

EDITORIAL BOARD

Editor and Chair

Mary Beth Weber, *Rutgers University*

Members

Julian Everett Allgood, *New York University*

David Banush, *Brown University*

Sian Dorian Brannon, *University of North Texas*

Barry Brown, *University of Montana*

Karen E. K. Brown, *State University of New York-Albany*

Steven B. Carrico, *University of Florida*

Christopher J. Cronin, *University of Chicago*

Nadine P. Ellero, *Auburn University*

Lisa B. German, *Penn State University*

Andrew S. Hart, *University of North Carolina at Chapel Hill*

Steven A. Knowlton, *University of Memphis*

Philip E. Schreur, *Stanford University*

Michele Seikel, *Oklahoma State University, Stillwater*

Anne M. Sleeman, *Community College of Baltimore County, Catonsville*

Lori Terrill, *University of Wyoming*

Lynn N. Wiley, *University of Illinois at Urbana-Champaign*

Virginia Kay Williams, *Wichita State University*

Oksana Zavalina, *University of North Texas*

Ex-Officio Members

Norm Medeiros, *Haverford College*
Book Review Editor, *LRTS*

Alice Pearman, *YBP*
Editor, *ALCTS News*

Charles Wilt, Executive Director,
ALCTS

The Future of *LRTS*



I am sure the title of my editorial has caught your attention and made you wonder about *LRTS*! *LRTS* is thriving and will continue to contribute to the professional literature for technical services. See the letter from ALCTS President Genevieve S. Owens and me in this issue for full details about *LRTS*' future.

I am pleased to report that *LRTS* operates at a green Open Access (OA) level. ALCTS members have expressed a desire for *LRTS* to be an OA journal. Unlike gold OA journals, which provide immediate and open access to articles, *LRTS* has an embargo period of less than one year. *LRTS* supports green OA because authors can self-archive their published papers in their institutional repositories for public use at no cost. The self-archiving policy is available at www.ala.org/alcts/resources/lrts/authinst; scroll down to the portion on copyright to see the permission statement.

Other news about *LRTS*:

- ALCTS has entered into an agreement with Portico to create a dark archive of the journal's back issues. See Portico's press release: www.portico.org/digital-preservation/news-events/news/general-news/the-american-library-association-to-preserve-e-journal-with-portico.
- ALA is collaborating with the University of Illinois to create an institutional repository (IR), ALAIR. ALAIR will provide a unified place for ALCTS to post public documents. A press release is available at www.ala.org/news/press-releases/2014/01/ala-creates-institutional-repository, and ALAIR is accessible at <https://alair.ala.org>.

I would like to highlight the contents of this issue of *LRTS*:

- Oksana Zavalina and Elena V. Vassilieva discuss the results of a comparative study of user search logs in two large-scale, domain-specific digital libraries, the National Science Digital Library and Opening History. Their study demonstrates varying levels of use of advanced search options and differences in the search query lengths, search query frequencies, and distribution of search categories in queries.
- Rebecca Mugridge addresses technical services assessment reporting a study she designed to explore assessment activities in Pennsylvania's academic libraries.
- Steven A. Knowlton provides an interesting look at the career of William E. Studwell and his quest to establish a subject cataloging code.
- Richard E. Sapon-White outlines the workflow developed at Oregon State University to address various e-book cataloging workflows.

I also note the passing of Birdie MacLennan, a former member of the *LRTS* Editorial Board and a published *LRTS* author, and also an active ALCTS member. Birdie started the discussion list Serialist when discussion lists were a new concept. The fact this list is still active and thriving is testament to her vision. And while her accomplishments, which included being a talented photographer and prolific scholar, were notable, Birdie remained approachable and unpretentious. She will be missed.

An Open Letter to ALCTS Members and *LRTS* Subscribers

Dear ALCTS Members and LRTS Subscribers,

We would like to take this opportunity to inform you of an important decision regarding *Library Resources and Technical Services (LRTS)*. We are proud to publish a quality peer-reviewed scholarly journal that features papers on cutting edge technologies and the latest developments in technical services to keep you informed and prepared to meet the challenges posed by the evolving nature of our profession. As you are aware, many long-standing journals have dropped their print editions and now publish in an e-only format. This pattern includes the ALA division publications *College & Research Libraries*, *ITAL*, and *RUSQ*. The big news is that ALCTS' flagship publication will transition to an electronic-only (e-only) publication over the coming year.

Following a thorough examination of *LRTS'* expenses and various publishing models, the ALCTS board of directors has voted to move to an e-only *LRTS*. This decision will realize considerable savings by eliminating printing and mailing costs. The shift to e-only will allow for even more timely delivery of content. *LRTS* will continue to follow its established publication schedule with four issues per year. We will retain the look and feel of the print, including the cover art that has become a standard feature. Readers will have the ability to print selected sections of each issue. Other features offered by an e-only *LRTS* are the ability to select articles for downloading or emailing. An e-only *LRTS* also provides an advanced search function, plus the ability to set up an alert for new issues and recommend articles or issues to colleagues via email. Consideration of moving to an e-only model for *LRTS* was investigated by the 2013 Emerging Leaders Team D, who submitted a report with three financial models and also addressed the issue of open access (OA).

Some issues to be considered during the transition to e-only include the following:

- Are page limitations for submissions a consideration in an e-only journal?
- What is the best mechanism to alert ALCTS members

and subscribers when new issues are available?

- Should new publishing models for submissions be considered that are compatible with an e-only publication?
- What impact might switching to e-only have readership and subscriptions?

The last issue of *LRTS* to be published simultaneously in print and electronically is volume 58, number 4 (October 2014). The first e-only issue will be volume 59, number 1 (January 2015). Our intent is to give you sufficient advance notice to make any preparations affecting your personal or institutional subscription. A year might seem like a long time, yet it is not in practical terms, and efforts to make this transition will begin immediately. We believe that starting a new year with the new publication model will enable a smooth transition.

The first issue of *LRTS* was published in 1957 and is available on the journal's website, as are all other previous issues up to volume 58, number 1 (January 2014). While there have been changes to *LRTS* over the years, moving from a print journal to a hybrid model and finally to e-only, we assure you that the mission and quality of content have remained constant. The first issue includes a piece titled "Introducing *LRTS*" and outlines how the journal began. Although that column was written in 1957, what was then written is applicable to the e-only model: "This is the first issue of a new magazine called *Library Resources and Technical Services*. To many readers there will be something familiar about it—and with reason. For it is an old friend in a new dress—or a new friend in an old dress, depending on the viewpoint."

Thank you for your continued support and readership of *LRTS*.

Sincerely,

Genevieve S. Owens
ALCTS President

Mary Beth Weber
Editor, *Library Resources
and Technical Services*

Understanding the Information Needs of Large-Scale Digital Library Users

Comparative Analysis of User Searching

Oksana Zavalina and Elena V. Vassilieva

This paper reports on the results of a comparative study of user search logs in two large-scale, domain-specific digital libraries functioning in the United States: the National Science Digital Library and Opening History. Results demonstrate varying levels of use of advanced search options and substantial differences in the search query lengths, search query frequencies, and distribution of search categories in queries. The empirical data on how the members of the target communities search can be used in deriving important information for domain-specific digital library developers' decisions regarding both the details of information organization and support of various search features.

A growing number of large-scale digital libraries, portals that aggregate millions of digitized or born-digital items of historical, cultural, or educational value that are organized into digital collections, have been developed in recent decades. While many of these large-scale digital libraries have been created for the general public, some serve more specific audiences of scholars and educators in different disciplines or domains, for example, history, science, technology, engineering, and mathematics (STEM), etc.

To improve user interaction with large-scale digital libraries and to make sure they successfully meet their users' information needs, the design and development of large-scale digital libraries' discovery and access systems should be informed by general user tasks such as finding, identifying, selecting, and obtaining information as well as by the needs and information-searching patterns of their specific intended user communities.¹ Various groups of users (e.g., researchers, educators, and enthusiasts) may use digital libraries differently because of their varying information needs; moreover, users' information-searching strategies may differ in the large-scale digital libraries that function in distinct domains, or subject areas. These differences may require specific policies regarding the organization and description of information objects in large-scale digital libraries.

The extensive digitization and organization of large-scale digital libraries require in-depth research of current trends in use of these emerging and rapidly developing resources. However, systematic investigation into the user searching

Dr. Oksana Zavalina (oksana.zavalina@unt.edu) is Associate Director, Interdisciplinary Information Science PhD Program and Assistant Professor, Department of Library and Information Sciences, College of Information, University of North Texas. **Dr. Elena V. Vassilieva** (elena.vassilieva@unt.edu) is an adjunct faculty member in the Department of Library and Information Sciences, College of Information, University of North Texas.

Submitted March 4, 2013; tentatively accepted May 6, 2013 pending modest revision; accepted for publication February 24, 2014.

in the context of large-scale digital libraries is in its infancy. In particular, virtually no research studies have compared user searching in domain-specific large-scale digital libraries. The study reported in this article sought to begin bridging this gap by answering the following research question: What are the differences and similarities in user searching behavior between the two large-scale digital libraries geared toward two different user groups? The results of this research could be useful for professionals applying cataloging practices and procedures for digital materials and addressing resource description and metadata for digital collections.

Literature Review

Large-Scale Digital Libraries Serving US History and STEM Education and Research

In the US, digitization of valuable information resources has been supported with federal and state funding for over fifteen years. The Institute of Museum and Library Services (IMLS) has awarded National Leadership Grants and Library Services and Technology Act grants to more than five hundred digitization projects of various scales since 1998.² The National Science Foundation (NSF) has funded more than three hundred STEM digital collections.³

To offer easy access to rich pools of information objects that are available in digital format because of efforts of hundreds of digitization projects over the years, large-scale digital libraries aggregate hundreds of separate collections and function as portals to these collections and the individual items contained in them. Large-scale digital libraries provide innovative solutions in transitioning learning and teaching to the digital platform.⁴ Many of these large-scale digital libraries were created for the general public (e.g., the European Library, and IMLS Digital Collections and Content). Others serve more specific audiences of educators, students, and scholars in different disciplines or domains.

Cultural heritage materials of historical and educational value, particularly resources about local and national history, have been a priority in mass digitization initiatives, especially in the early stages in 1990s and 2000s. Therefore many large-scale digital libraries were created for users in the domain of history. In the United States, many of them function at the state level (e.g., the Portal to Texas History; <http://texashistory.unt.edu>), some at the regional level (e.g., Mountain West Digital Library; <http://mwdl.org>), and several were created at the federal level. The American Memory (AM; <http://memory.loc.gov>) is without doubt the most well-known large-scale digital library in the US history domain. Although comparatively small in collection size, AM aggregates the most carefully selected information resources of the highest quality. This digital library was created by

the Library of Congress (LC), in cooperation with other cultural heritage institutions, in the mid-1990s with financial support from the IMLS.⁵ Similarly, IMLS funded creation of the Opening History (OH) digital library (<http://imlsdcc.grainger.uiuc.edu/history>). This digital library was a spin-off from the IMLS Digital Collections and Content (IMLS-DCC; <http://imlsdcc.grainger.uiuc.edu>) portal to all digital collections supported by IMLS, with the purpose of further developing the strongest content area in the IMLSDCC (US history) and providing access to it. OH's primary user group was broadly defined as history researchers, including both academic and nonacademic history scholars; teachers and students at undergraduate, graduate, and postgraduate levels; and genealogists and "citizen historians."⁶ OH functioned as a separate entity from October 2008 to July 2012 and quickly became the largest aggregation of digitized content in the United States with more than 1,500 digital collections and more than a million items. In August 2012, OH was absorbed by its parent digital library, IMLSDCC.

