A Strategy for Academic Libraries in the First Quarter of the 21st Century

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"You've got to be careful if you don't know where you're going 'cause you might not get there!"
        — Yogi Berra[i]

Abstract

The wide application of digital technologies to scholarly communications has disrupted the model of academic library service that has been in place for the past century. Given the new Internet tools and the explosive growth of digital content available on the Web, it is now not entirely clear what an academic library should be. This article is an attempt to provide a strategy for academic libraries in what is left of the first quarter of the 21st century. There are five components of the model: 1.) Complete the migration from print to electronic collections; 2.) Retire legacy print collections; 3.) Redevelop library space; 4.) Reposition library and information tools, resources, and expertise; and 5.) Migrate the focus of collections from purchasing materials to curating content. Each of the components of the strategy and their interactions will be considered. It is hoped that the result will provide a useful roadmap for academic libraries and the campuses they serve.

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Introduction

In September 2006 at a conference on library assessment in Charlottesville, Virginia, John Lombardi, the Chancellor of the University of Massachusetts-Amherst challenged the assembled librarians. He said that despite the fact that his mother and sister were librarians, and that, as a Latin America historian, he had depended on libraries and librarians all of his professional life, he did not know anymore what an academic library should be. Thus as a campus leader, he found it hard to know what investments in libraries made sense. Lombardi made it clear that in the competitive environment of higher education today, if libraries could not make a strong and clear case for their role, the money would go to the new student recreation center because that is what students and their parents asked about on the campus tour.[ii] Coming from a thoughtful and influential friend of academic libraries Lombardi's words should be a wake-up call.

Jerry D. Campbell expressed similar concerns in his 2006 *EDUCAUSE Review* article when he said, "Because of the fundamental role that academic libraries have played in the past century, it is tremendously difficult to imagine a college or university without a library. Considering the extraordinary pace with which knowledge is moving to the Web, it is equally difficult to imagine what an academic library will be and do in another decade."[iii] The recent report of ACRL's Roundtable on Technology and Change in Academic Libraries echoes Campbell. Its opening sentence speaks of the "iconographic power of a college or university library." But in the next paragraph the report states, "The business of libraries can now be understood as one component of a rapidly evolving, almost wholly transformed environment in which information is proliferating at heretofore unimagined rates and in which the ability of academic libraries to deliver authenticated and reliable information is continuously challenged by new technologies."[iv]

It is easy to understand why at the end of the age of print academic libraries, and indeed all libraries, are dazed and confused. The technology upon which we have built our missions over the past half millennium is being usurped. The development of print in the 15th century and the 19th century industrialization of print made libraries what they are today. Or, to be more precise, what they were in 1993 when the Web era began. Most of what we as librarians know about organizing information is a refinement and enhancement of the work of Melvil Dewey and other 19th century library pioneers. As Google so powerfully proves every day, authority control and classification are no longer the only, or the best, answers.   Academic libraries must find and articulate their roles in the current and future information ecology. If we cannot or will not do this, our campuses will invest in other priorities and the library will slowly, but surely, atrophy and become a little used museum of the book.

This article is an attempt to provide a strategy for academic libraries in the digital age or at least in its early stages. I do not believe that the transitions proposed will take place immediately, but rather that they will play out over the next fifteen to twenty years. What will be important is that we manage this transition purposefully and that we not drift through it. There are trade-offs that need to be made. If we are not prepared to make them, it is unlikely that we will be able to marshal the required resources and we will fall short of what we need to accomplish.

Assumptions

My strategy for the early 21st century academic library builds on several underlying assumptions:

1. Libraries are a means and not an end. Libraries serve as a mechanism for making knowledge available in communities and organizations. More precisely, libraries are the mechanism for providing the subsidy that is required if information is to be used efficiently in communities and organizations. An economic case can be made that without such a subsidy information will be underused and communities and organizations will be less successful than they should be. As technology changes there may be other better mechanisms for applying the subsidy and we should embrace and support them. [v] One example of such a mechanism is open access publishing.

2. Libraries confront a variety of disruptive technologies and these technologies will disrupt libraries. [vi] The structures and practices of libraries will no more withstand the technological changes we are facing than the scribal culture withstood the changes brought on by the printing press. Change will not be instantaneous, but it will be relentless. To take the most obvious example, Google aims to digitize and index all of the world's printed literature. While Google and the publishing community are currently at odds, it is inevitable that economic models will be found to make copyrighted materials openly accessible. What will it mean to libraries when all books are potentially full-text searchable and available to everyone with an Internet connection?

3. Real change requires real change. Incremental adjustments at the margins will not suffice; rather alterations in fundamental practice will be needed. Fortunately, this is not uncharted ground. There are established strategies and tactics, and we can take advantage of them.

4. We have a window of opportunity. Books and libraries are revered in academic culture and librarians in general are well thought of by faculty

and even administrators. We have a reasonable measure of good will that we can spend down. If we do this wisely, we can successfully manage the transition we now face. However, this window will not stay open forever, so we cannot afford to wait too long.

Parts of the Puzzle

For me there are five parts of a strategy for maintaining the library as a vibrant enterprise worthy of support from our campuses.

1. Complete the migration from print to electronic collections and capture the efficiencies made possible by this change.

2. Retire legacy print collections in a way that efficiently provides for their long-term preservation and makes access to this material available when required. This will free space that can be repurposed.

3. Redevelop the library as the primary informal learning space on the campus. In the process partnerships with other campus units that support research, teaching, and learning should be developed.

4. Reposition library and information tools, resources, and expertise so that they are embedded into the teaching, learning, and research enterprises. This includes both human and, increasingly, computer-mediated systems. Emphasis should be placed on external, not library-centered, structures and systems.

5. Migrate the focus of collections from purchasing materials to curating content.

In the near term, say the next decade or so, I believe that most academic libraries will want to pursue all five of these activities (particularly the first, third and fourth). However, in the longer term one can easily imagine that one or more of these activities (probably the second and fifth) will become less important on some campuses or will be more effectively managed by regional, national, or international agencies.

Part One: Complete the Migration from Print to Electronic Collections

There are three types of material to be considered as we look at the migration from print to electronic formats: reference works, journals, and books. The migration is nearly complete for the first two and is just beginning for the third.

The conversion of indexes and abstracts to electronic formats began in the mid

1980s with the advent of CD-ROMs and was complete by the mid 1990s when Web versions of these products were released. Encyclopedias moved to electronic formats in the same way and in the same timeframe. Legal and business reference works, whose print versions required labor-intensive filing, soon followed. These products were clearly superior substitutes for their printed predecessors and in most cases print products were abandoned. Large aggregated reference sets, such as Gale's *Biography Resource Center* or *Literature Resource Center*, became available on the Web in the late 1990s and in the early 2000s a wide variety of more specialized reference materials followed. It is less clear that these latter examples of electronic products were treated as substitutes for their print counterparts.

