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Changing Operations of Academic Libraries

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Abstract

The article is an exploration of library operational adaptations to the changing technologies of information distribution and usage. The librarians present glimpses of the changes occurring in their library operations as they transition to services without print. The cadence of change particularly with respect to e-books continues to accelerate. The librarians summarize some of the technology changes of the last year and explore, through the evidence of their changing library operations, a range of topics including: trends in e-book "acquisition" and usage; developments in open access publishing; changes in consortia; and the role of librarians in instruction and evolving peer-review and publication processes.

A Very Brief History of the Word and Innovation, Allen McKiel

Jim Dooley, Robert Murdoch, and I have been presenting on the changing library operations at the Charleston Conference in panel mode for the past 5 or 6 years. I have generally started the presentations and discussions with an overview of some of the changes in the technical, political, business, and legal aspects of the information sphere that have occurred over the year and that have bearing on library operations. This year I decided to scan the long view of the human information sphere for patterns that provide a framework for viewing the current changes. The scan lightly touches and thematically packages the evolution of the spoken word, writing, the printing press, and finally, the Internet.

Symbolic language differentiates humans from animals by expediting social learning. Roughly 200,000 years ago modern humans appeared with language that facilitates social evolution through collective learning and innovation. Lev Vygotsky and Alexander Luria in the early 20th century studied infant chimp and human learning in order to better understand language and problem solving. "The forming of the complex human unity of speech and practical operations is the product of a deeply rooted process of development in which the subject's individual history is closely linked to his social history." (Lev Vygotsky and Alexander Luria. *Tool and symbol in child development*. Source: The Vygotsky Reader, edited by Jaan Valsiner and Rene van der.) Practical operations in human social learning require triangulation of two selves over problem solving. Human infants use the mother to problem-solve in a much more profound way than infant chimps use their mothers. Primates can be taught to use sign language with humans. They cannot use it with each other. The fundamental difference is the ability of humans to experience themselves in each other. Language develops from this recognition or unity of self with the other. The triangulation or dialog from two selves over problem-solving permits abstraction, ideation, and social learning, which provides for a much more robust dialectic for innovation and the development of larger and more complex social structures. Early humans developed social networks that negotiated tribal trade and territorial arrangements over hundreds of miles. Their cultures included arts, religion, life crafts for habitation, food gathering and preparation, and hierarchical organizational and communication structures for social order and problem solving.

A further expansion and complexity of human social environments emerged with the development of writing. Detailed information that is abstracted and preserved in writing facilitated the evolution of social and organizational structures capable of sustaining millions of

individuals. The written word facilitated the development through innovation of city states and empires, which require much more complex systems of organization and administration. Religious practices, governance structures, and technical and cultural knowledge evolved and were preserved in an increasing diversity of documentation and expression.

The limits of human social innovation were again given an increased level of expression with the development of the printing press. The cost of copying a manuscript or document dropped from the price of a high paid scribe for the time it took to write a page to the time it took to print the page. If legibly writing a page of a book without embellishments takes around 15 minutes, a 200 page book would take about 50 hours and cost roughly $2,500, given a rough parallel of the cost of a scribe with an average academic salary in higher education of $100,000 per annum. Printing the page once the movable type has been set takes less than a minute to copy dropping the cost to one fifteenth of the manuscript cost, or roughly $166. Given a few hundred years for innovation to streamline printing operations, the price drops to under $20.

The point is that the lower cost facilitated the proliferation of information and an increase in innovation through increased social learning. Accelerated innovation after the invention of the printing press facilitated a protestant reformation, scientific revolution, industrial revolution, and political revolutions that evolved the social, political, technical, and cultural infrastructure of modern global civilization.

A much more dramatic increase in the exchange of ideas has occurred with the advent of the Internet. A global information infrastructure is evolving that provides immediate access to the world's storehouse of information to an expanded subset of the world's population. The price of a producing a copy on the Internet is near zero in electronic format, and the cost of access continues to plummet. For example, the Indian government is subsidizing Android tables with cellular and Wi-Fi access to the Internet for about 100,000 students in a pilot program for engineering students. The cost of the tablet is

$40, and the students can purchase it for $20. If the pilot goes well, India is planning on increasing the program to include 5.86 million tablets. (Mims, Christopher. *Aakash 2: How a $20 tablet from India could blindside PC makers, educate billions and transform computing as we know it*. Atlantic (new business site: http://qz.com. Nov. 11, 2012).