Another important domain served by large-scale digital libraries is STEM. In the past decade, STEM digital libraries became major players in STEM education.⁷ The NSDL (<http://nsdl.org>) was organized by the NSF in 2000 for administrators, educators, general public, learners, parents/guardians, professionals/practitioners, and researchers. As the demand for access to high-quality resources in the area of STEM education for teachers and learners grows, NSDL serves as a starting point to locate and retrieve these discipline-specific resources in a variety of formats for different learning levels.⁸ NSDL aggregates educational resources that are available online from a wide variety of providers. The majority of these resources are free, based on Open Educational Resource (OER) access. The resources are organized by educational level (from pre-kindergarten to higher education, including informal education and professional development education). They are grouped by resource type (assessment materials, audiovisual, instructional material, reference material, and other). Subject categories are STEM disciplines, e.g., Education, History/Policy/Law, and others, including a General subject section.⁹ The NSDL offers well-defined search, browse, and help instruments, which include keyword searching, browsing collections by subject area, combining search by broad subject area and audience, limiting search to new collections, etc.¹⁰ The NSDL serves not only as a resource repository, but also provides useful services and tools for professional development of educators and for network collaboration among the members of NSDL audiences.¹¹

To effectively deliver content of large-scale digital libraries to their respective user groups, improve users' interaction with digital libraries, and facilitate efficient information retrieval, digital library services must adjust to the evolving needs and information-seeking behavior patterns of

user groups in the online environment.¹² The following will provide a historical perspective on research into information searching and review the literature that addresses how users search for information in online environment.

User Searching: From Card Catalogs to Digital Libraries

People engage in searches to satisfy their information needs. Searching is one of the two major types of interactions between users and discovery and access systems such as library catalogs, databases, search engines, or digital libraries.¹³ User searching is expressed through queries: sets of one or more symbols (e.g., words or phrases) combined with other syntax and used as commands for the information retrieval system to locate potentially relevant content indexed by that system. The query is a key theoretical construct in both the information-retrieval systems research and the information searching behavior research fields.¹⁴ Figure 1 displays an example of a search query for “digital libraries” in one of the major search engines.

Many library catalog use studies, conducted in the 1930s to early 1970s and summarized by Krikelas in 1972, compared how traditional library card catalogs were searched and how different bibliographic description elements (fields) of the catalog card were used by library patrons.¹⁵ It was found that author, title, subject headings, call number, and date of publication were heavily consulted by users while place of publication, publisher, edition, and content notes tended to be consulted less often; size, series note, and illustration statement were of less interest to library users.

The early automated catalogs of 1970s, mostly due to hardware and software limitations, had less functionality than card catalogs and were used by and designed specifically for library staff trained in technology.¹⁶ Only in the early 1980s did end users receive direct access to public access catalogs. Largely because online catalogs brought in new affordances of “search capabilities indexing,” which include keyword searching, Boolean searching, truncation, and multi-index searching, users initially expressed much greater satisfaction with online catalogs than with traditional library card catalogs.¹⁷ Such patterns of user searching as the use of Boolean operators and controlled vocabulary in online catalogs were analyzed in many studies. Boolean searching was found to be ineffective, not only because the majority of library users—even highly educated ones—experienced difficulties with Boolean logic concepts, but also because the execution order of Boolean commands was not standardized across different online catalogs.¹⁸ Moreover, some research from the early 1990s found that performance is improved in systems that do not require Boolean operators for complex queries.¹⁹ Many studies demonstrated that users of online catalogs tend to use simple keyword searches more often than any type of advanced search that allows them to search

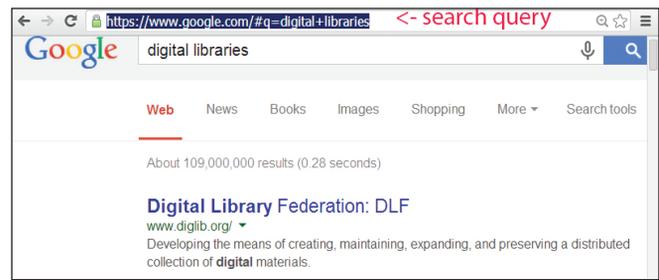


Figure 1. Example of a search query for “digital libraries” in one of the major search engines that automatically limits the number of retrieved results to 109,990

with controlled vocabulary terms.²⁰

Digital libraries have been developed since the late 1990s. User expectations of digital libraries were shaped by experiences with major easy-to-use search engines (predominantly Google), widely used transactional sites (e.g., Amazon and eBay), the popularity of computer games, and changes in the Western society in general: greater speed of developments, perceived need for immediate gratification, a more information-rich environment, and the popular heuristic of “satisficing” (i.e., an approach when the user is satisfied with “good enough” results that reach the minimum acceptability threshold by meeting some of the criteria and sacrificing other criteria).²¹ As a result, users typically expect much more from digital libraries than from conventional library services. These expectations include comprehensiveness, accessibility, immediate gratification, ease of use, and availability of data in multiple formats.²² Expectations of digital library services are often too high (although this is somewhat context-dependent) and are combined with a lack of appreciation of basic points, such as that digital library collections are created based on the knowledge of user groups’ needs.²³

A study released by British Library researchers in 2008 found that the main characteristics of user behavior include horizontal information seeking (a form of skimming activity, where searchers view just one or two pages from an academic site and then “bounce” out); extended navigation (people spend as much time finding their way around as actually viewing results); horizontal “power browsing” through titles, contents pages and abstracts; squirreling behavior, where the user saves information—particularly free content—in the form of downloads for later use but rarely revisits it; and little time spent in evaluating information.²⁴

Domain Knowledge and User Searching

The term *domain knowledge* was first coined in 1991 by Allen, who found that information-seeking behavior (i.e., selection of search strategy and tactics) and the outcomes of the search depend to a large extent on a searcher’s level of

knowledge both on a specific search topic and the broader subject domain.²⁵ This observation was confirmed by numerous other studies. Researchers found that domain experts focus on the answers to search questions and have clear expectations for both the answer and the context in which it would appear.²⁶ For example, digital library user expectations, including “collection expectation”—an expectation that certain kinds of resources and information would be found in library or academic sources and not in search engines—differ by user domain and level of expertise.²⁷

Another important finding is that search tactics used by students change over time: as students acquire more domain knowledge on their research topic, they start to use wider and more specific vocabulary in their subject search.²⁸ Studies show that when the domain knowledge is low, higher numbers of searches per session occur because of an inability to initially choose appropriate terms; more domain-knowledgeable students use advanced search options more but make fewer changes to their searches.²⁹ It was also found that with an increase in the level of domain knowledge, users tend to use more terms in queries; domain experts use more effective strategy, conduct more complex searches, and incorporate more unique terms.³⁰

Many studies considered how representatives of a specific domain or discipline search for information. Studies have shown that scientists’ searching is usually aimed at specific questions or problems that they face when conducting an experiment, writing up results, or checking the accuracy of information in hand.³¹ Humanities researchers with high domain knowledge were found to use a variety of search types, with known author-title search being the least problematic. Success in more uncertain types of searches (e.g., a conceptual/discipline term search) was found to heavily depend on the level of the searcher’s domain knowledge and experience in using a particular digital library. Subject classifications were almost never used by academic searchers because the scholars’ conceptual models usually differed from that represented in the classification scheme.³²

Digital library users—humanities and social science researchers—were found to prefer searching to browsing, and some explained this by the lack of call number browsing capabilities in a digital library environment.³³ The users—both students and scholars—in these domains have been found to actively use timeline and chronological browsing, and interactive map browsing, and express the need for search limit by date.³⁴

Researchers also analyzed for what the users of information systems—in particular, scholars (i.e., domain experts)—search. Previous studies of web searching discovered, for example, that humanities scholars most often include in their search queries personal names, geographic names, chronological terms, and discipline terms. As shown by other studies, water quality researchers frequently use topical,

geographical, and format or genre search terms, and occasionally, chemical formulas, dates, names, and URLs. Medical researchers’ prevailing search query types were found to include laboratory/test results, disease/syndrome, body part/organ/organ component, pharmacological substance, or diagnostic procedure.³⁵

The user base for domain-independent information systems that are aimed at a broad user audience tends to include more novice than expert users, while the audience of domain-specific information systems that are aimed at the users in certain domain (e.g., history, science) typically includes a higher proportion of domain experts. The studies discussed above analyzed information seeking behavior of the users of domain-independent and domain-specific information systems of more traditional types: bibliographic databases, including library catalogs, and some web search engines. However, information seeking by users in either domain-specific or domain-independent information systems of the new type—openly accessible large-scale digital libraries comprising of digitized and born-digital, high-quality content for education and research—has not been previously researched and compared.

Transaction Log Analysis Studies of User Searching

Transaction logs recorded by the servers of information retrieval systems provide a wealth of data for analysis of various patterns of user information seeking expressed through queries. Transaction log analysis—“the study of electronically recorded interactions between online information retrieval systems and the persons who search for the information found in those systems”—is one of the methods actively used for unobtrusive observation of user behavior in various information retrieval systems.³⁶ For example, Markey’s summary of research results of the studies into information seeking behavior conducted over the period of 25 years, demonstrates that many of these studies used transaction log analysis method.³⁷ Transaction log data are often analyzed quantitatively. For example, Jansen, Spink, and Pedersen compared search query length and Boolean usage rates in different digital collections.³⁸ Moulaison studied transaction logs and analyzed queries by the users of a college online public access catalog and indicated that the number of terms included in a search (a query length) and the number of search limits can serve as “measures of search complexity” and a way of “documenting the sophistication of the queries.”³⁹ Transaction log analysis is frequently used in qualitative analysis. Several studies categorized web search queries into topical categories applying qualitative methods of research.⁴⁰

Despite the popularity of transaction log analysis as a research method for studying user information-seeking behavior, the potential of transaction log analysis has not

been used to its full capacity to benefit large-scale digital libraries' development. Several published earlier studies have analyzed transaction logs of domain-specific, large-scale digital libraries such as the NSDL, AM, OH, or domain-independent, large-scale digital libraries such as IMLS DCC or the European Library.⁴¹ However, only two of these studies examined the content of the user search queries.⁴² Moreover, the user search queries in the various types of digital libraries aimed at different user communities have not been previously compared.

The study reported in this paper addresses this gap through a mixed-method comparative analysis of transaction log data for patterns of user searching in two representative domain-specific, large-scale digital libraries: OH and NSDL.

Research Method

While some large-scale digital libraries regularly collect transaction log data, others do not. Moreover, a variety of tools and methods are used to record transaction log data, which significantly complicates comparative analysis. To ensure a meaningful comparison, the decision was made to seek transaction log datasets collected using the same application. Two large-scale digital libraries that had collected transaction log data using the Google Analytics application as of January 1, 2010, and had made that data available to the researchers in late 2011—the NSDL and the OH portal—were selected as the targets of this investigation. All of the user search queries in these two large-scale digital libraries during the one-year period between January 1 and December 31, 2010, were included in the analysis.

The transaction log data collected by the Google Analytics application were imported into Microsoft Excel spreadsheet files for further analysis. A total of 28,531 non-empty search queries (i.e., the search queries that not only contained a search page URL and a search command, as in <http://nsdl.org/search/?verb=Search&q=&submitButton=Search>—but also contained a string of characters identifying the specific search term(s) used in the search, as in <http://nsdl.org/search/?verb=search&q=sharks=&submitButton=Search>) were identified in the log samples. Many of the more popular search terms occurred more than once, so identical queries were grouped together and folded into unique search queries for each of the two domain-specific digital libraries. For example, if the Google Analytics search log file for a digital library contained five instances of user(s) searching with the same search term (e.g., “clouds”) at different points in time, for the purposes of further analysis, the authors counted them as a single unique search query “clouds” with five instances, or with a query frequency value of 5. This resulted in 13,965 unique search queries: 2,551 in OH and 11,414 in the NSDL.