Beginning with Lexis/Nexis and then IAC's *InfoTrac*, full-text journal content started to become available electronically. With indexes and abstracts this content moved to the Web in the mid 1990s. This journal content expanded as other aggregators entered the market and many individual publishers released Web versions of their titles either as free standing products or as supplements to the print. JSTOR then added large backfiles to the mix. By the early 2000s in most disciplines nearly all important journal content was available electronically. In most cases libraries did not treat the aggregator's products as substitutes for printed versions arguing that the constant changes in these collections' content made them an unreliable and therefore unacceptable substitute. Substitution of the electronic version for the print was more acceptable for individual titles, especially when budgets were constrained. While librarians were moving with caution, users were not. In most libraries the use of printed journals declined quickly and consistently. This can be tracked by looking at photocopying and reshelving statistics. It is also likely that the ease of use and power of the Web indexes, especially when full-text collections were part of the product or where linking services, such as SFX, were employed, increased the use of the journal literature. There should be considerable savings in migrating from print to electronic journal collections both in processing the material and in managing the collections. Schonfeld, King, Okerson, and Fenton have documented life cycle savings of from 20% to 60%. [vii]

Academic e-books first became available in the late 1990s when netLibrary introduced its first collections. After a bumpy start, netLibrary and other e-book providers became established in the market. Readex and others have introduced large retrospective e-book collections. Project Gutenberg has been digitizing and making freely available out of copyright titles since the early 1970s, though this effort has had little impact on library collecting. In late 2004 Google created a stir by announcing its partnership with five major research libraries in the Google Print Library Project. The project intended to digitize and make electronically available millions of volumes including the complete collection of the University of Michigan. Shortly thereafter the Internet Archive launched a competing project, the Open Content Alliance, focusing on out of copyright titles. To date there has been much talk about e-books, but little evidence that e-books

are a suitable substitute for printed books. As a result there has been little change in library practice. However, it does not seem unreasonable to suggest that this may change in the near future.

Federal documents pose an interesting parallel to e-books. By 2005 92% of all documents distributed to depository libraries were available in electronic form.[viii] The University of Arizona, in a pilot program with GPO, reduced the number of titles received in dual form to 25 titles.[ix] Despite the difficult and time-consuming nature of processing federal documents, most depository libraries have been slow to modify their collecting practice, but when they do there should be significant savings of processing costs.

It is clear, at least for most reference materials, nearly all journals, and for federal documents, if the University of Arizona experience is generalizable, that electronic versions are at least acceptable substitutes for their paper equivalents. What is less clear is the extent to which libraries have abandoned their print versions and reinvested those resources in other areas. There are clear savings as fewer paper items are processed, as reshelving declines, and as fewer volumes are bound. But I suspect that few libraries have clear strategies to manage this migration and how and when they will reclaim resources. Nor do many libraries seem to be in a hurry to move assertively in this direction.

An additional area of potential savings is available in the selection of materials. Electronic resources are often packaged in larger bundles than their printed equivalents. In some cases this bundling is a disadvantage, for example when done by the large commercial journal publishers, but in other cases the savings in selection time might be significant. For example, subscribing to ebrary provides access to tens of thousands of e-books with only one decision rather than the many hours of librarian time that would otherwise be spent on this selection task. User-driven purchase models, like netLibrary's PDA model, passes the selection task to library users, and at least in some cases can be markedly more effective than traditional selection.[x] However, since models like these threaten to displace the traditional roles of librarians, it is likely that there will be resistance to this change.

I believe libraries need to move assertively from print to electronic materials and, of equal importance, work diligently to capture the savings this move makes possible. Unless we do the latter, we will lose much of the benefit of the former. Doing both will require discipline, and rigorous and continuous assessment of practice.

Part Two: Retire Legacy Print Collections

As libraries move from print to electronic collections, our legacy print collections will serve a different purpose and we will need to manage them differently. While

some print materials will remain important, particularly monographs in the humanities and social sciences, in general, print materials will cease to be the primary part of working collections. Significant efficiencies can be achieved with this shift, particularly in the use of space. In addition, new strategies and funding models will be required for the long-term preservation of and access to this material. If we do not develop clear strategies, our ability to repurpose space will be limited. But we need to keep in mind that sooner rather than later it will become clear to every academic administrator that using prime campus real estate to house little used books and journals volumes is unacceptable.

Fortunately, the underlying infrastructure upon which this strategy can be built is well established. Many large research libraries and some consortia have constructed high-density off-site storage facilities and have developed good practice for the management of collections in these facilities and for providing access to them.[xi]

Proposals for regional collection management have been made and Connaway, O'Neill, and Prabha have shown that OCLC's WorldCat has the capability to identify unique materials to implement such programs.[xii] Whether it will be possible to build a national consensus and to implement a concerted program of action or whether a laissez faire approach will be adequate is unclear. Until one approach or the other is proven to work, individual libraries will either have to delay decisions or make them on faith. Neither choice will be attractive to traditionally minded librarians who do not wish to antagonize faculty who value proximity to "their" books. An easy exception to this might be the JSTOR journal collection. Many libraries may be able to discard these volumes. This was, after all, the intent of the JSTOR project from its inception.[xiii]

If the library community can establish regional or national strategies for the storage and long-term preservation of print collections, then individual libraries can confidently retire, or discard, their legacy print collections, especially those that are available in digital formats, and ultimately move to repurpose high value campus space.

An example of how this might work is being implemented in Indiana for federal documents. Indiana University Bloomington, Purdue University, and the University of Notre Dame have agreed to create a second comprehensive federal documents collection in Indiana. The first is in the Indiana State Library, which is the regional depository library. Much of the current combined collection is housed in the Indiana University Bloomington high-density storage facility and the plan is to eventually house all of it there. The three universities have agreed to divide the collecting and retention responsibility for the full output of the Government Printing Office. Because good bibliographic records are available for post-1976 titles the comprehensiveness of the collection can be verified. Thus a complete "light archive" collection of federal documents will be created for the state. After this agreement was finalized other depositories in the state were

given permission to withdraw post-1976 documents without listing them. This system will provide Indiana depository libraries the ability to confidently and easily withdraw unneeded materials from their federal documents collections.[xiv]

Part Three: Redevelop the Library as an Informal Learning Space

Until very recently the study space in most libraries was a mix of carrels, tables, and some soft seating that was designed to serve individual users. Beginning in the mid 1990s substantial numbers of public computers were deployed, though most often these computers were configured and managed as public computer labs that just happened to be located in the library. In the past several years there has been a concerted effort in many libraries to rethink and redevelop study spaces to create what are generally referred to as the "Information" or "Academic" Commons.