The Internet has fundamentally changed the economics and use of as well as the expectations for the production and distribution of information. The cost of copies is approaching zero. The cost of the production, editing, peer review, and discovery of information continues to drop as information technologies evolve. The economies of scale will potentially pay for a lot more of everything at much reduced costs. There are 7 billion potential users of information at nearly zero additional costs for copying and distributing.

While this sets up expectations for impatient librarians of an information cornucopia, the exigencies of the current academic publication system circumscribe its immediate realization. A variety of formidable barriers exist. Among them, publishers need to be freed of print distribution. Electronic access will need to be ubiquitously adopted before publication need not incur the costs of both print and electronic distribution. Standards for presentation need to evolve. The technologies and methodologies of editing, formatting, peer review, and discovery will need to evolve to further drop the costs and expedite production and distribution. In the meantime we are likely to have a disruptive, complex, evolving model of distribution in which librarians will be trying to optimize access for dollars spent for their patrons' information needs. Optimization of the use of a blend of the various distribution models—big deals, individual electronic and print journal subscriptions, patron-driven acquisitions (PDA), and pay-per-view (PPV)—can help maximize content volume and minimize cost-per-use.

At Western Oregon University we have moved steadily toward an access rather than an acquisition model of collection development. By using the most efficient combination of the models available, we have increased the volume

of articles and books to which our faculty and students have access. As the content pool expands, the probability of a search term finding a relevant resource increases. Expanded discoverability has increased usage. Higher usage has decreased cost-per-use. Below are some numbers that demonstrate the strategy.

For journals, we have canceled individual print and electronic subscriptions when annual pay-per-view costs were lower to expand access to more e-journal titles via big deal subscriptions and pay-per-view. From 2008, when we started using pay-per-view, until 2012, we have increased 'holdings' (access) by 421% (from 27,265 to 114,989 titles) that faculty and students have access to in full text. The total costs for all modes of journal access dropped by 25% from $317,849 to $254,771. Article usage increased by 17% from 160,496 to 194,177. And, the cost-per-use dropped 51% from $1.98 to $1.31 per article.

Our print book collection contains just over 200,000 titles. We have added nearly 100,000 additional e-book titles through subscription and patron-driven access models. The most significant expansion of the book collection occurred through subscription. The subscription model provides increased title access at an average of $1.11 per additional title as part of the subscriptions. Last year, for example, vendors added over 18,000 titles to the subscriptions for just over $20,000 of subscription costs. Print purchases, on the other hand, averaged just over $80 per title last year. We added only 645 titles for over $52,000. Usage of the e-book collection is slightly favored over print. It accounts for 28% of total book usage and 26% of the cost.

Western also participates in the Orbis Cascade Alliance patron-driven access program in which all 37 member libraries are cooperatively purchasing e-books as one collection. The numbers for average cost-per-title available, cost-per-title purchased, and use are very tentative and shifting as the model evolves. For the initial year of the program, Western paid an average of 52 cents for access to the 13,463 titles available to our students and faculty through our catalog; $15.20

for each of the 460 titles that the Alliance purchased in perpetuity for all of us; and $35 for each access by Western faculty and staff.

Average cost for access is the lowest of any of the models Western uses to purchase access to e-books. It is also the lowest cost for purchasing access in perpetuity. The average cost per use, however, is slightly over the average cost we pay for e-journal articles via pay-per-view.

The strategy overall of moving to an optimization of access versus purchase model for Western Oregon University has resulted in increased resource access and usage with overall lower costs per use.

Digital Transformation and Its Impact on Changing Academic Library Operations, Robert Murdoch

In reviewing those things that have impacted and influenced changes in library operations at Brigham Young University, it became very clear that social, educational, technological, and commercial environments and other events which are connected to digital transformation have been the most impactful. It seems that every aspect of library services, associated library operations, and student, faculty, and staff interaction and expectations of the library are being shaped and transformed by technologies, products, and services that are digitally driven.