Both quantitative and qualitative characteristics of user searching were assessed. Frequencies of occurrence (total and mean) were measured for basic and advanced search approaches. Variability measures—variance and standard deviation—were also assessed. In addition, query length and query frequency indicators were measured using traditional definitions and approaches applied in transaction log analysis studies as suggested by Spink et al., query length was measured as the number of words in a query, and query frequency was measured as the number of times a query appears in the dataset.⁴³

Unique search queries were categorized into ten search categories. These coding categories included seven bibliographic entities from three groups of entities in the Functional Requirements for Bibliographic References (FRBR) model—*work* entity from Group 1 (resource entities), *person* and *corporate body* entities from Group 2 (agent entities), and *concept*, *object*, *event*, and *place* entities from Group 3 (subject entities). One entity from the Functional Requirements for Authority Data (FRAD) model—*family*—was also adopted as a coding category. The researchers adopted the following definitions for the search categories from definitions of FRBR and FRAD entities:

- *work*—“a distinct intellectual or artistic creation.”⁴⁴
- *person*—“an individual . . . encompasses individuals that are deceased as well as those that are living” and “includes personas established or adopted by an individual through the use of more than one name (e.g., the individual’s real name and/or one or more pseudonyms), includes personas established or adopted jointly by two or more individuals (e.g., Ellery Queen—joint pseudonym of Frederic Dannay and Manfred B. Lee). Includes *personas* established or adopted by a group (e.g., Betty Crocker).”⁴⁵
- *family*—“two or more persons related by birth, marriage, adoption, or similar legal status, or otherwise present themselves as a family. Includes royal families, dynasties, houses of nobility, etc. Includes patriarchies and matriarchies. Includes groups of individuals sharing a common ancestral lineage. Includes family units (parents, children, grandchildren, etc.). Includes the successive holders of a title in a house of nobility, viewed collectively (e.g., Dukes of Norfolk).”⁴⁶
- *corporate body*—“an organization or group of individuals and/or organizations acting as a unit, encompasses organizations and groups of individuals and/or organizations that are identified by a particular name.”⁴⁷
- *concept*—“an abstract notion or idea . . . encompasses a comprehensive range of abstractions that may be the subject of a *work*: fields of knowledge, disciplines,

schools of thought (philosophies, religions, political ideologies, etc.), theories, processes, techniques, practices, etc. A *concept* may be broad in nature or narrowly defined and precise.”⁴⁸

- *object*—“a material thing . . . encompasses a comprehensive range of material things that may be the subject of a *work*: animate and inanimate objects occurring in nature, fixed, movable, and moving objects that are the product of human creation, objects that no longer exist.”⁴⁹
- *event*—“an action or occurrence . . . encompasses a comprehensive range of actions and occurrences that may be the subject of a work: historical events, epochs, periods of time, etc.”⁵⁰
- *place*—“a location . . . encompasses a comprehensive range of locations: terrestrial and extra-terrestrial, historical and contemporary, geographic features and geo-political jurisdictions.”⁵¹

The coding categories included only one entity—*work*—out of four FRBR family of models’ Group 1 (resource entities) categories that include *work*, *expression*, *manifestation*, and *item*. Despite the benefits of search log analysis as an unobtrusive method of observation, one of its limitations is the impossibility to detect from the user’s search query what exactly the user is expecting to find any instance of a *work*, its particular *expression* (e.g., Spanish translation), *manifestation* (e.g., 2nd edition), or a specific digital *item*/copy embodying the work. For this reason, only the broadest FRBR Group 1 entity—*work*—was adopted as a search category for this analysis.

In addition to the eight search categories listed above, two more search categories were used in this study: *class of persons* and *ethnic group*; they were derived from the earlier study by the first author of this paper.⁵² The following definitions were used for these search categories:

- *ethnic group*—people of the same race or nationality who share a distinctive culture (e.g., Irish Americans, Sioux Indian, Basque).
- *class of persons*—a group of people who shares common attributes, characteristics, qualities, or traits other than race or nationality (e.g., children, graphic designers, prisoners).

Polysemic user search queries (i.e., search queries using the words that can have multiple meanings) were assigned to multiple categories. For example, a polysemic search query “network” was categorized as a *concept* (a network in abstract sense, e.g., social network, Internet, etc.) and an *object* (a physical network, e.g., fish net, spider web, etc.) while another polysemic search query “cologne” was categorized as as an *object* (perfume type) and a place (a

city in Germany). Most phrase queries also belonged to multiple categories. For example a “two eagles cherokee” query was categorized as *object*, *person*, and *ethnic group* while an “Atlanta 1864 map” query was categorized as *place*, *event*, and *object*. Whenever possible, search queries formulated in languages other than English were translated and categorized into appropriate search categories, e.g., German-language query “Anti faschisten,” which translates as “anti-fascists,” was placed into the *class of people* category, the French-language search query “revolution français,” which means “French revolution,” was categorized as an *event* search.

To assure that the results of the analysis were not “skewed by a single coder’s subjective judgment and bias,” this research employed two coders.⁵³ The first author of this paper coded all of the 13,965 unique search queries in this dataset. A subset of 18.8 percent of unique search queries—10.51 percent of the NSDL dataset and 55.89 percent of the OH dataset—was coded by the second author. In the coding process, the authors worked independently of each other and applied the same coding instructions to the same subsets of the units of analysis.⁵⁴ A detailed coding manual was developed to support coding activity; it included definitions and examples for each of the coding categories, along with other guidelines. The method had been originally developed and tested by the first author in the study on a sample of 500 search queries and later refined and tested in the study on a sample of 1,200 search queries.⁵⁵ For example, the revised coding manual recommended categorizing the names of diseases and medical conditions—which often occurred in NSDL search queries—as *concept* searches if the affected organ was not explicitly indicated in the search query (e.g., “pneumonia”), as *concept* and *object* searches if the organ was named (e.g., “kidney dysfunction”) or if the pathogen causing disease was named in the query (e.g., “adenovirus common cold”), and as *concept* and *person* if the disease or condition name included the name of the person who first found or described it (e.g., “Down syndrome”).

To establish the reliability of the coding measures, one must examine the similarities and differences in the coders’ results and assess the “amount of agreement or correspondence among two or more coders” in coding (i.e., to measure intercoder agreement, also often referred to as intercoder reliability).⁵⁶ To ensure that the findings of content analysis are reliable, it is generally recommended to measure intercoder agreement not only as a percentage (as in “two coders agreed with each other in categorizing 83 percent of search terms”), but also using one of the much more complex coefficients (e.g., Cohen’s Kappa), which are usually calculated with the help of statistical software packages such as SPSS, SAS, etc. An intercoder agreement coefficient of .90 or greater is considered acceptable to all, and one of .80 or higher is acceptable to most situations.⁵⁷

In the study presented in this paper, a strong intercoder agreement—97.02 percent or Cohen's Kappa of .877 for the NSDL dataset and 99.40 percent or Cohen's Kappa of .976 for the OH dataset—was observed.

At the time of data collection, the NSDL—one of the pioneering digital libraries launched in 2000—was an established and widely used digital library, while OH—created almost a decade later, in 2008—was not yet as widely known to its potential users. A considerable difference in the levels of use of the two digital libraries resulted in an almost fivefold difference in sample sizes between the two digital libraries. To minimize the risk of uneven sample sizes skewing the study results regarding search query frequencies, particularly in relation to the fraction of queries that occurred only once, the authors of this paper decided to analyze and report relative numbers, or percentages (e.g., “30 percent of search queries in the A digital library and 35 percent of search queries in the B digital library had a query frequency of X or more”) rather than absolute numbers (e.g., “50 search queries in the A digital library and 320 of search queries in the B digital library had a query frequency of X or more”) whenever possible.

In addition, to make sure that differences or similarities observed in user searching between the two digital libraries of different domains did not occur by chance and are therefore real and worth considering in digital library development, the statistical significance of the comparative analysis findings was assessed. The most widely used method of assessment of statistical significance, which is considered appropriate for most types of data, is the t-test. When the t-test is not appropriate—for example, for binary data, where only two values (e.g., yes or 1, and no or 0) are possible, other methods of assessment (e.g., Chi-square test) are used. The authors of this paper used the t-test whenever applicable and substituted it with the Chi-square test as needed. In this study, a t-test was used to assess the statistical significance of the results for search query length, search query frequency, and number of search categories per search query; a Chi-square test was used to assess the statistical significance of the results for the frequencies of selection of advanced and basic search approaches and for the inclusion of particular search categories in users' search queries.

The values of a t-test and Chi-square test are most often calculated with the help of statistical software packages using complex formulae; researchers have to preset the values for probability of error level (p) and degrees of freedom (df) before this calculation. These values are also necessary to interpret the results of the t-test and Chi-square test with the help of special tables developed by statisticians and to determine whether the findings are statistically significant. Usually, a probability of error level of .01 ($p < .01$), which means that a finding has a 99 percent chance of being true,

is considered appropriate for establishing the statistical significance of research results with either the t-test or the Chi-square test. In this study, a probability of error level of .01 was used both in t-tests and in Chi-square tests. The degree of freedom for t-test is set based on the number of observations (e.g., search queries) and calculated as the number of observations minus 2. If the data are binary, like in the case with some of the data used in this research, the degree of freedom for a Chi-square test is set as 1. For t-tests with a probability of error level $p < .01$ and large value (i.e., more than 29) for degree of freedom, the value of a t-test over 2.575 indicates that the finding is statistically significant. For Chi-square tests with a probability of error level $p < .01$ and the degrees of freedom value $df = 1$, the value of a Chi-square test over 6.635 indicates that the finding is statistically significant. In the “Findings and Discussion” section of this paper, results of the t-test are reported as the value of t-test ($t = X$) calculated by the SPSS statistical software application, followed by the preset value of degrees of freedom ($df = Y$), and the preset value of probability of error level ($p < Z$), where X, Y, and Z are the specific numbers; for example, as “ $t = 8.09$, $df = 13963$, $p < .01$.” The results of the Chi-square test are reported the same way, with the value of Chi-square test shown as Chi-square = X (for example, as “Chi-square = 567.5135, $df = 1$, $p < .01$ ”).

Findings and Discussion

User Search Approaches

Figure 2 displays search options that were enabled in the OH large-scale digital library at the time of this study. There were two types of item-level search where the user searches for individual information objects. The basic version of *search for items* allowed searching by keyword or phrase anywhere in item-level metadata records that describe individual items. The advanced version of *search for items* allowed searching by keyword or phrase anywhere in item-level metadata records, the faceted searching (i.e., a search in specific field(s) of the metadata record) by author/artist's last name and/or by title/subject word(s), with a possibility to combine search fields and to limit results to specific digital collections selected from the dropdown menu. OH also thoughtfully provided its users with two collection-level search options to accommodate users interested in finding entire collections as opposed to individual items. The basic version of *search collections* allowed for a simple keyword search in all fields in collection-level metadata records that describe the collection of items as whole as opposed to individual items. The advanced version of *search collections* option augmented a simple keyword search in all fields in collection-level metadata records with a possibility to limit

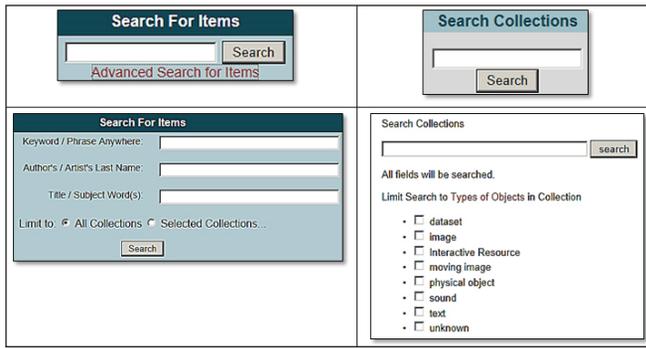


Figure 2. Search options in Opening History

search results to collections containing one or more of eight resource types: dataset, interactive resource, physical object, text, image, moving image, and sound.

Figure 3 shows the search options enabled in the NSDL. There is one simple keyword search window, with a possibility to limit search results using one or more of the seven education levels, one or more of the twelve resource types, and one or more of the fourteen broad subject areas. The NSDL does not provide separate search options for advanced item-level search in specific fields of a metadata record (i.e., faceted search) or for collection-level search.

