with their Web site, this book may be too basic. Those institutions may want to model the next generation of their Web site on e-commerce applications. The usefulness of this book depends on what kinds of services and resources the library wants to promote and how much experience they have in Web design. The book is organized in simple chapters on basic features of a Web site. There are many graphic examples to accompany the text; however their resolution suggests that this may be a good candidate for an e-book.

Two outstanding aspects of Designing Web Interfaces are the chapter on incorporating user feedback into the site design process and the one on site content. Soliciting user feedback on Web design demonstrates that the library wants to maintain its edge, cares what users think about this service, and expects to edit, revise, and make changes as needed. Good ideas
come from a variety of sources, and if one accepts the maxim that the customer is always right, then user input is essential. The goal is to have repeat users who expect a certain level of familiarity at the Web site and can use the site independently.

The richest chapter in Designing Web Interfaces is devoted to content. The authors cover in detail the variety of library resources and services and the relationships among online catalogs, commercial databases, local resources, and Internet access. They show the importance of such issues as restricted access, the wide variety of delivery options, explanations for printing and saving information, and the increasing need for client software to use some Web resources. One of the major challenges in creating a library Web site is establishing valuable links from one part of the site to another. Web sites have the potential to become denser and more complicated as more content becomes available, and good design takes the user to the relevant information with the fewest possible layers or clicks. There are many hints in this book and many cases and examples, however most Web development is a combination of individual preference and ease of use. There is valuable information in the appendix directing the reader to a range of resources on Web design. The cost of the book is surprising, though, given its brevity and the existence of many other books on this subject.

Design Wise is a different take on Web development. Alison Head stresses the need to rethink how Web sites are designed. She poses some difficult questions and offers ideas for change in this interesting book on software and Web development, providing a solid introduction to human-computer interaction (HCI) and showing how improvements can be made in designing interactive media.

This excellent book begins with the statement, "Design Wise is about making better choices" (xv). At the conclusion, the reader will be prepared to do so with more ideas and knowledge. In the first part of the book, Head emphasizes design theory and in the second demonstrates how to apply it in designing Web sites. As a reference book, Design Wise includes many viewpoints, and the contextual framework is one with which anyone in the information industry—programmer, librarian, publisher, content provider, contributor, or user—can identify. As an information scientist herself, Head also incorporates several interviews with leaders and pioneer architects that make the process of Web design all the more real and legitimate. The brief interviews with Don Norman, Jakob Nielsen, Reva Basch, Peter Jacso, Lou Rosenfeld, and Anne Mintz are objective and inspiring. Head includes examples to support many hypotheses and ideas, from a variety of sources in different sectors. The inclusion of a range of educational sites, banking and commercial Web pages, those from the giant IBM and Microsoft, plus some not-so-good examples brings helpful insight into why HCI is so valuable in creating more user-centered Web designs. Head includes design evaluation templates based on accepted principles, but adds new focus to them by illustrating how interface design can be improved. As more diverse user groups emerge, Head considers how critical it is to design for users with special needs.

Design Wise is objective and creative in its treatment of three leading media forms: CD-ROMs, Web sites, and online commercial databases. For anyone who thinks that CD-ROMs are a passing fad in institutional environments in the developed world but appreciates their value for individual users or in the developing world, this chapter is refreshing reading. Head also prepares her reader for predictions about Web design in the book's final chapter. Those who are experienced in Web design and who follow industry trends will concur that knowledge management has surfaced; intelligent agents have not conquered the world as we hoped; searching has and will become more sophisticated and intelligent, engendering even more optimistic expectations; and finally, that librarians as information professionals have a challenging and exciting future if they take the opportunity to "contribute and accelerate an important dimension to user-centered design, especially through their understanding of information-seeking behavior" (173) (This book, full of practical wisdom, insights, and creativity is a "must read" for all information professionals.—Julia Gelfand (jgelfand@sun1.lib.ucr.edu), University of California, Riverside Library)