Like most academic libraries today, the composition of library resources being acquired by Brigham Young University has forever shifted. The selection and purchase of print materials no longer dominates library expenditures for resources, but rather today's collection development practices overwhelmingly favor purchasing and acquiring access to content and data that has either been created digitally or has been transformed from print into a digital format.

For the purpose of today's presentation I want to focus on seven operational changes connected to future library collection development and acquisitions directions.

Consolidated Collection Development Budgets

For years, our library has maintained a collection development budgeting model represented by a series of individual budget categories such as: Serials; Standing Orders; Firm Orders; Approval Books; Media; and so on. A specific percentage of the overall materials budget was assigned to these budgets. Subject Librarians and Bibliographers were expected to select and acquire library resources based on fairly ridged budgets and material type formulas.

Today our operations have changed in a direction that is erasing as many budget silos as possible. In place of the former budget categories and material type quotas, we have adopted a consolidated budget model. Under this budget model, librarians have been given the flexibility to purchase or subscribe to whatever information or data resource they determine most appropriate for their assigned subject areas and the needs of their student and faculty clientele. This model has offered several benefits:

- Reduction in budget silos;

- Greater flexibility in making selection decisions;

- Enhanced opportunity to set specific selection and acquisition priorities;

- Encourages independent thinking and decision making; and

- Improved accountability and stewardship.

Demand-Driven Acquisition Models

Demand Driven Acquisition Models have been formally adopted as important selection tools which have now been formally incorporated into BYU's collection development and acquisition operations.

The ever expanding universe of digital publishing is providing an environment in which new acquisition models can be explored and implemented. Like many academic libraries, Brigham Young University has experimented during the past several years with a variety of Demand Driven Acquisition (DDA) plans. Most recently, we concluded DDA pilot projects with YBP/ebrary and Elsevier.

In the YBP/ebrary model, a collection of 10,730 records and links to e-books was added to the library's catalog over a 24-month period. During that 24-month timeline, 451 e-books had been triggered by patron use for purchase.

The Elsevier DDA Model provided bibliographic records and access links to 1,847 e-books (publishing dates: 2008-2011). For a specified dollar amount, this model granted library patrons unlimited access to the entire collection of books with no DRM restrictions for a 12-month access period. At the conclusion of the access period, the library used the specified dollar spend amount to purchase 230 e-books from the original 1,847 book collection.

In short, DDA for e-books is providing immediate access to desired resources and allowing the library to repurpose funds that would traditionally have been spent on "just-in-case" resources, to purchase library materials that have a higher priority.

E-Book Preference and Acceptance

Patron preference for e-resources is influencing collection development directions.

Patron acceptance of e-books has increased significantly during the past 2 years. Surveys are showing that not only has the use of electronic books expanded considerably in a relatively brief time period, but that the percentage of library users who prefer using e-books over print monographs is increasing at a fairly steep rate. Library patrons are recognizing and appreciating the host of advantages of digitized content, which is pushing the demand for digital resources.

Advances in digital technologies are also playing an important role in influencing patron acceptance of e-resources. The popularity of the electronic tablets and e-book readers, in particular, is becoming a major factor in bringing about change in library collection building and acquisitions practices. At the same time publishers are becoming more flexible in allowing their publications to be "e-reader neutral" and are

beginning to minimize DRM boundaries, which adds to the motivation on the part of library patrons to prefer e-resources.

There is no reason to believe the trend toward patrons preferring e-resources will diminish. With this in mind, library operations have and will continue to change as we attempt to accommodate this evolution in digital content and publishing.

One-Time Purchases of Electronic Collections/Databases

The purchase of Electronic Collections and Databases is consuming a larger portion of collection development expenditures.

The number of outstanding digital collections and advances in sophisticated discover and search platforms are becoming more and more affordable and desirable. We are seeing increased interest on the part of subject librarians in directing material selection and purchase priorities towards database collections.

We are anticipating this trend to acquire commercially published digitalize collections will continue and even increase in the coming years. It is becoming more affordable for libraries to purchase outstanding subject-based collections of materials. In many cases, the content found in these databases is not restricted to text but rather images, audio-visual, and interactive content is being incorporated into many digital databases. Additionally, the value and appreciation of these databases is being recognized by faculty who are incorporating these resources into classroom curriculum and research and learning settings.