As shown in table 1, most of the search queries in both digital libraries were basic keyword searches, although the percentage of basic keyword searches was significantly higher in OH. The use of various advanced search options was observed in fewer than 15 percent of search queries in OH but in almost 40 percent of search queries in the NSDL. Hence the users of the NSDL engaged in advanced searches much more often than OH users (Chi-square = 1001.602, $df = 1$, $p < .01$).

Table 2 shows the use of advanced search options in two digital libraries in more detail. Both digital libraries allow the use of various search limits as part of advanced searching (e.g., limit search results to certain collections or by certain object types or audiences). These limits were used in 12.58 percent of search queries in the OH sample. More than a third (38.28 percent) of search queries in the NSDL sample included one or more of search limits. Faceted search queries are the advanced search queries in which the user is allowed to search for matches in specific fields of metadata records. OH users had an option to search by author or by title and subject words. Faceted searching was observed in a small proportion (0.61 percent) of the OH search queries in the sample but not at all in the NSDL sample, which is explained by the absence of faceted search options in this digital library. Use of another advanced search feature—quotes for bound phrases (as in the “‘climate change’ and water” NSDL query or in the “‘John Cobb’ Bonneville” OH query)—was also observed infrequently (1.32 percent of search queries in OH

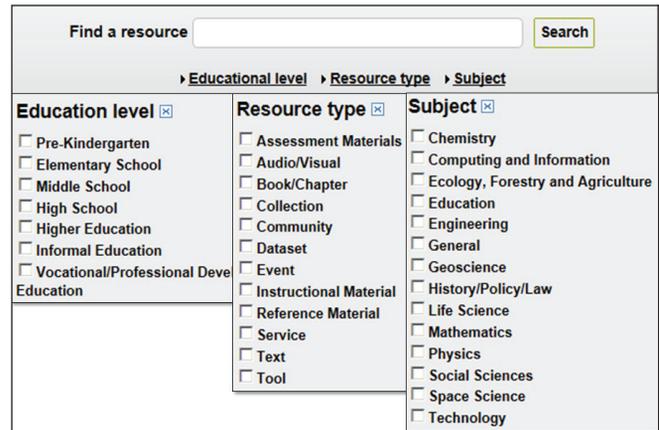


Figure 3. Search options in the National Science Digital Library

Table 1. Search approaches by digital library (observed frequencies)

Search approach	NSDL	OH	Total
Basic	14,665	3,823	18,488
Advanced	9,406	647	10,053
Total	24,071	4,460	28,531

Chi-square = 1001.602, $df = 1$, $p < .01$

Table 2. Search approaches: details ($N = 28,531$)

Search approach	NSDL	OH
Basic keyword search	60.92%	85.49%
Advanced search, including:	39.08%	14.51%
Search limit (audience, collection, genre, etc.)	38.28%	12.58%
Faceted search (e.g., search in author field)	—	0.61%
Bound phrase search	0.79%	1.32%

and 0.79 percent of search queries in NSDL).

Search Query Lengths

Search query length is defined as the number of words in the query. For example, the query length of the “national parks” query is two, while the query length of the “John White’s narrative of the 1587 Virginia voyage” query is eight. Almost half of user search queries (47 percent) in the OH sample but only 29 percent of users’ search queries in the NSDL sample consisted of a single word. As shown in table 3, the search queries of the NSDL users varies more widely in length than those of OH users, which is demonstrated by higher variability—both variance (4.14 as compared to 2.58) and standard deviation (2.03 as compared to 1.61).

Table 3. Search query length ($N = 13,965$)

	NSDL	OH
Number of observations	11,414	2,551
Mean	2.66	2.36
Standard deviation	2.03	1.61
Variance	4.14	2.58

$t = 8.09$, $df = 13963$, $p < .01$

For OH, the search query length ranged from 1 to 13 words per query, while the NSDL range was much more considerable: 1 to 53 words. Search queries in NSDL were found, with statistical significance ($t = 8.09$, $df = 13963$, $p < .01$), to NSDL to tend to contain more words than search queries in OH. The average NSDL search query length (2.66 words) was found to be shorter than the average OH search query length (2.36 words).

Search Query Frequencies

Search query frequency is the number of times certain identical queries are found in the transaction log dataset in a digital library. For example, a query “Wisconsin statehood” occurs only once over the period of twelve months in the OH sample, thus its query frequency equals 1; a query “planting” occurs six times in the same sample, thus its query frequency equals 6. Similarly, a query “Ohm’s law water” occurs four times over the period of twelve months in the NSDL sample, thus its query frequency equals 4; a query “anticoagulant properties of snake venom” occurs eleven times in the same sample, thus its query frequency equals 11. This study revealed, with statistical significance ($t = 21.89$, $df = 13963$, $p < .01$), that the search queries of the NSDL users occurred more frequently than the search queries of OH users. As shown in table 4, the average NSDL search query frequency (6.54) was found to be considerably higher than the average OH search query frequency (1.75).

Query frequency had a much higher variability in NSDL search queries than in OH search queries—both in variance (534 compared to 2.76) and in standard deviation (23.1 compared to 1.66). In OH, all of the search queries occurred between 1 and 25 times. Similarly, in NSDL, the vast majority of search queries (97.28 percent) occurred between 1 and 25 times. Although some NSDL queries (e.g., “chemistry,” “relativity and Einstein,” “photosynthesis” etc.) occurred as often as 100 to 885 times their proportion in the total dataset was minuscule, measured in tiny fractions of a percent. Therefore the detailed analysis of search query frequency, results of which are presented in figure 4, focused around search queries that constituted at least 0.01 percent of all search queries in either digital library, i.e., the queries that ranged in query frequency from 1 to 25 (percentage

Table 4. Search query frequency ($N = 13,965$)

	NSDL	OH
Number of observations	11,414	2,551
Mean	6.54	1.75
Standard deviation	23.1	1.66
Variance	534	2.76

$t = 21.8926$, $df = 13963$, $p < .01$

values that are below 0.01 percent are not shown on figure 4). Two-thirds (65.7 percent) of search queries in OH and almost a half (48.55 percent) of search queries in NSDL occurred only once in their respective search log samples. While the number of search queries with frequencies of 1, 11, 12, 13, 14, 16, 19, 20, and 25 were higher in the OH search log sample, search queries with frequencies of 2, 3, 4, 5, 6, 7, 8, 9, and 10 were more common in the NSDL search log sample.

Search Categories

As discussed above, in the categorization of user search queries, the following categories were used: *work*, *person*, *family*, *corporate body*, *concept*, *object*, *event*, *place*, *ethnic group*, and *class of persons*. As discussed above, polysemic and most phrase queries search queries were assigned to multiple categories. Qualitative results of search query categorization were quantified and are reported here as percentages of search queries in which a certain search category occurred.

The presence of particular search categories in user search queries displayed noticeable differences between the two domain-specific digital libraries. As shown in figure 5, the top two categories observed in the OH search queries were *place* (e.g., “Chile”) with 34 percent of searches, and *object* (e.g., “drinking vessel”) with 31 percent of searches. It is worth noting that both of these categories belong to FRBR Group 3 of entities, or subject entities. Another Group 3 search category—*concept* (e.g., “civil right”)—was the fourth most common search category with 17 percent of search queries. However, the fourth FRBR Group 3 subject entity—*event* (e.g., “1935 meat strike”)—was observed in the search queries much less often than the other three (10 percent). The FRBR Group 2 (agent) search categories *person* (e.g., “Alfred R. Glancy Jr.”) and *corporate body* (e.g., “Dana College,” “Kapa Alpha Psi”) were observed in 26 percent and 14 percent, respectively, of the search queries. The *work* search category (e.g., “Find It Illinois,” “how a colored woman aided john brown”) was observed in 9 percent of the search queries, while the *class of persons* (e.g., “fashion designers”) and *ethnic group* (e.g., “Cheyenne”) search categories were observed in 8 percent and 5 percent of user

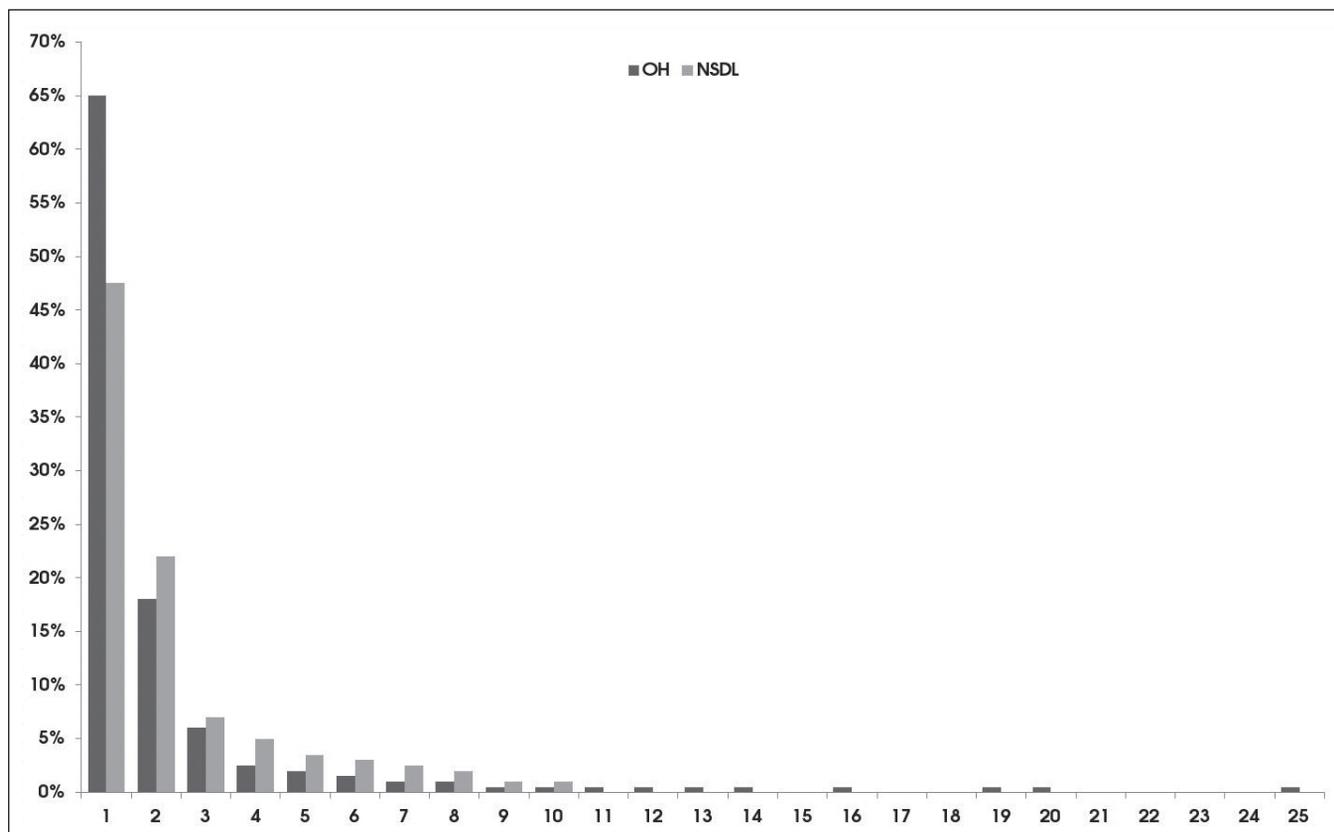


Figure 4. Search query frequency distribution

searches respectively. Finally, the *family* search category (e.g., “Wright brothers”) was observed in only 0.43 percent of unique search queries in OH.