The first commons projects generally focused on bringing technology into the library and often involved collaborations with campus technology organizations. More recent projects have focused on developing spaces that are conducive to group work and involve partnerships with writing centers and other campus groups focused on student success. Multimedia centers and presentation rehearsal rooms are not uncommon nor are collaborations with centers that provide technological and pedagogical support to faculty. Following the Barnes and Noble model, coffee shops are becoming the norm. The aim is to create comfortable, lively, and active spaces where students can interact with each other, with information and with technology and where support for the use of library resources and technology can be found. Increasingly these spaces are being thought of as places to create, as well as to access, knowledge.[xv]

At the same time libraries are confronting the disruption brought on by cell phones and laptop computers, which because of wireless networks can be used anywhere in the building, by creating "quiet" study areas. What has become clear is that the relatively homogenous and open space that had been the norm in most library construction since the 1950s no longer works. As Steven M. Foote, an architect involved in library projects, puts it, "As we trace the history of how to accommodate readers in libraries, we are struck by the new paradigms that apply. In every instance—from freshman orientation at liberal arts undergraduate institutions to the most sophisticated post-graduate research--it is apparent that changes are upon us, and that the old programmatic models are no longer adequate."[xvi] What is needed is a new mix of different kinds of spaces and work environments that can accommodate different uses and possess different ambiances. Library space will need to be shared with a variety of partners and it is likely that the distinction between the library and other informal campus space will blur.

With the retirement of paper collections space should be available to be

redeveloped, but in most cases the costs of this redevelopment will be significant. Campus conversations will be required to forge a consensus on the form and function of future library space. The redevelopment of library space should be an attractive philanthropic opportunity and will likely be funded in large part with external funds. In the longer term, it may be possible for some space to be returned to the campus for non-library uses.

Part Four: Reposition Library Tools, Resources, and Expertise

As we think about the future of library services, it is useful to consider OCLC's *College Students' Perceptions of Libraries and Information Resources*. The conclusion stated:

> There is widespread high use of general Internet information resources among college students. They regularly use search engines, e-mail and instant messaging to obtain and share information. The library is not the first or only stop for these information seekers. Search engines are the favorite place to begin a search and respondents indicate that Google is the search engine most recently used to begin their searches. Among students who have started a search using a search engine, 48 percent ended up at a library Web site. Forty-one percent went on to use the library Web site, but only 10 percent agreed the library Web site fulfilled their information needs. Twenty-seven percent indicated they also had to use other resources. The results of this survey confirm that libraries are not seen as the top choice for access to electronic resources, even among college students who have the highest level of awareness of those resources.[xvii]

Undergraduates live on the Web. They begin, and often finish, their research with Google, and mostly use the library as a place to study. This is a sadly accepted truth among librarians, but we all like to think that faculty and graduate students are different. This might be true for now, but it is quickly changing. A recent University of Minnesota study of faculty and graduate students in the humanities and social sciences concludes by charting a new direction for library services for scholars:

> Our proposed Scholar's Collective would address the dual challenge of creating useful tools for humanities scholarship, while simultaneously creating capacity for collaboration… The scope of the Scholar's Collective addresses two significant cultural shifts in humanities scholarship. The first is the research practices of scholars who depend on electronic media and tools for individual and collaborative work but whose research methods have not yet successfully incorporated techniques to manage a hybrid

information environment. The second is the increasingly social dimension of new online environments. By building a comprehensive research environment for humanists that leverages scholars' expertise and specialized knowledge *and* that offers personalized and customized resources and support for individual and collaborative research.[xviii]

The Scholar's Collective is not a place, rather it is a set of tools for the discovery, gathering, creating, and sharing of information. It will be web-based and while it will have some traditional library functions built into it, it will not be the library.

What is most important about both of these studies is that they clearly show that if the library chooses to stand alone, it will be bypassed. Alternative information sources may not be as extensive or as authoritative as those housed in or subscribed to by the library, but they are good enough and they fit easily and seamlessly into the lives that our students, and increasingly our faculty, live. For students the primary digital space they will do their academic work in will be the campuses' course management systems. For faculty institutionally based systems, like Minnesota's Scholars Collective, may work, but given the importance of cross-institutional collaboration among scholars, national or international disciplinary systems might prove to be more effective.

Both students and faculty will use the general Web search engines as their primary discovery tools. Library tools, resources, and expertise need to be where the users are.   The simple truth is: if you can't get to the library from Google, you won't go there. Libraries need to use linking strategies to make this simple and easy. It should also be transparent.

There are two strategies that need to be deployed:

1. Libraries need to embed their resources and expertise into the systems and tools students and faculty use in their daily lives. We should resist inventing new systems unless there is absolutely no alternative. OCLC's Open WorldCat and its linking to the Google Book project is a good example of the right approach. Integrating library tools into course management systems should be an obvious priority.

2. Libraries must reposition in-person interactions so that they are used to respond to the most complex and difficult problems. The aim should not be to replace in-person interactions and the relationships that are built through them, but rather to find ways to enhance them and to build stronger relationships. Traditional reference desks, even when extended with chat and e-mail, are probably not the best strategy, though it is unclear to me what alternatives will work best. It is also unclear what the best approach to instruction will be, but I suspect a new mix of tutorials, learning tools, and in-person classroom involvement will need to be

developed. While the tool-based approach of much of the traditional library instruction activities will probably become less important, new topics such as evaluating the authority of resources, academic integrity, and intellectual property have entered the library's domain. There are obvious opportunities to place librarians in centers for teaching and learning and to involve them formally in undergraduate research programs. Blogs aimed at individual courses or departmental audiences should be explored, as should a library presence in social spaces like MySpace or Facebook.

In larger institutions there may be opportunities to create systems and services like those envisioned in the University of Minnesota study that could provide data as grist for analysis of the scholarly process. As Rick Luce states, "I believe there is great potential value, for bona fide research institutions, in mining the knowledge space/transaction space relationships in predictive ways that could be every bit as valuable as the publications and research reports that our institutions produce today — and that value has real economic and financial consequences."[xix]

Part Five: Migrate from Purchasing Materials to Curating Content

The transition of information from print to electronic format is clear and its impact is obvious. But there is a second, equally important transition whose impact has not been fully recognized — the transition from purchased to open access content. This second transition will do more to reshape what libraries will be and do in the future than the first, but this has not yet been carefully considered or broadly discussed.