Consortia Cooperative Initiatives Acquisitions

Library operations at our institution continue to be impacted by involvement and memberships in library consortia. While membership in consortia has been a long-time practice and benefit, it appears that even greater participation in formal multi-library cooperatives and alliances will expand. Digital transformation within the academic library world is providing fertile ground and opportunities

for consortia to exploit institutional cooperation in a host of areas, such as:

- leveraging group purchases and host collective license agreement negotiations;

- crafting cooperative collection development and technical services partnerships;

- participating in open access and linking agreements;

- share collection development and library service metrics and other assessment tools and data; and

- participation in conservation, preservation, and print storage programs.

Media

The growing demand and use of media within higher education will have a tremendous impact on library services and operations.

The digitization of sound recordings and both static and moving visual images is one of the most rapidly growing collection areas in the library. Classroom instruction, laboratory instruction and training, case study scenarios, and simulation modeling are all taking a more prominent place in the academic curriculum and research setting. Library operations are beginning to change and adapt in order to more successfully integrate digitally formatted multimedia resources into library discovery, access, and delivery tools and systems.

Library operations are adjusting to better understand and implement the place audio-visual resources has in the academic environment. Issues such as multimedia use; licensing agreements; distribution and management rights; and acquisition issues, such as purchase/ subscription/open access require a growing amount of library operations' attention. Additionally, accommodating needs associated with streaming media and preservation are prominent and important factors impacting library operations.

Physical Library Collections vs. Linked Collections

Identifying and locating the library's collections within a set of specific boundaries is becoming almost impossible. The digital transformation of library resources is erasing the traditional concept of a library collection. For the foreseeable future, academic libraries will continue to acquire resources in physical formats but at a declining pace. As has been mentioned throughout this presentation, the majority of library collection expenditures are being directed to accessing digital resources. The growing make-up of the library collections is no longer tangible. Additionally, the vast majority of the library's digital resources do not even reside on local servers.

As this huge paradigm shift continues to expand, academic library operations and associated policies will need to change and adjust. The need and benefit to build and maintain library collections based on "just-in-case" models is evaporating. The need and benefit of a library "owning" as opposed to "accessing" needed information and data has never been questioned more than it is today. Initiatives such as Open Access Publishing, Hathi Trust, and Internet Archives are significantly changing how local library collections are being created, maintained, and perceived. As discussed earlier, DDA is having an extremely significant impact on the way library resources are acquired and when library collection resources are expended.

The steady decline in the pace in which physical library collections are growing coupled with expanding opportunities associated with cooperative print collection repositories, such as WEST, is significantly changing the complexion of how library space is currently being used or may be used in the future. The opportunity for library space to be used more as areas designed for learning, creativity, and collaboration is rapidly increasing. Less attention is being focused on the growth of physical collections and space management. Growth in virtual library resources and collections is enabling library operations to refocus spacing planning away from accommodating the collection to planning

agendas that are geared to accommodating the library user.

Changing Operations of Academic Libraries, Jim Dooley

Despite the national and state economic situation, the University of California, Merced continues to grow. In September 2012, enrollment reached 5,750 FTE, including 329 graduate students. At that time, the university administration announced a plan to grow the campus to 10,000 students, including 1,000 graduate students, by 2020 and to seek a Carnegie classification as a Research University-High Output in 2015. Building construction has resumed after a hiatus of several years resulting from the loss of over 2 billion dollars in state support for the University of California as a whole. An additional science building and a residence hall, along with a student services building, are currently under construction. The design of an additional classroom and academic office building is underway; the legislature will be asked to fund construction in 2013.

The growth of the campus continues to strain library budgets, services and facilities. The collection budget has not meaningfully increased since the University opened in 2005. As a result, it will soon no longer be possible to support new faculty and programs without cutting support for existing faculty and programs. The increasing size of the student body has resulted in increasing requests for library instruction resulting in workload issues for public services librarians. The increasing size of the student body has also resulted in increasing strain on the library physical facilities; over 70% of available seating is regularly occupied during afternoon and early evening times. In a real sense, these are all measures of success. At the same time they point to the necessity for campus-wide strategic planning to focus growth and to develop resources to support that growth.