In the NSDL search queries (figure 5), the distribution of search categories was different. Two search categories occurred significantly more often in the search queries of the NSDL users as compared to the queries of the OH users. This statistically significant difference was observed for the *object* search category (Chi-square = 292.7135, $df = 1$, $p < .01$), and the *concept* search category (Chi-square = 1944.959, $df = 1$, $p < .01$). Similar to the OH sample, *object* (e.g., “starfish student and teacher resource”) was one of the most frequently occurring search categories in the NSDL. However, this category occurred in the NSDL sample more often than in the OH sample (51 percent as compared to 31 percent of unique search queries). Unlike in OH search queries, *concept* (e.g., “epigenetics”) was the most frequently observed search category in the NSDL sample, with 64 percent of unique search queries containing *concept*. This is a considerably higher proportion of search queries than was found for OH (17 percent). Two search categories that were prevalent in OH search queries but occurred substantially less often in the NSDL search queries, with high statistical

significance, included *place* (Chi-square = 2018.511, $df = 1$, $p < .01$) and *person* (Chi-square = 753.2203, $df = 1$, $p < .01$).⁵⁸ The *Place* category (e.g., “Chesapeake bay”) was found in only 5 percent of NSDL search queries as opposed to 34 percent of OH search queries; *person* search category (e.g., “Nikolai Lobachevsky”) was found in only 7 percent of NSDL search queries as opposed to 26 percent of OH search queries. It was also found, with statistical significance, that several other search categories had occurred less often in user search queries in the NSDL than in OH: *corporate body* (Chi-square = 567.5135, $df = 1$, $p < .01$), *ethnic group* (Chi-square = 277.1274, $df = 1$, $p < .01$), *event* (Chi-square = 276.574, $df = 1$, $p < .01$), and *class of persons* (Chi-square = 50.4434, $df = 1$, $p < .01$). The *corporate body* search category (e.g., “NASA”) was present in only 3 percent of NSDL search queries as opposed to 14 percent of OH search queries; *ethnic group* category (e.g., “mayans”) was present in only 0.7 percent of NSDL search queries as opposed to 5 percent of OH search queries; *event* category (e.g., “middle ages”) was present in only 3 percent of NSDL search queries as opposed to 10 percent of OH search queries; and *class of persons* category (e.g., “meteorologist”) was present in only 3 percent of NSDL search queries as opposed to 8 percent of OH search

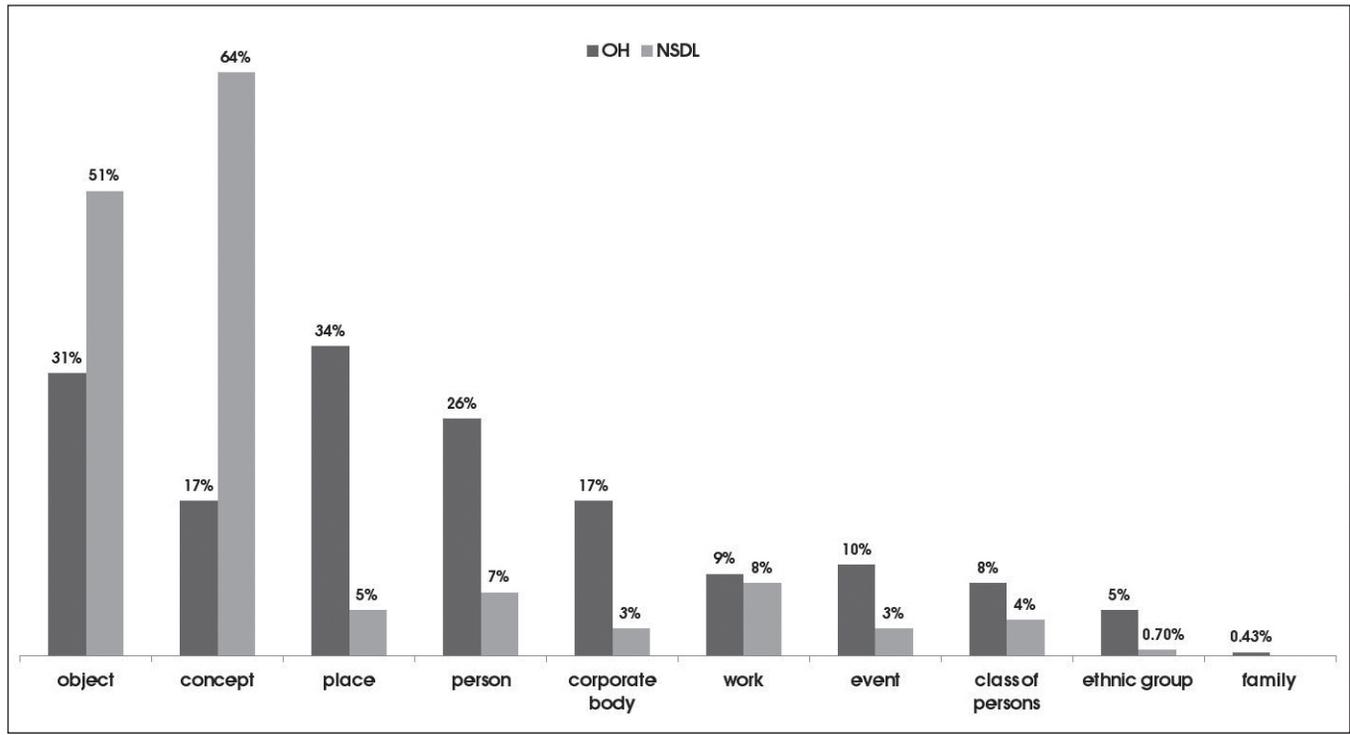


Figure 5. Search categories in OH and NSDL user search queries

queries. The only search category where the difference in occurrence in NSDL and OH search queries was not statistically significant (Chi-square = 2.524082, $df = 1$, $p < .2$) was *work* search category. Finally, no *family* searches were observed in the user interactions with the NSDL, as compared to only 0.43 percent of OH search queries that contained the *family* search category.

As discussed above, in the process of analysis, polysemic search queries and most phrase search queries were assigned to multiple categories. The researchers found that although over half of all user search queries in the sample (59 percent in the NSDL and 55 percent in OH) belonged to single search category, a considerable proportion of search queries (45 percent in OH and 41 percent in the NSDL) were multi-category search queries. The number of categories in these multi-category search queries ranged from two to seven. Search queries of the OH users were found, with statistical significance ($t = 8.71$, $df = 13479$, $p < .01$), to contain more search categories than search queries of the NSDL users (see table 5).

As shown in figure 6, roughly a third of search queries (32 percent in the OH sample and 36 percent in the NSDL sample) combined two search categories. Representative examples include “Hisako eagle painting” (*person* and *object*), “mining Arizona Mohave county” (*concept* and *place*), “ADHD in teens” (*concept* and *class of persons*), and

“Galapagos tortoise” (*object* and *place*).

The proportion of search queries with three and more search categories was low in both digital libraries. Ten percent of user search queries in the OH sample and 5 percent of queries in the NSDL sample included three search categories. Representative examples of three-category search queries include “California gold rush” (*place*, *object*, and *event*), “mechanics; Newton; acceleration; catapult; force; graphing; laws of motion; mass; motion” (*concept*, *person*, and *object*), and “Japanese culture United States” (*ethnic group*, *concept*, and *place*). Four-category search queries constituted 2 percent of all search queries in the OH transaction log sample, while only 0.4 percent of search queries in the NSDL sample comprised four search categories. Representative examples include “history of oil spills in the United States” (*concept*, *event*, *object*, and *place*) and “the mcgraw-hill dictionary of misspelled and easily confused words” (*concept*, *object*, *corporate body*, and *work*). A small fraction of search queries (0.45 percent in OH and 0.03 percent in the NSDL) included five search categories. For example, “fowler, h. w. 1914. fishes from the rupununi river, british guiana. proceedings of the academy of natural sciences of philadelphia v. 66:229–284” search query from NSDL included the categories: *object*, *place*, *person*, *work*, and *corporate body*. Finally, six category and seven category queries composed only 0.04 percent of the OH user

Table 5. Number of search categories per unique search query ($N = 13,481$)

	OH	NSDL
Number of observations	2,441	11,040
Mean	1.61	1.46
Standard deviation	0.8	0.61
Variance	0.64	0.38

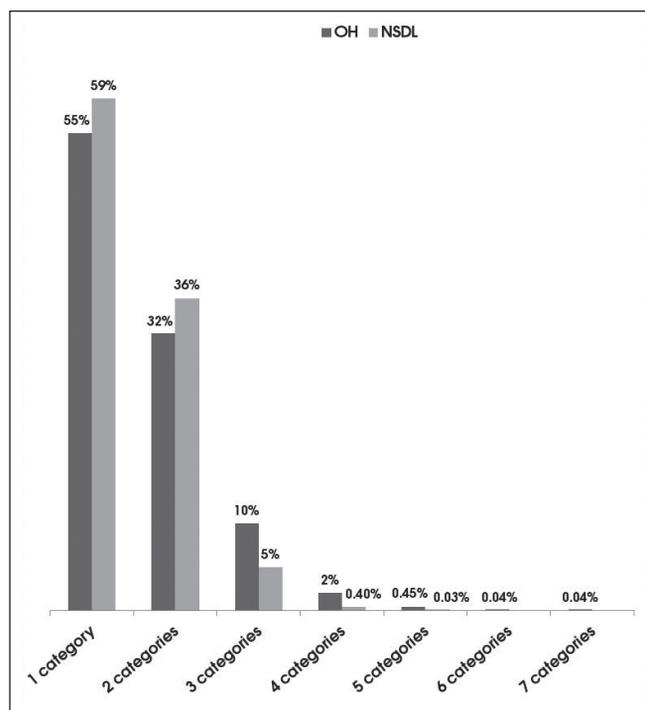
$t = 8.71$, $df = 13,479$, $p < .01$

search queries each, while no multicategory search queries with more than five search categories were observed in the NSDL search logs.

Conclusion

The study shows that in both domain-specific large-scale digital libraries created for different user communities, users preferred a basic keyword search to advanced search options; this observation correlates with results of earlier studies, which found that users of online catalogs and other information retrieval systems tend to prefer simple keyword searches, although evidence from more recent studies shows an upward trend in the use of faceted searches in online catalogs.⁵⁹ However, the level of advanced searching observed by the authors of this article in both large-scale digital libraries is high compared with the findings of studies of user searching on the web or in online databases.⁶⁰ This may indicate higher a proportion of domain expert users in large-scale digital libraries, as many user studies report that selection of advanced search options increases with increase in user domain knowledge. While NSDL users engaged in advanced searches much more often than OH users, this finding might in part be explained by interface differences between the two large-scale digital libraries, as more search limit options are offered by the NSDL interface. This study also found lower average search query lengths than most transaction log analysis studies of online catalogs and web search engines, as summarized by Markey, with exception of the study of New Zealand Digital Library, the query lengths observed in which were very close with the query lengths observed in the present study.⁶¹

This study revealed that user searching differed substantially between two digital libraries that are aimed at serving different domains and user populations. For example, the search queries of the NSDL users varied more widely in length, on average were longer, and occurred more frequently than the search queries of OH users. As shown by this study, search queries of the OH users varied more widely in frequency and contained more search categories than search queries of the NSDL users. In

**Figure 6.** Number of search categories per unique search query

addition, the frequency of occurrence of particular search categories in user search queries displayed noticeable differences between the two domain-specific digital libraries. Two search categories—*concept* and *object*—occurred significantly more often in the search queries of the NSDL users while several others—*place*, *person*, *corporate body*, *ethnic group*, *event*, and *class of persons*—occurred significantly more often in OH search queries.

Based on the results of this study, the conclusion can be made that geographical and personal names continue to be prevalent in humanities users' searches, while *object* searches not reported by earlier studies also have prominence. The generally low level of *event* searching in a large-scale digital library in the US history domain (only 10 percent of the OH user search queries contain an *event* search category) observed in this study is somewhat unexpected.