The number of open access journals has steadily increased.[xx] There is also a growing body of evidence that authors increase the impact of their articles when they are available through an open access mechanism.[xxi] It has also been argued that open access accelerates the pace at which science develops.[xxii] But between the squabbling of open access proponents and the often-misleading rhetoric of commercial publishers trying to guard their markets, it is easy to miss the fundamental transformation that is taking place.

Peter Suber defines open access as follows: "Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions. OA removes *price barriers* (subscriptions, licensing fees, pay-per-view fees) and *permission barriers* (most copyright and licensing restrictions)."[xxiii] Open access literature is free to the user, but it is not produced without cost. Like all information products, open access literature has an initial fixed cost, what in the print world was called the first copy cost. This cost has to be covered just as it was in the print world. In the print world the marginal cost of producing each copy of a book or journal was non-trivial and needed to be covered. The only

way to do so was to sell the book or journal and pass the first copy costs and marginal cost of the book or journal on to the reader (or library). Increasing returns to scale are achieved with all information products and sizeable profits can be made once first copy costs are covered. This happens with best sellers, which is why blockbuster authors get large advances. But in the realm of scholarly publishing, this happens less often and first copy costs are often subsidized. Two things have changed with the development of the Internet. First, production or first copy costs have declined, often dramatically.[xxiv] Second, the marginal cost of distribution of the information product has dropped, for all practical purposes, to zero. For publications that are electronically produced and delivered, fixed costs are lowered and marginal costs disappear. Thus if the low first copy cost can be covered, the item can be made available at no cost to the user. What can be lost in this analysis is that while the increasing returns to scale still exist, what is returned is not money, but impact and reputation.

Most of the conversation about open access has focused on the scholarly journal literature, but it is more appropriately regarded as any information product where the first copy cost is subsidized and the product is freely available to the user. This includes a lot of things. Importantly, it includes a lot of what libraries do, including most digital library projects.

From the perspective of students and faculty the growth of open access means that more high quality scholarly material is freely available (and most easily found with Google or Google Scholar). This frees them from reliance on their campus's library as the sole source for scholarly materials. Over time this will mean that the library's collection of purchased materials, in both print and electronic formats, will be less important. The good news is that as this happens, libraries will be required to purchase less. The especially good news is that this should happen first in the area of science and technology journals where the cost of materials has increased at double digit rates for several decades. The bad news is that much of what libraries have done in the past is make available purchased collections and as this role declines, so may we.

It will be critical for libraries to articulate a change in the role of their collections if they are to remain vital. To do so I think it is important to recall that most academic libraries have always done two things:

1. They have purchased collections to support their local communities or organizations.

2. They have curated special collections of unique or valuable items for the world.

In the past the first role was dominant. In the future, it will be the second that will become most important. In the past the collections that were curated were primarily manuscripts and rare books. In the future the bulk of what is curated

will be digital. A part will be digital versions of traditional special collections, but increasingly it will be born digital documents and digital outputs of the research enterprise. Managing the former is reasonably well understood; managing the latter will be a challenge, especially as large data sets become common with real-time ubiquitous data collection in many areas of science (often referred to as e-science) and the social sciences.

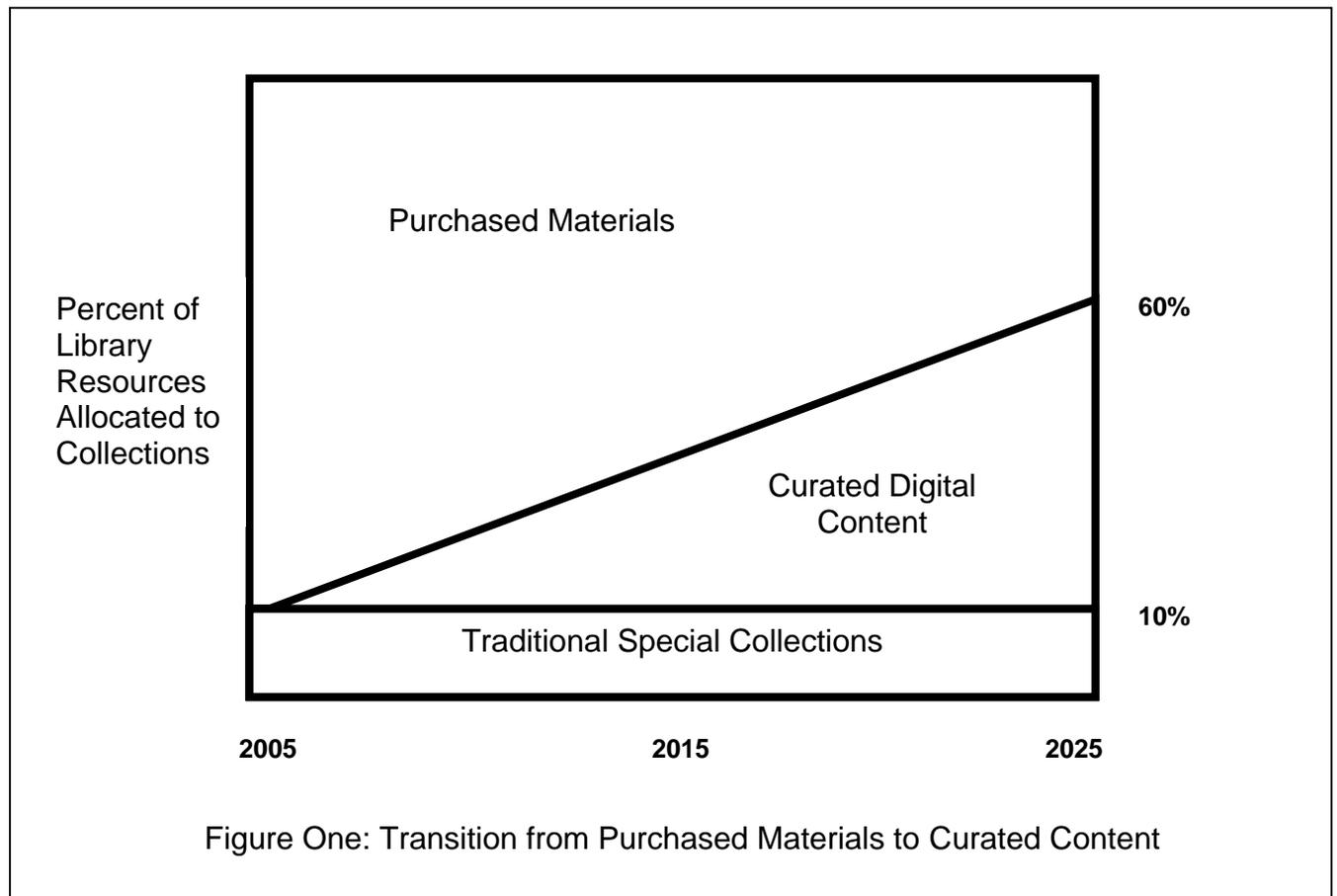Figure One: Transition from Purchased Materials to Curated Content