During the past few years, several trends in research library collections and services have become apparent. The UC Merced Library has responded to some of these trends directly and to

others as a member of the University of California Libraries.

One significant trend is the increasing transition from print to electronic resources. Library collection development has expressly reflected this trend from the opening of the campus and library in 2005. In July 2012 the library reached a milestone with the one millionth bibliographic record added to the library catalogue. The proportion of electronic resources to print remains at 90% electronic to 10% print, and the collections budget has now reached the same proportions. Other research library collections are trending in this direction; although, few if any others have these proportions. Specifically, the collection includes 70,000 electronic journals and seven print journal subscriptions. There are slightly over 100,000 print books and over 800,000 electronic books (including electronic federal government documents) plus access to the 36 million volume University of California Libraries print collection through ILL. These proportions are unlikely to change significantly in the foreseeable future. There has never been a plan to achieve any particular percentage of electronic to print resources; the current percentages have evolved in response to user demand and changes in publishing patterns. The relative percentages do, however, reflect the conscious adoption of a "just-in-time" rather than a "just-in-case" approach to collection development. Almost all electronic journals and a significant number of electronic books are accessed through consortial agreements negotiated by the California Digital Library on behalf of all University of California campuses.

The library continues to employ DDA almost exclusively for the acquisition of e-books, maintaining plans with both EBL and MyiLibrary. Short Term Loans are a significant component of the EBL plan and are likely one reason the library has been a net ILL lender for the past 3 years. While there is not data to prove a causal relationship, it seems reasonable that the availability of a large number of e-books through DDA has contributed to a decrease in the borrowing of print titles through ILL. E-book usage has grown steadily and proportionally to the increase in the user population. Steps are currently underway to remove a large number of high-cost titles from the EBL plan in order to lessen the rate of growth in expenditures. At the same time, print circulation remains strong with a high percentage of titles circulating for an academic library collection. The library is maintaining its subscription to ebrary Academic Complete which provides low-cost access to a very large number of titles, as well as to Marcive Documents without Shelves, which enables the library to be an all-electronic Federal Depository Library. The University of California has implemented a print-on-demand service in cooperation with Hewlett Packard to make available print copies of all public domain works in HathiTrust held by the University of California Libraries.

Cloud-based computing and the use of web services have also become important to research libraries. In June 2012, the library replaced its previous integrated library system with OCLC WorldShare Management Systems. This decision was made by the UC Merced Library alone and may or may not be followed by other University of California Libraries in the future. Implementation was reasonably straight-forward, and the system is operating successfully.

Another trend is the increasing importance of what is often referred to as "Big Data." During the past year, the library has consciously tried to position itself as the principal campus resource for issues surrounding academic data curation. The library sees its role as that of serving as a broker between faculty and providers of data repository services, such as the California Digital Library Merritt repository and the San Diego Supercomputing Center, an organized research unit of the University of California, San Diego, rather than building and maintaining server farms on campus. In addition to the Merritt repository, the California Digital Library through its University of California Curation Center (UC3) also provides the EZID service to create and manage unique, persistent identifiers; the Web Archiving Service to capture and publish web sites and documents; and the DMP Tool to help researchers create and

manage data management plans (http://www.cdlib.org/services/uc3/).

In July the library hired its first Data Curation Librarian to provide technical expertise and outreach to faculty. An important role for this librarian is to assist faculty in meeting the data archiving and sharing requirements of funding agencies. Although the library is not an ARL member, it is participating in the second cohort of the DuraSpace/ARL/DLF E-Science Institute to develop a strategic agenda to support e-research at UC Merced. A team of librarians has conducted a self-study and interviews with key campus stakeholders. In December they will participate in a capstone event in Washington, D.C. to complete development of the strategic agenda.

In addition to the accelerating transition from print to electronic collections and the focus on digital curation, several other large-scale trends affecting academic libraries have become apparent in the past year. By "large-scale" is meant as activities beyond the scope of a single library or library system conducted at a regional, national, or even international level. These activities are underway due to the recognition by library leaders that the scope of the issues facing academic libraries requires large-scale, cooperative solutions.