Interface design may have somewhat contributed to user searching differences between OH and the NSDL. Additional investigation into this factor is needed and will be carried out by the authors of this paper. Nevertheless, some of the most statistically significant findings of this exploratory study bear practical implications for digital library developers. For example, the differences revealed by this study suggest that developers of digital libraries serving the STEM population need to give more priority to providing faceted search options and search result limits and to documenting the *concepts* and *objects* (including genres, formats, etc.) in

metadata records. At the same time, as the user-searching data collected by this study suggests, developers of cultural heritage digital libraries that are aimed at serving educators, students, and researchers in the areas of history—and possibly also related social science fields—need to document a wider variety of item attributes in their metadata than need to be documented by their colleagues developing STEM digital libraries, and to pay particular attention to documenting the *persons* and *places* in their metadata. User experience can be improved if large-scale digital libraries—regardless of domain—supply an option to limit search results by geographical area, which is suggested by the high proportion of *place* searching observed in this study.

The need for advanced search options in the user interface of large-scale digital libraries has been proven in the surveys of digital library users. For instance, in the European Library, the majority (81 percent) of users expressed preference for advanced search.⁶² The study reported in this paper provides empirical support that is based on actual user behavior in large-scale digital libraries. By doing this, it makes a substantial contribution to establishing the importance of advanced search options in the digital library user interface—the options that are currently often neglected by digital library developers.⁶³ In particular, the prevalence of subject searching among the users of both digital libraries, which was observed in this study, suggests that provision of the subject-based advanced search option should be prioritized in the design of large-scale digital libraries, regardless of domain.

As a result of uneven levels of use of the two digital libraries that served targets of this study, sample sizes differed substantially. In future comparative analysis studies of user searching, the difference in the levels of use of the digital libraries should be taken into consideration. For example, to make the sample sizes more comparable while still drawing the samples over the same period, future research could compare a complete sample of the search queries from a less heavily used digital library to a random subset of search queries from a more heavily used digital library.

This exploratory study used a single data collection method—transaction logs—to assess digital library users' searching. To obtain a more complete picture of user searching in large-scale domain-specific digital libraries, more studies that combine both unobtrusive (e.g., in-depth transaction log analysis) and obtrusive (e.g., interview, observation, survey of digital library users) methods and triangulate the results are needed. These future investigations will also need to increase the number of target domain-specific digital libraries to represent wider variety of domains, and to include domain-independent digital libraries that serve a broader general audience.

The results of this exploratory study can also be used in building domain-specific user models for digital library

users in the history domain and the STEM meta-disciplinary domain. To build such user models, additional data that were not the focus of this investigation need to be collected and analyzed. One example of such important additional data collection and analysis include session-level transaction log analysis that will go beyond the individual search query and include sequence of search queries, as well as other user interactions with digital libraries, such as browsing and viewing of metadata records. Another example is comparative analysis of traffic in cultural heritage and STEM digital libraries at various time scales: daily, weekly, monthly, and yearly.

References and Notes

1. IFLA Study Group on the Functional Requirements for Bibliographic Records, *Functional Requirements for Bibliographic Records: Final Report*, accessed June 25, 2013, www.ifla.org/files/cataloguing/frbr/frbr_2008.pdf.
2. The numbers are based on IMLS Digital Collections and Content registry of digital collections supported by IMLS (<http://imlsdcc.granger.uiuc.edu>).
3. Judith Skog, Richard M. McCourt, and Jessica Gorman, "The NSF Scientific Collections Survey: A Brief Overview of Findings" (white paper, National Science Foundation, 2009), accessed June 25, 2013, <http://digital.library.unt.edu/ark:/67531/metadata25978>.
4. Marcia A. Mardis et al., "The Digital Lives of U.S. Teachers: A Research Synthesis and Trends to Watch," *School Libraries Worldwide* 18, no. 1 (2012): 70–86.
5. Caroline R. Arms, "Historical Collections for the National Digital Library: Lessons and Challenges at the Library of Congress: Part 1," *D-Lib Magazine* (April 1996), accessed June 25, 2013, www.dlib.org/dlib/april96/loc/04c-arms.html; Caroline R. Arms, "Historical Collections for the National Digital Library: Lessons and Challenges at the Library of Congress: Part 2," *D-Lib Magazine* (April 1996), accessed June 25, 2013, www.dlib.org/dlib/may96/loc/05c-arms.html.
6. Carole L. Palmer, Oksana L. Zavalina, and Katrina Fenlon, "Beyond Size and Search: Building Contextual Mass in Digital Aggregations for Scholarly Use," *Proceedings of the Annual Meeting of the American Society for Information Science & Technology* 47, no. 1 (2010): 1–10.
7. Mardis et al., "The Digital Lives of U.S. Teachers."
8. Daniella Quinones, "Digital Media (Including Video!): Resources for the STEM Classroom and Collection," *Knowledge Quest* 39, no. 2 (2010): 28–32; Eileen McIlvain, "NSDL as a Teacher Empower Point: Expanding Capacity for Classroom Integration of Digital Resources," *Knowledge Quest* 39, no. 2 (2010): 54–63; Anne Marie Perrault, "Making Science Learning Available & Accessible to All Learners: Leveraging Digital Library Resources," *Knowledge Quest* 39, no. 2 (2010): 64–68; Daniel Toomey, "The National Science Digital Library: STEM Resources for the 21st-Century Learner,"

- School Library Monthly* 27, no. 2 (2010): 54–56.
9. “About NSDL,” National Science Digital Library, accessed June 25, 2013, <http://nsdl.org/about>.
 10. Perrault, “Making Science Learning Available & Accessible to All Learners”; Toomey, “The National Science Digital Library.”
 11. Shonda Brisco, “The Motherlode of STEM,” *School Library Journal* 56, no. 2 (2010): 65–66; McIlvain, “NSDL as a Teacher Empower Point.”
 12. Brian F. Lavoie, Lynn Silipigni Connaway, and Edward T. O’Neill, “Mapping WorldCat’s Digital Landscape,” *Library Resources & Technical Services* 51, no. 2 (2007): 106–15; Ingeborg Verheul, Anna Maria Tammaro, and Steve Witt, eds., *Digital Library Futures: Users Perspectives & Institutional Strategies* (Berlin; New York: De Gruyter Saur, 2010); Tony Horava, “Challenges and Possibilities for Collection Management in a Digital Age,” *Library Resources & Technical Services* 54, no. 3 (2010): 142–52.
 13. Tom D. Wilson, “Human Information Behavior,” *Informing Science* 3, no. 2 (2000): 49–56.
 14. Bernard J. Jansen and Soo Young Rieh, “The Seventeen Theoretical Constructs of Information Searching and Information Retrieval,” *Journal of the American Society for Information Science & Technology* 61, no. 8 (2010): 1517–34.
 15. James Krikelas, “Catalog Use Studies and Their Implications,” *Advances in Librarianship* 3 (1972): 195–220.
 16. Micheline Beaulieu and Christine L. Borgman “A New Era for OPAC Research: Introduction to Special Topic Issue on Current Research in Online Public Access Systems,” *Journal of the American Society for Information Science* 47, no. 7 (1996): 491–92.
 17. Marcia J. Bates, “Rethinking Subject Cataloging in the Online Environment,” *Library Resources & Technical Services* 33, no. 4 (1989): 400; Ray Larson, “Between Scylla and Charybdis: Subject Searching in Online Catalogs,” *Advances in Librarianship* 15 (1991): 175–236; Joseph A. Matthews, Gary S. Lawrence, and Douglas K. Ferguson, eds., *Using Online Catalogs: A Nationwide Survey: A Report of a Study Sponsored by the Council on Library Resources* (New York: Neal-Schumann, 1983).
 18. Christine L. Borgman, “Why are Online Catalogs Still Hard to Use?” *Journal of American Society for Information Science* 47, no. 7 (1996): 493–503.
 19. Bryce L. Allen, “Cognitive Research in Information Science: Implications for Design,” *Annual Review of Information Science & Technology* 26 (1991): 3–37.
 20. Margo Warner Curl, “Enhancing Subject and Keyword Access to Periodical Abstracts and Indexes: Possibilities and Problems,” *Cataloging & Classification Quarterly* 20, no. 4 (1996): 45–55; Raya Fidel, “Who Needs Controlled Vocabulary?” *Special Libraries* 83 (January 15, 1992): 1–9; Charles R. Hildreth, “The Use and Understanding of Keyword Searching in a University Online Catalog,” *Information Technology & Libraries* 16, no. 2 (1997): 52–62; Manikya Rao Muddamalle, “Natural Language Versus Controlled Vocabulary in Information Retrieval: A Case Study in Soil Mechanics,” *Journal of the American Society for Information Science* 49, no. 10 (1998): 881–87.
 21. David Bawden and Polona Vilar, “Digital Libraries: To Meet or Manage User Expectations,” *Aslib Proceedings* 58, no. 4 (2006): 346–54.
 22. Ibid.
 23. Ibid.
 24. Ian Rowlands and David Nicholas, “Information Behaviour of the Researcher of the Future: A Ciber Briefing Paper” (London: University College, 2008), accessed June 25, 2013, www.jisc.ac.uk/media/documents/programmes/reppres/gg_final_keynote_11012008.pdf.
 25. Bryce L. Allen, “Cognitive Research in Information Science: Implications for Design,” *Annual Review of Information Science & Technology* 26 (1991): 3–37.
 26. Gary Marchionini et al., “Information Seeking in Full-Text End-User-Oriented Search Systems: The Roles of Domain and Search Expertise,” *Library & Information Science Research* 15, no.1 (1993): 35–69.
 27. Bawden, “Digital Libraries.”
 28. Pertti Vakkari, Mikko Penmanen, and Sami Serola, “Changes of Search Terms and Tactics While Writing a Research Proposal: A Longitudinal Case Study,” *Information Processing & Management* 39, no. 3 (2003): 445–63.
 29. Barbara M. Wildemuth, “The Effects of Domain Knowledge on Search Tactic Formulation,” *Journal of the American Society for Information Science & Technology* 55, no. 3 (2004): 246–58, doi:10.1002/asi.10367.
 30. Xiangmin Zhang, Hermina G.B. Anghelescu, and Xiaojun Yuan, “Domain Knowledge, Search Behaviour, and Search Effectiveness of Engineering and Science Students: An Exploratory Study,” *Information Research* 10, no. 2 (2005): paper 217, accessed June 25, 2013, <http://informationr.net/ir/10-2/paper217.html>; Helen A. Hembrooke et al., “The Effects of Expertise and Feedback on Search Term Selection and Subsequent Learning,” *Journal of the American Society for Information Science & Technology* 56, no. 8 (2005): 861–71, doi:10.1002/asi.20180.
 31. Carole L. Palmer, “Scholarly Work and the Shaping of Digital Access,” *Journal of the American Society for Information Science & Technology* 56, no. 11 (2005): 1140–53; David Ellis, “Modeling the Information-Seeking Patterns of Academic Researchers: A Grounded Theory Approach,” *Library Quarterly* 63, no. 4 (1993): 469–86.
 32. George Buchanan et al., “Information Seeking by Humanities Scholars,” in *Research and Advanced Technology for Digital Libraries: Proceedings of the European Conference on Digital Libraries (ECDL2005)*, ed. Andreas Rauber, Stavros Christodoulakis, and A Min Tjoa (Berlin: Springer-Verlag, 2005): 218–29.