These two superb compact monographs were published in 1998 as part of the now-defunct Getty Information Institute's "Introduction to" series. They are first-rate in the way they synthesize and explain complex information about the use of vocabulary tools and archival descriptive practices. An outstanding feature of these two books is the diversity of audiences who can benefit from their use. Both are of value to seasoned custodians and students in library and information science, museum studies, and archival
programs—to those who are aware of information organization standards and the principles underlying efforts to control and provide access to cultural resources and archival holdings—and to those who are learning about standards, principles, and practices for the first time. Perhaps most important, these books are of enormous value in the cultural resource or archival repository that has functioned mainly under the guidance of in-house, homegrown practices and localized schemas, but now wants to contribute to the growing networked world of cultural resources and archival access. These excellent books are indispensable for any institution that wants to make its resources Web-accessible in a way that will support collection control and access and will facilitate interoperable exchange of information.

Introduction to Vocabularies opens with a “A View from the Top” by David Green, executive director of the National Initiative for Networked Cultural Heritage. This “special message for administrators of cultural heritage collections,” (1) will certainly get cultural heritage custodians who are currently functioning in isolation thinking about the value of shared vocabularies in the networked environment. Vocabularies, intended for practitioners, students, administrators, educators, and researchers working with cultural resources, covers the what, why, and how of standards for documenting cultural heritage information, with emphasis on standard vocabularies for description. Chapter 5 is a detailed introduction to the Getty vocabularies: The Art & Architecture Thesaurus, the Union List of Artists Names, and the Getty Thesaurus for Geographic Names. Chapter 6 focuses on more advanced vocabulary-related matters, such as search assistants, database and catalog issues, browsers, and the multilingual aspect of vocabularies. This book concludes with a resource section that provides a list of acronyms and abbreviations essential to the field, a list of readings, and an excellent compendium that lists tools, guides, manuals, organizations, projects, and training opportunities for individuals who want to expand their knowledge in this area.

The layout of the Introduction to Archival Organization and Description is similar to that of Vocabularies. In the introduction, Suzanne Warren notes the growth of the archival profession and the development of principles and standards that facilitate control of and access to archival materials. The book is divided into four parts: “Archival Principles, Archival Practices”; “Archival Analysis, Archival Description”; “Putting it All Together: How the Archivist Works”; and “What’s Ahead in Description and Access.” Warren notes that the book serves as an orientation to fundamental archival principles for the beginning and novice archivist, and demonstrates how the work of the archivist flows from them” (vii). Archival descriptive activities are grounded in two fundamental principles: provenance and original order. The authors discuss the importance of these concepts and how they guide archival description. Archival thinking has expanded beyond these boundaries to include discussions on funds and functional provenance that might be included in a new edition of this book. The book ends with the informative “Tutorial: An Over-the-Shoulder View of an Archivist at Work,” followed by a great little glossary, a list of acronyms that are important to the field, a bibliography for further reading covering tools and technical resources, and a list of Web resources providing useful examples and links to organizations, training, and educational opportunities.

Both of these books are worthwhile; in fact, one hopes that second editions of both will be forthcoming. Though the format of these little volumes is appealing, a larger font would be appreciated.—Jane Greenberg (janeg@lib.unc.edu), School of Information and Library Science, University of North Carolina at Chapel Hill


Sorting Things Out: Classification and Its Consequences is well characterized by its subtitle. Bowker and Star examine both the social, political, and economic forces that shape classifications and the social, political, and economic consequences of classification. The book consists of an introduction to classification as part of social infrastructure; a thorough examination of the creation and operation of the International Classification of Diseases (ICD); two cases of the effect of classification on individuals’ lives (tuberculosis patients and South African Apartheid race classifications); a description of the use of the Nursing Intervention Classification (NIC) to make visible what professionals do; and a concluding theoretical discussion of changing the practice of classification. In this review I will consider the book’s significance in a broad sense and how the authors’ observations on non-library classifications and their critical and theoretical approach relate to library and information studies (LIS).