Figure One is a graphic representation of how we might view this change. Assume that at the present time 80% to 90% of a library's resources devoted to collections go into purchasing materials. This includes not simply the cost of the materials themselves, but also the cost of selecting, processing, and managing these collections. It should also be noted that this includes the purchase of both print and electronic materials. The remaining 10% to 20% of a typical academic library's collection resources goes into traditional special collections. I am prepared to predict that in the next 20 years less than 50% of a library's collection related investments will go into purchasing collections and over 50% will go into curating digital content. Investments in traditional special collections

will remain at approximately the current level. I believe it is important to recognize the inevitability of this transition and to embrace it.

There are a number of challenges that we will need to meet in this transition. First, libraries need to develop the skills and infrastructures to manage collections of content with which we are not familiar. We also need to develop technologies and strategies for the long-term preservation of digital information. I am reasonably confident that we now know how to preserve bits for decades, but we need to be able to do so for centuries. Among the important skills required will be the ability to assist and support faculty in the creation and collection of this content. I believe this will be an important new role for subject librarians.

A second challenge will be to develop the level of support for this activity to match the level of support that currently exists for purchasing content. The value of purchased content is clear, especially to the users. Curating content has a similar value, but this value is not always as clear.[xxv] There will be a temptation to be a free rider. Since open access provides information at no cost to the user, why should my campus invest in being an information provider? I am convinced that most campuses will quickly come to see the value in curation as it provides researchers with a mechanism to share their results and in the process brings the researchers and the campus recognition and prestige. The recent recommendations of the Modern Language Association on promotion and tenure that call for a broader range of acceptable venues for scholarly contribution, including portfolios and new media, may be an indication of changing views.[xxvi] NIH and NSF mandates on data management will also move researchers to value this service.

A third challenge will be to balance the benefits of the curation program across the various academic units on campus. Libraries will curate different things for historians than they do for biologists, but they need to be doing something for everyone.

The final challenge will be to remain disciplined in making the transition. We cannot build a curation program unless we repurpose resources that are now used to purchase materials. We can expect publishers to make this as difficult as they can, and many librarians will be resistant to the change, as it will threaten their traditional roles. In my view, an explicit strategy vetted by the campus will be required. Drifting and incremental development will not be successful. Such a strategy will be difficult, because in effect it will require canceling or not purchasing published materials on the assumption that the content will be available in an open access format. From a broad long-term perspective this might be true, but on an item-by-item day-to-day basis there will rarely be perfect or often even approximate substitutability. The easiest way to manage might be to constrain the budget for purchased content and require selectors — both librarians and faculty — to live within the budget. It is also likely that a robust document delivery system and/or a mechanism for the rapid purchase of

individual items will be required during the transition period.

Putting the Parts Together

Three of the parts of the model — migrating from print to electronic collections, retiring legacy print collections, and moving from purchasing to curating collections — represent a change in how the collecting activity is conceived. The third part is a new way of thinking about space. The fourth modifies the way librarians employ their expertise. In all cases there is a blurring of the boundaries that separate the library from the rest of the campus and the external information environment. The library becomes less of a distinct place.

While the different parts of the model can be pursued independently, there are interdependencies between them. They are shown in Figure Two and described below.

1. The transition from print to electronic resources should provide staff savings as the number of individual print items selected, processed, and managed decreases and more comprehensive electronic resources are acquired. These savings should be both professional and clerical. It will be important to capture and redeploy these resources. In addition, there should be savings in the costs of binding, postage, and cataloging fees.

2. In the short term, the retiring of the legacy paper collection will require additional staff. It should be possible to use staff freed as part of the migration from print to electronic for this purpose as skills sets should be comparable. When the retirement of the print collection is complete there should be staff savings that should be able to be captured, especially in libraries that do not manage their own high-density storage facilities. The most important resource that will be created with the retirement of the paper collection is space. In the short term the library will want to retain most of the space to be redeveloped and any space that is given up should be traded to develop relationships with other campus organizations that enhance the library's capacities and mission, such as teaching and learning centers or writing centers. In the longer term however, it seems likely that some space could be returned to the campus to be repurposed for uses that are not directly related to the library.

3. The redevelopment of library space will require financial resources beyond what can be expected to be recouped from the transition from print to electronic resources. It will have to come from external sources. It seems that this could be a good candidate for philanthropic support, as there should be many naming opportunities. It may also be the case that a "contemporary" library will become a requirement to attract students much as recreation centers have been in the recent past. It may also be that the

promise of space for other purposes will convince some campuses to make investments in the redevelopment of library space.

4. The repositioning of library tools, resources, and expertise will require staff resources and some new investments. Most libraries will require technology skill sets that are not possessed by current staff. It is not clear if the best strategy will be to train existing staff, hire librarians who have the required skills, or hire technologists and instructional designers. I suspect some combination of the latter two approaches will be most successful. It is possible, but not certain, that ultimately this transition will result in net savings in staff resources. While new investments in hardware and software will be required, in the long term it is likely that there will be savings in systems costs as libraries increasingly embed the resources in systems managed by others rather than maintaining their own proprietary infrastructure. For example it is easy to imagine that some combination of WorldCat and Google Books could replace the library's catalog. Adam Smith, group business-product manager for the Google Book Search and Google Scholar programs, has said about Google's ambitions, "One of the key attributes of Google Book Search is going to be comprehensiveness. For it to really be a powerful tool, we need to ensure that you can search all the world's books… what we are really doing is making a discovery tool for books."[xxvii] Again, net savings are possible, but not certain.

5. For most libraries the migration from purchased resources to curated content will require an input of staff. Fortunately, many of the skills required exist in current employees. For example moving from cataloging to metadata creation should be straightforward and subject librarians should be able to be able to support faculty in archiving their research output and developing other digital library collections. New investments in hardware and software may sometimes be funded with external support, primarily grants or contracts, but it will be critical for the library to convince the campus of the necessity of moving some funds from collection building through the purchase of materials to the curation function if this transition is to be successful.