33. Ibid.; Ming-der Wu and Shih-chuan Chen, "Humanities Graduate Students' Use Behavior on Full-Text Databases for Ancient Chinese Books," in *Asian Digital Libraries: Looking Back 10 Years and Forging New Frontiers*, ed. Dion Hoel-Lian Goh et al. (Berlin: Springer-Verlag, 2007), 141–49.
34. Susan Harum, personal conversation with the authors, January 15, 2008; Wu, "Humanities Graduate Students' Use Behavior on Full-Text Databases."
35. Marcia J. Bates, "The Getty End-User Online Searching Project in the Humanities: Report No. 6: Overview and Conclusions," *College & Research Libraries* 57 (1996): 514–23; Wu, "Humanities Graduate Students' Use Behavior on Full-Text Databases," 141–49; Elaine A. Nowick and Margaret Mering, "Comparisons between Internet Users' Free-Text Queries and Controlled Vocabularies: A Case Study in Water Quality," *Technical Services Quarterly* 21, no. 2 (2003): 15–32, accessed June 25, 2013, www.tandfonline.com/doi/pdf/10.1300/J124v21n02_02; Kathik Natarajan et al., "An Analysis of Clinical Queries in an Electronic Health Record Search Utility," *International Journal of Medical Informatics* 79, no. 7 (2010): 515–22, doi:10.1016/j.ijmedinf.2010.03.004.
36. Thomas A. Peters, "The History and Development of Transaction Log Analysis," *Library Hi Tech* 11, no. 2 (1993): 41–66.
37. Karen Markey, "Twenty-Five Years of End-User Searching, Part 1: Research Findings," *Journal of the American Society for Information Science & Technology* 58, no. 8 (2007): 1071–81.
38. Bernard Jansen, Amanda Spink, and Jan O. Pedersen, "The Effect of Specialized Multimedia Collections on Web Searching," *Journal of Web Engineering* 3 no. 3-4 (2004): 182–99.
39. Heather L. Moulaison, "OPAC Queries at a Medium-Sized Academic Library: A Transaction Log Analysis," *Library Resources & Technical Services* 52, no. 4 (2008): 230–37.
40. Bates, "The Getty End-User Online Searching Project in the Humanities"; Steven M. Beitzel, Eric C. Jensen, and Abdur Chowdhury, "Temporal Analysis of a Very Large Topically Categorized Web Query Log," *Journal of the American Society for Information Science & Technology* 58, no. 2 (2007): 166–78; Bernard J. Jansen, Amanda Spink, and Sherry Koshman, "Web Searcher Interaction with the Dogpile.com Metasearch Engine," *Journal of the American Society for Information Science & Technology* 58, no. 5 (March 2007): 744–55; Sherry Koshman, Amanda Spink, and Bernard J. Jansen, "Web Searching on the Vivisimo Search Engine," *Journal of the American Society for Information Science & Technology* 57, no. 14 (2006): 1875–87; Amanda Spink and Bernard J. Jansen, "A Study of Web Search Trends," *Webology* 1, no. 2 (2004), accessed June 25, 2013, <http://webology.ir/2004/v1n2/a4.html>.
41. Michael Khoonet et al., "Using Web Metrics to Analyze Digital Libraries," in *Proceedings of the ACM/IEEE-CS Joint Conference on Digital Libraries* (New York: ACM, 2008), 375–84; Bin Pang, "Capturing Users' Behavior in the National Science Digital Library (NSDL)" (unpublished report, Cornell University Human Computer Interaction Research Group, 2003), accessed June 23, 2013, <http://arizona.openrepository.com/arizona/bitstream/10150/106332/1/nsdl-user-report.pdf>; Suzan Verberne et al., "How does the Library Searcher Behave? A Contrastive Study of Library Search against Ad-hoc Search," Paper presented at the meeting of the CLEF (Notebook Papers/LABs/Workshops), 2010, accessed June 25, 2013; www.clef-initiative.eu/documents/71612/86374/CLEF2010wn-LogCLEF-VerberneEt2010.pdf; Oksana L. Zavalina, "Collection-Level User Searches in Federated Digital Resource Environment," in *Proceedings of the American Society for Information Science & Technology* (2007), 1–16.; Oksana L. Zavalina, "Contextual Metadata in Digital Aggregations: Application of Collection-Level Subject Metadata and Its Role in User Interactions and Information Retrieval," *Journal of Library Metadata* 11, no. 3–4 (2011): 104–28.
42. Zavalina, "Collection-Level User Searches in Federated Digital Resource Environment"; Zavalina, "Contextual Metadata in Digital Aggregations."
43. Amanda Spink et al., "From E-Sex to E-Commerce: Web Search Changes," *IEEE Computer* 35, no. 3 (2002): 107–9.
44. IFLA Study Group on the Functional Requirements for Bibliographic Records, *Functional Requirements for Bibliographic Records: Final Report* (IFLA: September 1997, amended February 2009), accessed June 25, 2013, www.ifla.org/files/cataloguing/frbr/frbr_2008.pdf.
45. Ibid.; Glenn E. Patton, ed., *Functional Requirements for Authority Data: A Conceptual Model*, (Munich: K.G. Saur, 2009), 13.
46. Patton, *Functional Requirements for Authority Data*, 13.
47. IFLA, *Functional Requirements for Bibliographic Records: Final Report* www.ifla.org/files/cataloguing/frbr/frbr_2008.pdf.
48. Ibid., 26.
49. Ibid., 27.
50. Ibid., 28.
51. Ibid., 28–29.
52. Zavalina, "Collection-Level User Searches in Federated Digital Resource Environment."
53. Kristina M. Spurgin, and Barbara M. Wildemuth, "Content Analysis," in *Applications of Social Research Methods to Questions in Information and Library Science*, ed. Barbara M. Wildemuth, 129–37 (Westport, CT: Libraries Unlimited, 2009).
54. Klaus Krippendorff, "Reliability in Content Analysis Some Common Misconceptions and Recommendations," *Human Communication Research* 30, no. 3 (2004): 411–33.
55. Zavalina, "Collection-Level User Searches in Federated Digital Resource Environment"; Zavalina, "Contextual Metadata in Digital Aggregations."
56. Kimberly A. Neuendorf, *Content Analysis Guidebook* (Thousand Oaks, CA: Sage, 2002).

57. Ibid.
58. This observation is in line with earlier studies of humanities scholars' information-seeking behavior conducted in the 1980s, 1990s, and early 2000s: Bates, "The Getty End-User Online Searching Project in the Humanities"; Buchanan et al., "Information Seeking by Humanities Scholars"; Stephen Wiberley and William Goodrich Jones, "Patterns of Information Seeking in the Humanities," *College & Research Libraries* 50, no. 6 (1989): 638-45.
59. Curl, "Enhancing Subject and Keyword Access to Periodical Abstracts and Indexes: Possibilities and Problems"; Fidel, "Who Needs Controlled Vocabulary?"; Hildreth, "The Use and Understanding of Keyword Searching in a University Online Catalog"; Muddamalle, "Natural Language Versus Controlled Vocabulary in Information Retrieval"; Spurgin and Wildemuth, "Content Analysis"; Xi Niu and Bradley M. Hemminger, "Tactics for Information Search in a Public and an Academic Library Catalog with Faceted Interfaces," in *Proceedings of the 4th Workshop on Human-Computer Interaction & Information Retrieval* (2010): 83-86, accessed June 25, 2013, <http://research.microsoft.com/en-us/um/people/ryenw/hcir2010/docs/H CIR2010Proceedings.pdf>.
60. Spink and Jansen, "A Study of Web Search Trends"; David Nicholas et al., "Online Use and Information Seeking Behavior: Institutional and Subject Comparisons of UK Researchers," *Journal of Information Science* 35, no. 6 (2009): 660-76, doi:10.1177/0165551509338341.
61. Markey, "Twenty-Five Years of End-User Searching"; Steve Jones et al., "A Transaction Log Analysis of a Digital Library," *International Journal on Digital Libraries* 3, no. 2 (2000): 152-69.
62. Maristella Agosti et al., "Analysing HTTP Logs of a European DL Initiative to Maximize Usage and Usability," in *Proceedings of the 10th International Conference on Asian Digital Libraries (ICADL 2007)*, ed. Dion Hoe-Lian Goh et al., 35-44 (Berlin: Springer, 2007).
63. Ibid.; Moulaison, "OPAC Queries at a Medium-Sized Academic Library."



ARCHIVAL.COM
INNOVATIVE SOLUTIONS FOR PRESERVATION

Call for a complete catalog

<i>Pamphlet Binders</i>	<i>Polypropylene Sheet & Photo Protectors</i>
<i>Music Binders</i>	<i>Archival Boards</i>
<i>Archival Folders</i>	<i>Adhesives</i>
<i>Manuscript Folders</i>	<i>Bookkeeper</i>
<i>Hinge Board Covers</i>	<i>Century Boxes</i>
<i>Academy Folders</i>	<i>Conservation Cloths</i>
<i>Newspaper/Map Folders</i>	<i>Non-Glare Polypropylene Book Covers</i>
<i>Bound Four Flap Enclosures</i>	<i>CoLibri Book Cover System</i>
<i>Archival Binders</i>	

ARCHIVAL PRODUCTS

P.O. Box 1413
Des Moines, Iowa 50306-1413

Phone: 800.526.5640
Fax: 888.220.2397
E-mail: custserv@archival.com
Web: archival.com

Technical Services Assessment

A Survey of Pennsylvania Academic Libraries

Rebecca L. Mugridge

Academic libraries regularly conduct assessment of library services through the use of rubrics or assessment tools such as LibQUAL (www.libqual.org/home). Technical services activities are frequently assessed; however, the assessment is typically limited to the evaluation of specific processes. This study was designed to explore assessment activities in Pennsylvania's academic libraries. The author designed a survey to investigate whether technical services activities are assessed, how they are assessed, who is responsible for assessment, how the results of assessment activities are shared with others, and how those results are used to improve services or for other purposes. Sixty-three libraries responded to the survey (a 53 percent response rate). Survey results show that 90 percent of academic libraries in Pennsylvania have conducted some form of assessment of technical services activities but that most of that assessment is quantitative in nature.

Assessment is a topic of great interest to academic library directors and administrators. For the purposes of this paper, assessment is defined as the process of evaluating a procedure, service, product, or person to determine its value or effectiveness. The Association of Research Libraries (ARL) has sponsored a biannual conference on the topic since 2006. The Association for College and Research Libraries (ACRL) sponsored a report published in 2010, *The Value of Academic Libraries: A Comprehensive Research Review and Report*, which encouraged libraries to use assessment to demonstrate the value and impact of libraries on their communities.¹ The LibQUAL suite of tools (www.libqual.org) is used to assess and evaluate library services; however, the focus is on public services rather than on technical services.

In 2012, the Association for Library Collections and Technical Services (ALCTS) sponsored an interactive electronic discussion forum (e-forum) on the topic "Technical Services Statistics and Assessment," which focused primarily on the collection and use of statistics.² The discussion covered issues such as what statistics are collected, the difficulty of using automated systems to collect statistics, the reasons why statistics are collected, and how librarians make use of and report the statistics that they collect and maintain. The discussion concluded by questioning how well statistics address concerns that were raised in *The Value of Academic Libraries*, including how well they demonstrate the impact of libraries on our customers.

Rebecca L. Mugridge (rmugridge@albany.edu) is Associate Director for Technical Services and Library Systems, State University of New York at Albany.

Submitted June 13, 2013; tentatively accepted October 8, 2013 pending modest revisions; revisions submitted October 10, 2013; accepted for publication November 11, 2013.

There are many reasons why technical services assessment can benefit library managers and administrators. Assessment findings can be used to improve effectiveness, identify areas that need improvement, and communicate with customers and other stakeholders. Communicating with customers and other stakeholders can take several forms. For example, a customer service survey, while clearly seeking feedback from customers, is also a communication vehicle that serves as an outreach tool to those customers, indicating that their opinion is important and that their feedback is valuable. Communicating the results of technical services assessment activities to stakeholders and customers shows that their opinion was heard and that it will be acted on. The results of technical services assessment activities can be used to communicate with administrators and to help make the case for increased funding, staffing, or other resources. Technical services assessment findings can also be used to inform decision-making and reduce costs, such as those related to processing, vendor services, staffing, supplies, and other costs. The author believes that the evaluation and assessment of the activities and effectiveness of technical services units require more than the simple collection and reporting of statistics. It is necessary to make use of both quantitative and qualitative assessment tools to articulate technical services' effect on the teaching and research mission of a college or university. This study is intended to investigate whether libraries assess technical services activities, how they are assessed, who is responsible for assessment, how the results of assessment activities are shared with others, and how those results are used to improve services or for other purposes.