The most important contribution of Sorting Things Out is its authors’ explanations of the significance of classifications as part of the infrastructure of peoples’ lives. Bowker and Star are explicit about their moral and ethical agenda. They use what I would call a “worst-case study” methodology, a cross between “worst-case scenario” and “case study,” using the most obviously problematic cases to highlight problems that are then visible in more subtle forms in everyday cases. Thus,
their discussion of what happened to tuberculosis patients caught in a bureaucratic infrastructure and of individuals caught in the race classifications of Apartheid South Africa helps us see how classifications can construct peoples’ lives. From there we can use our own imaginations to link these consequences to our own experience—classification used by insurance companies, educational institutions, and marketers, for example. Each of these classifications pigenholes individuals on the basis of a few salient, but nevertheless limited, criteria. Bowker and Star offer intellectual tools for assessing both the advantages of enforcing classification, such as using the ICD to gather information on the spread of disease, and the dangers of pigeonholing, such as the definition of an identifiable, and therefore treatable and insurable, disease.

With this overall approach, how does *Sorting Things Out* relate to library and information science? We will have to do the work of making connections between our classifications and those described by Bowker and Star, but the results are well worth it. For example, the ICD is the instrument for tracking international disease data for the World Health Organization. It is similar to the standards we use for bibliographic control internationally. IFLAS’s Universal Bibliographic Control program delegates cataloging to national bibliographic agencies who subscribe to the International Standard Bibliographic Description and the Paris Principles. In addition to these internationally developed and endorsed standards, we also have de facto international standards such as the Dewey Decimal Classification. Reading the three chapters about the ICD in light of these cataloging and classification standards can offer us a new way to look at our work in a global context. In addition, LIS readers can link many of Bowker and Star’s observations to the principles of classification that our field has developed over more than a century of research and practice. Our understanding of specificity (they use the term “granularity”); exhaustivity; interindexer consistency; and relevance, precision, and recall can enhance and be enhanced in reading *Sorting Things Out*. For example, Bowker and Star note the cultural differences in coding diseases using the ICD. Knowledge of the problems of and possible ameliorative measures for interindexer consistency would be useful to those gathering data on diseases, but the insights into the cultural nature of inconsistent coding is a relevant contribution to LIS literature.

Bowker and Star approach the study of classification by “reading” in the style of a Foucauldian discourse analysis. This is a critical technique worth emulating because it makes visible what is otherwise taken as innate or natural. However, this particular reading could fruitfully go further. At the beginning, the authors state that “to classify is human” (1). Traces throughout the text echo this statement. It strikes me as an inappropriately sweeping presumption in general, but especially so in a work whose authors seem to be questioning fundamentals. It suggests to me that this book is not quite as radical as it appears. The authors do what they set out to do—to reveal the infrastructures that are built from classifications and to reveal their consequences—but they do not question the nature of classification as such. Bowker and Star provide many potentially useful theoretical techniques for self-critical reflection on our creation and use of classifications, but that is as far as they go. An interesting example is the suggested use of classification to raise the visibility of what professional nurses do. The NIC was designed to make nurses’ work visible in hospital information systems, with the idea that it would lead to the recognition of nurses as a profession. This lack of recognition is also familiar to librarians, teachers, social workers, home economists, and other predominantly female professions; and the authors allude to gender issues occasionally. But in discussing the NIC they do not pursue the question of whether the structure of a classification might have negative as well as positive ramifications with gender as a determining factor. If, indeed, gender is active in this situation, then itemizing nurses’ tasks in the context of a classificatory structure may lead to deprofessionalization, making nursing appear more like non-professional, primarily female, clerical work. Bowker and Star discuss the difficulty of classifying activities such as emotional support, but do not take the next step of questioning whether or not a traditional classification is a suitable means for the desired end. In some ways they are implying that classification is simply a tool that can be used for good or ill. They do not question the structure of this infrastructure itself and its appropriateness for different groups and cultures. In the end however, *Sorting Things Out* should be considered in terms of its intent and result. Bowker and Star have created an impressive demonstration that classification is power in an often hidden form and therefore demands our critical attention—Hope A. Olson (hope.olson@ualberta.ca), School of Library & Information Studies, University of Alberta, Edmonton, Alberta, Canada