While it is difficult to predict, I do not think that it is unreasonable to anticipate that the cost of the model described will not be greater than the current cost of operating most academic libraries. Large research libraries that take responsibility for large collections of special or unique materials, for example area studies collections, may require increased resources and some libraries that can free ride on the increase in open access materials may require less. On balance, though, it is not unreasonable to expect most libraries to manage without increases in funding beyond the general rate of inflation.
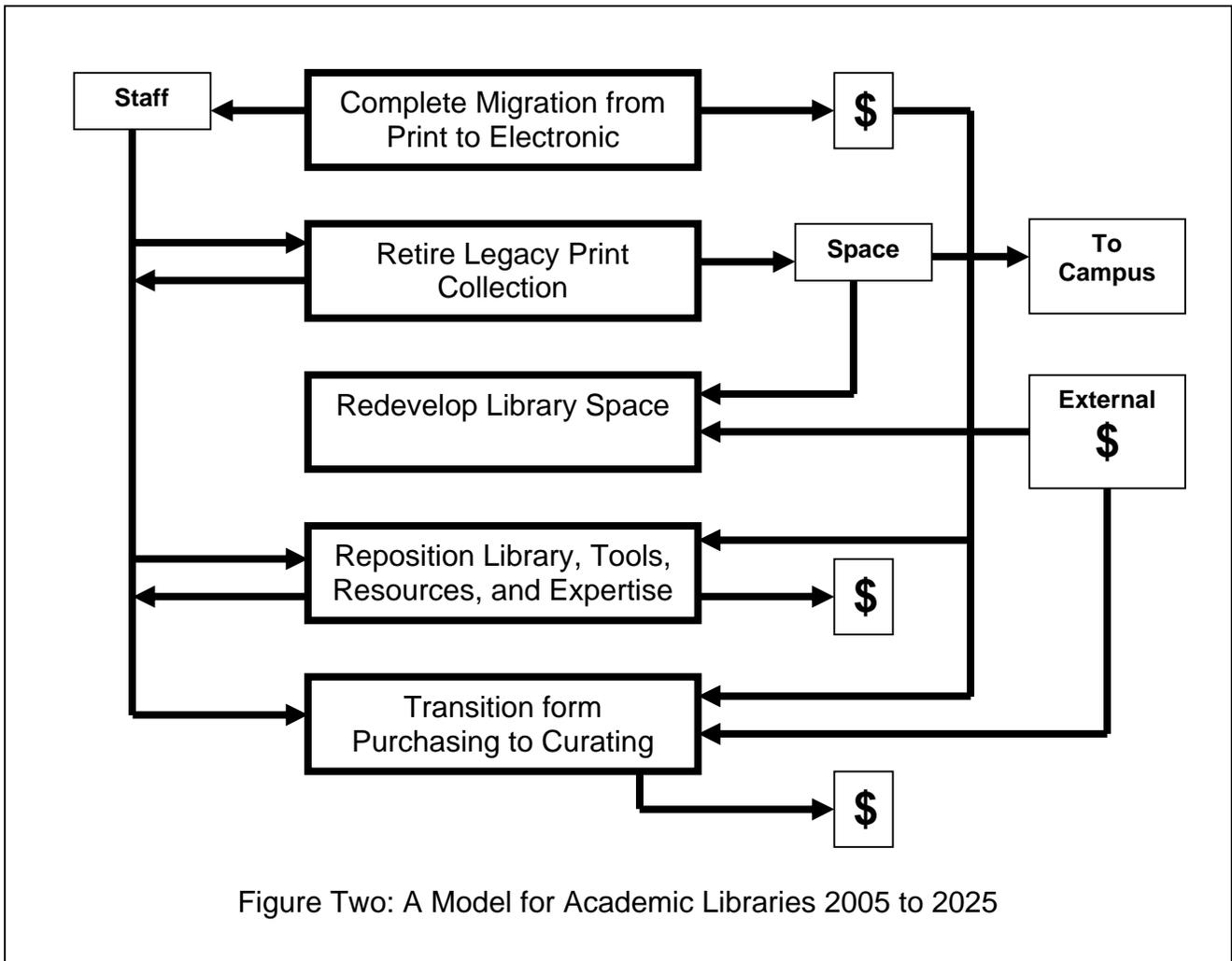
Figure Two: A Model for Academic Libraries 2005 to 2025

Boxes and labels in figure:
- Staff
- Complete Migration from Print to Electronic
- $
- Retire Legacy Print Collection
- Space
- To Campus
- Redevelop Library Space
- External $
- Reposition Library, Tools, Resources, and Expertise
- $
- Transition form Purchasing to Curating
- $

Organizational Issues

The changes that are necessary will require libraries to be managed in different ways than has been the practice over the past 50 years. The culture in libraries, which dates from the 19th century, is based on carefully managed and controlled procedures and a conservative approach to change. This made a great deal of sense. We need to remember that in the paper world the most important thing that libraries, particularly large academic libraries, did was to keep millions and millions of small pieces of paper in the correct order. They did other things, of course, but if the small pieces of paper were not in the correct order nothing else mattered. The current challenges require different approaches and a different

culture.

Beyond this there are a number of organizational issues that will need to be managed.

Library Staff Composition. As we look out a decade or two and if we assume developments similar to those I have proposed, I think we can make several assumptions about changes in the composition of library staffing.

1. There will be a reduction in the number of clerical positions. This will also include a reduction in hourly student positions that do clerical work. This will not begin immediately, as the task of retiring legacy collections will replace the labor that is saved between the reduction in acquiring print and in managing print collections, but within the next two decades we will see reductions in clerical positions. I estimate that this will be in the range a 25% to 30% decline over the next 20 years. This would take the ratio of clerical staff to librarians from 2:1 to close to 1:1.

2. There will be a continuing increase in the number of technologists. I would anticipate they will represent 25% to 40% of professional staff by 2025.

3. The number of librarians will remain roughly constant, but the roles they play will change. Fewer librarians will be involved in the traditional library roles of selecting, processing, and managing purchased collections and in providing their expertise in-person, either through reference work or classroom instruction. Librarians will be increasingly involved in new roles of curating collections and providing their expertise in ways that embed it in systems and in other environments. In cases where librarians cannot be found with the skill sets for these roles, libraries will look to staff without library credentials. James G. Neal argues that an influx of non-MLS professionals could create a new vitality in academic libraries.[xxviii] In my view, the extent to which this takes place will likely depend on the size and specialization of the library. Larger institutions that are developing their own tools will likely require higher levels of specialized skills that few librarians will possess. Smaller libraries that rely on tools provided by others may be better served by the broader general skills of librarians. The increase in librarian retirements will provide the necessary flexibility, but there will undoubtedly be many challenges.[xxix]

4. The net effect of these changes will total compensation levels (in constant dollars) that are approximately what they are today.