The first trend is large-scale collection development. As of October 2012, 24 university libraries had contributed 10.5 million digital volumes to HathiTrust, 3.4 million of which were contributed by the University of California. 3.2 million of the total volumes are in the public domain. By any standard, this is a very large collection, equal to or greater than all but a handful of libraries world-wide. The recent dismissal of the Authors Guild suit against HathiTrust and several participating libraries (including the University of California) is a hopeful sign that the potential of the HathiTrust corpus can be realized. Details of HathiTrust services and development activities can be found at http://www.hathitrust.org.

Another example of large-scale collection development activity is the involvement of the Center for Research Libraries in the licensing of

digital resources. This will allow member libraries that are not in consortia to realize significant discounts over what they would have to pay if licensing singly. A somewhat similar development is the involvement of Lyrasis on behalf of ARL in the licensing of e-book packages. In both cases, discount tiers are based on the number of libraries participating in the offer.

A second trend is network-level print management. For many years, research libraries attempted to collect comprehensively using a "just in case" model. Although even the largest research libraries have abandoned the goal of comprehensiveness, the result is massive print collections with low levels of use occupying prime campus real estate. One solution has been off-site storage. The University of California has, for years, operated two multi-million volume storage facilities, the Northern and Southern Regional Library Facilities. Both are expected to be full within 2 to 4 years. Other universities with off-site storage facilities face similar situations. It has become obvious that this issue cannot be addressed by individual libraries, no matter how large, acting alone, but that a solution requires concerted action at a regional or even national level.

For many years JSTOR has provided libraries with digital access to serial back files maintained in distributed dark archives. This has allowed many libraries to withdraw duplicate print journal holdings with the knowledge that the journal issues are securely archived.

The Western Regional Storage Trust (WEST) is another initiative that seeks to address the archiving of print serials by creating a distributed, retrospective print journal archiving program. WEST comprises 109 academic libraries in 18 western states and is administered by the California Digital Library. Details of WEST activities can be found at http://www.cdlib.org/west.

At its Constitutional Convention in 2011, HathiTrust members approved investigating a program to archive print monographs at the national level. While the specifics are still under development, this initiative shows an awareness that the problem of duplicate print isn't limited to

serials and that any solution needs to be at a network level.

Another trend is the increasing importance of open access (OA) publishing and the involvement of libraries in hosting institutional repositories and assisting researchers by paying author fees for publication in OA journals. In 2012, faculty at the University of California, San Francisco passed an OA policy requiring deposit of articles in an institutional repository. Other campuses' Academic Senates are currently debating similar policies. In response, the California Digital Library is working to streamline submission of articles to UC eScholarship, the University of California institutional repository.

In 2008 the University of California, Berkeley began the Berkeley Research Impact Initiative as a cooperative program between the library and the Office of Research to pay author fees for publication in OA journals http://www.lib.berkeley.edu/brii. In 2013, the other nine UC campuses will begin a pilot program to fund author fees for OA journals. Some will fund publication in both full-OA and hybrid journals (where an individual article can be made open access in an otherwise subscription journal); others will initially only fund publication in journals that are completely open access.

Still another trend is the increasing emphasis on large-scale mass digitization of library collections. The work of Google/HathiTrust/Internet Archive, etc., in digitizing print monographs has already

been noted. Research libraries are also placing increased emphasis on digitization of their unique special collections holdings. Some of these initiatives are completely library funded and staffed; others are cooperative ventures involving commercial vendors. The University of California Collection Development Committee recently completed an inventory of special collections suitable for mass digitization. Work is now underway to prioritize the inventory and determine staffing and funding sources.

Another potential area for mass digitization is U.S. Federal Government documents, because they are voluminous, highly duplicated, and occupy substantial footprints in libraries. One barrier to mass digitization of Federal documents is the fact that a large number are under poor bibliographic control. As a result, libraries do not know the extent of their holdings which has resulted in widely varying estimates of the scope of the required work. In response HathiTrust has begun to create a Registry of U.S. Federal Documents as a first step to facilitating "collective action to create a comprehensive digital corpus of U.S. federal publications including those issued by GPO and other federal agencies" (http://www. hathitrust.org/usgovdocs_registry).

All of these trends will significantly affect research library planning for years to come. Addressing them will require both a level of cooperation among libraries not previously seen and the development of new skill sets by librarians and library staff.