Flexible Staffing and Flexible Staff. The next several decades will be full of change. The adaptability of staff and the ability of the library to have staff with the required skill sets to try and succeed at new things will be critical. This will be

a complex challenge and it will require at least the following:

1. An organizational culture that values learning and is willing to experiment even when success is not assured.

2. An explicit strategy for hiring and retaining staff with the skills, abilities, and characteristics the organization requires.

3. A willingness to invest in staff development.

4. A commitment to organizational development.

Library staff will need to recognize that they are unlikely to be doing the same things they are doing now ten or even five years hence. They also need to prepare themselves to acquire the skills needed to play the new roles that will be required.

The Principles of Disruptive Innovation. Clayton Christensen and his colleagues have developed strategies designed to create success when introducing innovative or disruptive programs or technologies.[xxx] Among others, the strategies libraries need to pursue include:

1. Make products and services more reliable, more convenient, and cheaper (as measured in the user's time if not in dollars). This should be a constant and never-ending quest.

2. Use exploratory project development strategies that assure learning rather than success and which preserve resources for the second and third attempts at getting it right.

3. Be impatient for success with small projects, but don't be in a hurry to grow the project to full scale. This will push the exploration of new ideas but avoid risking immature developing projects by banking on them too heavily. Done correctly this will drive innovation.

4. Begin with simple projects that meet the needs of undemanding users and then move up market to provide services to more demanding users. In practice this means beginning with services to students and only moving to faculty services when some expertise has been developed. This is contrary to the approach academic libraries usually employ.

5. Don't ask users what they want; rather watch what they do with the tools you provide. Our users cannot anticipate how the new technologies will solve their problems any more that we can. Especially watch new users who are unencumbered by old systems and practices.

6. We should encourage standards that allow for modularization of the scholarly information value chain. This will make it more difficult for for-profit or other large enterprises to gain monopoly control of pieces of the value chain and thus extract unreasonable income from that control. This is what has happened with scholarly journals over the past three decades and we should work to keep this from happening in the developing information ecology.

7. Add value where things are "not good enough." Studies like the one conducted by University of Minnesota Libraries show where the possibilities lie. In general, what libraries have done in the past works "well enough," and is not where we should look for future opportunities.

8. We should use technology to create new approaches that are scalable and save time for both the user and the library.

We should look outside of the library world for trends and inspiration. As Christensen, Baumann, Ruggles, and Sadtler put it:

> What accounts for this poor showing [of U.S. health care and education]? It's not a lack of solutions but rather misdirected investment. Too much of the money available to address social needs is used to maintain the status quo, because it is given to organizations that are wedded to their current solutions, delivery models, and recipients... What's required is expanded support for organizations that are approaching social-sector problems in a fundamentally new way and creating scalable, sustainable, systems-changing solutions.[xxxi]

We cannot continue to operate as we have and must look outside our world for new ideas and solutions.

Conclusion

Seven years into the new millennium academic libraries are facing a great deal of uncertainty. The structure of scholarly communication is changing as is the role academic libraries will play in it. But it still seems to me that the way forward is really not that difficult to envision, at least in its broad outlines. The challenges we face are complex in detail and some, most notably the long-term preservation of digital objects, will take both inspiration and hard work, but none of what needs doing is beyond our capabilities. Moreover, the work that needs to be done is at the core of what libraries have always done — making knowledge available in communities and organizations.   We will use new and different techniques for doing so and we will undoubtedly define community somewhat differently — more often as the world and less often as the campus. But our underlying values

need not change. As individuals, we will need to be ready to invest in ourselves by acquiring new skills and looking at problems in new ways, but the work will serve the same end, and will probably have many of the same frustrations and rewards.

Notes

[i] Yogi Berra, *The Yogi Book*, New York: Workman Publishing, 1998, page 102.

[ii] John Lombardi, "Library Performance Measures That Matter," *Library Assessment Conference: Building Effective, Sustainable, Practical Assessment*, Charlottesville, Virginia, September 25, 2006.

[iii] Jerry D. Campbell, "Changing a Cultural Icon: The Academic Library as a Virtual Destination," *EDUCAUSE Review* 41(Jan./Feb. 2006):16-30, page 30, available at: http://www.educause.edu/apps/er/erm06/erm061.asp (accessed April 22, 2007).

[iv] "Changing Roles of Academic and Research Libraries," Roundtable on Technology and Change in Academic Libraries, convened by the Association of College and Research Libraries (ACRL) on November 2-3, 2006 in Chicago, IL. Available at: http://www.ala.org/ala/acrl/acrlissues/future/changingroles.htm (accessed April 22, 2007).

[v] See: David W. Lewis, "What if Libraries Are Artifact-Bound Institutions?" *Information Technology and Libraries* 17(Dec. 1998):191-197, available at: https://idea.iupui.edu/dspace/handle/1805/434 (accessed April 22, 2007).

[vi] See: David W. Lewis. "*The Innovator's Dilemma*: Disruptive Change and Academic Libraries," *Library Administration & Management* 18(Spring 2004):68-74, available at: https://idea.iupui.edu/dspace/handle/1805/173 (accessed April 22, 2007).

[vii] Roger C. Schonfeld, Donald W. King, Ann Okerson, and Eileen Gifford Fenton*, The Nonsubscription Side of Periodicals: Changes in Library Operations and Costs between Print and Electronic Formats*, Council on Library and Information Resources Report 127, June 2004, available at: http://www.clir.org/pubs/abstract/pub127abst.html (accessed April 22, 2007). A summary of the results is reported in: Roger C. Schonfeld and Eileen Gifford Fenton, "Digital Savings," *Library Journal* 130(March 1, 2005):50-1.

[viii] See: Judith C. Russell, "Remarks of Superintendent of Documents Judith C. Russell," Depository Library Council Meeting, Albuquerque, New Mexico, April 17, 2005, page 7, available at: http://www.gpoaccess.gov/about/speeches/jrussell_gpo_update.pdf (accessed April 22, 2007).

[ix] See: Atifa Rawan and Cheryl Knott Malone, "A Virtual Depository: The Arizona Project," *The Reference Librarian* 94(2006):5-18.

[x] See: Lynn Sutton, "Collaborating with Our Patrons: Letting the Users Select," ACRL Eleventh National Conference April 10ñ13, 2003, Charlotte, North Carolina, available at: http://www.ala.org/ala/acrl/acrlevents/lsutton.PDF (accessed April 22, 2007). Similar conclusions can be reached by reworking the data presented in Justin Littman and Lynn Silipigni Connaway, "A Circulation Analysis of Print Books and E-Books in an Academic Research Library," *Library Resources & Technical Services* 48(October 2004):256-62.

[xi] See for example: Willis E. Bridegam, *A Collaborative Approach to Collection Storage: The Five-College Library Depository*, Council on Library and Information Resources Report 97 June 2001, available at: http://www.clir.org/pubs/abstract/pub97abst.html (accessed April 22, 2007); Bernard F. Reilly, Jr. and Barbara DesRosiers, *Developing Print Repositories: Models for Shared Preservation and* Access, Council on Library and Information Resources Report 117 June 2003, available at: http://www.clir.org/pubs/abstract/pub117abst.html (accessed April 22, 2007); Scott Seaman, "High-Density Off-Site Storage: Document Delivery and Academic Library Research Collections," *Journal of Interlibrary Loan, Document Delivery & Information Supply* 13(2003):91-103, available at: http://www.haworthpress.com/store/E-Text/View_EText.asp?a=3&fn=J110v13n03_05&i=3&s=J110&v=13 (accessed April 22, 2007), and Ann MacKay Snowman, "The Penn State Annex: The Life and Times of an Off-Site Storage Facility," *Collection Management* 30(2005):45-53.

[xii] See: John Burger, Paul M. Gherman, and Flo Wilson, "ASERL's Virtual Storage/Preservation Concept," ACRL Twelfth National Conference, Minneapolis, Minnesota, April 7–10, 2005, Minneapolis, Minnesota, available at: http://www.ala.org/ala/acrl/acrlevents/burger-etal05.pdf (accessed April 22, 2007), and Lynn Silipigni Connaway, Edward T. O'Neill, and Chandra Prabha, "*Last Copies*: What's at Risk?," *College & Research Libraries* 67(July 2006):370-9, a preprint version of the paper is available at: http://www.oclc.org/research/publications/archive/2006/connaway-crl07.pdf (accessed April 22, 2007).

[xiii] "Originally conceived by William G. Bowen, President of The Andrew W. Mellon Foundation, JSTOR began as an effort to ease the increasing problems faced by libraries seeking to provide adequate stack space for the long runs of backfiles of scholarly journals." From the "History of JSTOR" page on the JSTOR Website, http://www.jstor.org/about/background.html (accessed April 22, 2007).

[xiv] An outline of the program can be found at the Academic Libraries of Indiana website at: http://ali.bsu.edu/ (accessed April 22, 2007).

xv There is a large quantity of information on Information Commons available. A Google search on "library information commons" is a good start. See also: Joan K. Lippincott, "Linking the Information Commons to Learning," in *Learning Spaces: An EDUCAUSE e-Book*, edited by Diane G. Oblinger, Washington, D.C.: EDUCAUSE, 2006, available at: http://www.educause.edu/LearningSpaces/10569 (accessed April 22, 2007); the papers from the "Information Commons: Learning Space Beyond the Classroom: Leavey Library 2004 Conference," September 16 and 17, 2004, available at: http://www.usc.edu/libraries/locations/leavey/news/conference/presentations/ (accessed April 22, 2007) and "Collaborative Facilities" at: http://www.dartmouth.edu/%7Ecollab/index.html (accessed April 22, 2007). For a good summary of recent academic library building trends see: Harold B. Shill and Shawn Tonner, "Creating a Better Place: Physical Improvements in Academic Libraries, 1995-2002," *College & Research Libraries* 64(Nov. 2003):431-66 and Harold B. Shill and Shawn Tonner, "Does the Building Still Matter? Usage Patterns in New, Expanded, and Renovated Libraries, 1995-2002," *College & Research Libraries* 65(Mar. 2004):123-50.

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xvii Cathy De Rosa, *College Students' Perceptions of Libraries and Information Resources: A Report to the OCLC Membership A Companion Piece to Perceptions of Libraries and Information Resources,* Dublin, OH: OCLC Online Computer Library Center, Inc., 2006, available at: http://www.oclc.org/reports/perceptionscollege.htm (accessed April 22, 2007), page 6-3.

xviii *A Multi-Dimensional Framework for Academic Support: A Final Report*, Submitted to the Andrew W. Mellon Foundation From the University of Minnesota Libraries, June, 2006, available at: http://www.lib.umn.edu/about/mellon/docs.phtml (accessed April 22, 2007), page 56.

xix Rick Luce, personal e-mail communication, January 3, 2007.

xx The number of titles included in the *DOAJ: Directory of Open Access Journals* has increased by about 500 per year since it's founding in May of 2003, with 350 titles until December 2006 when it topped 2,500 titles. See *DOAJ* news reports at: http://www.doaj.org/doaj?func=loadTempl&templ=news (accessed April 22, 2007).

xxi The Open Citation Project maintains a good current bibliography of this work. It can be found at: http://opcit.eprints.org/oacitation-biblio.html (accessed April

22, 2007). As the introduction to the bibliography states, "Why might open access be of benefit to authors? One universally important factor for all authors is impact, typically measured by the number of times a paper is cited (some older studies have estimated monetary returns to authors from article publication via the role citations play in determining salaries). Recent studies have begun to show that open access increases impact."

xxii Alma Swan, "Open Access and the Progress of Science: The Power to Transform Research Communication May Be at Each Scientist's Fingertips," *American Scientist* 95(May-June 2007). Available at: http://www.americanscientist.org/template/AssetDetail/assetid/55131 (accessed April 22, 2007).

xxiii Peter Suber, "Open Access Overview," available at: http://www.earlham.edu/~peters/fos/overview.htm (accessed April 22, 2007).

xxiv A good analysis of this for journals is provided in Andrew Odlyzko, "The Economics of Electronic Journals," *First Monday* 2(Aug. 1997), available at: http://firstmonday.org/issues/issue2_8/odlyzko/index.html (accessed April 22, 2007).

xxv At this time it does not seem that many librarians are prepared to invest in the curation function. A recent survey by Palmer and Dill indicates that only 21% of librarians strongly agree that providing financial support for open access should be a library priority and only 13% strongly agree that existing resources should be reallocated to open access projects. See: Kristi L. Palmer and Emily Anne Dill, "Preaching to the Choir?: How Academic Librarians Really Feel About Open Access," *Electronic Resources & Libraries 2nd Annual Conference*, Atlanta, Ga. February 23, 2007. Available at: http://hdl.handle.net/1805/706 (accessed April 22, 2007).

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xxvii Daniel Greenstein, Adam Smith, and Danielle Tiedt, "The Library as Search Engine," *Chronicle of Higher Education* 53(Jan. 5, 2007):B24.

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xxxi Clayton M. Christensen, Heiner Baumann, Rudy Ruggles, and Thomas M. Sadtler, "Disruptive Innovation for Social Change," *Harvard Business Review* 84(Dec. 2006):94-101, page 94-96.