Literature Review

The author examined the library science literature published between 2000 and June 2013 to determine current practices and trends in the area of technical services assessment, discovering few publications that address technical services assessment as a whole. Neither the ARL Library Assessment Conferences nor the ACRL initiatives focused significant attention on the assessment of technical services activities, despite the fact that technical services librarians and staff make up a significant portion of the employees, and therefore human resources budget, in academic libraries. A review of the proceedings of the 2006, 2008, and 2010 ARL-sponsored Library Assessment Conferences shows no sessions that specifically address the assessment of technical services activities.³ The most recent Library Assessment Conference was in 2012; while the proceedings are not yet available, a review of the program shows that no sessions address the assessment of technical services activities.⁴

Wright and White conducted a research project for

ARL on the topic of library assessment, which was published as a SPEC kit in 2007.⁵ One question they asked was which units were assessed during the five years before the survey's distribution. Of the sixty-seven libraries that responded to this question, 75.8 percent indicated that they had done some form of assessment of cataloging; 79 percent had done some form of assessment of acquisitions and 67.2 percent had done some form of assessment of preservation. The most frequently cited form of assessment in all three functions was statistics collection and analysis.⁶

The library science literature reveals many articles that address processes and workflows within and across technical services units. Webber reported on the application of program assessment techniques to electronic resources management, finding that all libraries can benefit from the use of these techniques to improve performance.⁷ Herrera et al. assessed the serials and monographic ordering process, using a survey to identify strategic improvements.⁸ Dragon and Sheets used a time and path study at the East Carolina University's Joyner Library to assess technical services workflow.⁹ Herrera et al. also assessed cataloging and database maintenance to evaluate customer satisfaction and assist with departmental strategic planning.¹⁰ Yue and Kurt reported on the assessment of print serials management practices at the University of Nevada, Reno, nine years after they ceased checking in print periodicals.¹¹ Their report is a reminder of the importance of follow-up assessment after workflow changes have been implemented.

Chase and Krug discussed the experiences of the Appalachian College Association (ACA) as they participated in a Council on Library and Information Resources (CLIR) grant to improve technical services work processes.¹² Andreadis et al. reported on the effort to redesign technical services workflow at Denison University and Kenyon College in an effort to make better use of staff and other resources.¹³ Similarly, Loring addressed the assessment of technical services workflow at Smith College.¹⁴ Medeiros reported on how the Tri-College Library Consortium of Bryn Mawr, Haverford, and Swarthmore Colleges assessed issues related to the management of electronic resources.¹⁵ Godbout discussed how Wells College streamlined the workflow between the acquisitions and cataloging units.¹⁶ Using tools acquired from a workshop on continuous improvement, they were able to implement changes that made a measurable improvement in productivity. Schroeder and Howland conducted a study of shelf-ready processing, finding that shelf-ready was cheaper and took less time to process.¹⁷ Stouthuysen et al. presented the results of their research to apply a time-driven activity-based costing (TDABC) model to the acquisitions process in a Belgian university library in an effort to improve cost management.¹⁸ Their findings show that TDABC is well suited for use in a library setting and may lead to potential cost efficiencies.¹⁹

Fewer studies address the assessment of preservation activities. Brown reported on the results of her research that investigated the use of general preservation assessment to develop a preservation plan.²⁰ She followed that paper with one that addressed to what extent libraries implemented the recommendations that resulted from their assessment activities.²¹ Miller reported on several online tools that are intended to assist archivists with assessing their preservation needs.²²

The value of cataloging has been addressed in numerous studies. Stalberg and Cronin reported on the efforts of the ALCTS Technical Services Directors of Large Research Libraries Interest Group Task Force on Cost/Value Assessment of Bibliographic Control.²³ The task force identified seven operational definitions of value plus many elements that contribute to the cost of cataloging. In their final report, they made many recommendations for further investigation of these issues. El-Sherbini and Chen investigated the use of non-Roman subject headings and their effect on access to library resources in the online catalog, finding that a majority of users would like to be able to search non-Roman headings.²⁴ Mitchell investigated the value of metadata to libraries, archives, and museums by analyzing three approaches to assessment: pure counting, user-based, and case study-focused.²⁵

Two studies addressed technical services webpages. Groves evaluated twenty academic libraries' technical services webpages, determining that few libraries list their online work tools and that there is very little overlap of online work tools between those that do.²⁶ Mundle, Huie, and Bangalore conducted an evaluation of ARL library catalog department websites.²⁷

While the library science literature includes reports of assessment activities in technical services units, such as workflow analysis; statistics collection; assessment of training, documentation, and websites; and the value of cataloging and metadata, the author was unable to find any studies that consider a holistic assessment of technical services activities and their impact on the faculty, staff, students, or other customers. This study is intended to supplement existing literature by examining the assessment of technical services activities in Pennsylvania academic libraries.

Research Method

The author designed a survey to gauge the existence and extent of technical services assessment in Pennsylvania academic libraries. Pennsylvania has more than one hundred institutions of higher education, and the author felt that the large number of libraries would provide a robust source of data about typical assessment activities. The author chose SelectSurvey software (<http://selectsurvey.net>) to develop

the survey, which included twelve questions. The brevity of the survey was intentional to encourage a high response rate.

The author identified all Pennsylvania academic libraries by accessing a spreadsheet available on a website maintained by the Pennsylvania Department of Education.²⁸ This website allows users to download a spreadsheet listing all the academic libraries in the state. The spreadsheet provides the institution name, the library name, the library director's name and phone number, and other information. It does not supply the library directors' email addresses. As the author planned to invite library directors to participate in the survey using personally addressed emails, their email addresses had to be identified and recorded. This was done by searching each institution's website, identifying the director, dean, or university librarian, and recording the email addresses on a locally saved copy of the spreadsheet. This process revealed that many smaller institutions lacked a library website; these institutions tended to be technical or art institutes, or small seminary or other religious institutions. This led the author to limit the survey population to institutions that had "college" or "university" in their names, but kept the pool large enough to gather useful data. The spreadsheet was alphabetized by institution name, duplicates were deleted, director names were updated, and email addresses added. This resulted in a list of 120 academic library directors who were each sent an invitation to participate in the survey.

The survey invitation, provided in appendix A, requested that either the library directors or deans complete the survey or forward it to the person in their organization who held primary responsibility for carrying out technical services assessment activities. For the purposes of the survey, technical services were defined as cataloging and metadata; acquisitions; preservation, bindery, and physical processing; and electronic resources management units or staff. The author indicated in the email that the survey consisted of twelve questions and that it should take ten to twelve minutes to complete. Respondents were assured of confidentiality and that institution names were collected to avoid duplication. Confidentiality was indicated in the survey itself by making the institution name question optional. The email also included an invitation to share any documentation related to technical services assessment, such as links to online statistics or reports, print documents reporting on assessment activities, or procedural documents regarding assessment activities.

The survey was attached as a Microsoft Word file to the email messages to give the directors the option of completing the survey offline. Two follow up emails were sent in subsequent weeks, resulting in sixty-three completed responses by the deadline, August 31, 2012. Seven of those surveys were returned as Word attachments; in those cases, the author manually entered the answers into SelectSurvey

to allow the survey software statistics reporting to function accurately. (See appendix B for the survey.)

Survey Results and Discussion

Demographics

Of the 120 surveys mailed, sixty-three respondents completed the survey by the deadline (a 52.5 percent response rate). All but one response included the institution's name. Of the responding libraries, sixteen (25 percent) were libraries at public institutions, and forty-seven were libraries at private institutions. Of the public institutions, six were community colleges, five were libraries in the four "state-related" universities,²⁹ and five were libraries in the Pennsylvania State System of Higher Education (PASSHE), i.e., the state university system.³⁰ Four of the survey responses represented libraries at ARL institutions. The responding libraries, including both public and private institutions, employed an average of thirteen librarians and seventeen staff in the library. Of those employees, an average of two librarians and four staff worked in technical services. The number of librarians ranged from 1 to 171; the two largest employed 171 and 135, respectively, and the next largest employed 50. The outliers were not excluded from the survey analysis.

Practice of Assessment

The survey asked participants to indicate whether their library assessed technical services activities. Sixty libraries answered this question, with 60 percent (thirty-six respondents) of the libraries indicating that they assessed technical services activities. Three libraries skipped this question. There was very little difference between public and private institutions' assessment activities as reported in the responses to this question: 60 percent of public institutions and 59.1 percent of private institutions reported that they had assessed technical services activities.

Specific Assessment Methods

Although only 60 percent of responding libraries reported assessing technical services activities, 90.5 percent responded to the next question in the survey intended to gather information about specific assessment methods used by the libraries. The question was, "Which specific assessment methods do you currently use or have used in the past to assess technical services activities?" In retrospect, this discrepancy may have been avoided by more clearly stating a time in this question; for example, asking whether assessment has been done in the past five years and then asking what kinds of assessment was conducted during that period. The discrepancy noted may

Table 1. Methods of Assessment (*N* = 63)

Methods of assessment	Libraries	Percent
Gather statistics	53	84.1
Gather usage data	31	49.2
Gather input from nontechnical services librarians or staff	28	44.4
Collect anecdotes or feedback from customers	19	30.2
Conduct customer service surveys	16	25.4
Benchmark with other institutions	12	19.0
Anonymous suggestion box	8	12.7
Conduct focus groups	6	9.5

indicate that assessment is only regularly conducted in 60 percent of the responding libraries; whereas 90.5 percent of the libraries have at one time conducted some form of assessment. Table 1 illustrates the types of assessment methods reported by responding libraries.

Other methods of assessment reported by survey respondents included

- comparing statistics for online resources, interlibrary loans, and acquisitions with those from similar institutions;
- return-on-investment studies of specific technical services functions;
- participating in a 360 degree review process;
- comparing practices with other institutions; and
- conducting a self-study exercise.

An analysis of the responses to this question shows a difference in the practice of technical services assessment between public and private institutions. A review of the responses reveals that 81.2 percent of public institutions report that they have conducted some assessment of technical services activities compared with 93.6 percent of private institutions which report the same. All five of the libraries in state-related institutions reported that they conduct assessment of technical services activities; however, in two of those cases that assessment consisted solely of gathering statistics. Two of the five libraries in PASSHE institutions reported that they do not assess technical services activities. Two of the community college libraries (33.3 percent) do not assess technical services activities.

According to the survey results, more responding libraries selected quantitative rather than qualitative assessment as ways they have conducted assessment in the past. The top two methods of assessment cited are quantitative: gathering statistics and gathering usage data. The survey question did not specify or ask what statistics were collected, and

Table 2. Goals of Technical Services Activities (*N* = 63)

Goals of Assessment	Libraries	Percent
Improve or streamline processes	43	68.3
Improve services	40	63.5
Make better decisions	39	61.9
Inform strategic planning activities	35	55.5
Explore offering new services	25	39.7
Reallocate staff or other resources	19	30.2
Compare with other institutions	14	22.2

it did not specify or ask what or how usage data were collected. Other methods, such as benchmarking, conducting customer service surveys or focus groups, gathering input or anecdotes from other staff or customers, and using an anonymous suggestion box are used less frequently than quantitative assessment methods.

Goals of Technical Services Assessment

The most frequently selected reason for assessing technical services activities was to improve or streamline processes, followed closely by the goal of improving services. Other reasons that libraries identified were to make better decisions, to inform strategic planning activities, to explore the possibility of offering new services, to reallocate staff or other resources, and to compare with other institutions. Table 2 illustrates the goals of technical services assessment activities.

Survey respondents supplied additional goals:

- Build better collections
- Identify activities and services that could be eliminated
- Demonstrate the value of technical services activities to the university and library
- Demonstrate value to scholarship and research
- Establish best practices based on national standards

Only one library reported that assessment of technical services activities is conducted to demonstrate the value of technical services to the university and library.

Departments Assessed

As mentioned in the methods section, for the purposes of this survey, technical services was defined as people or units responsible for cataloging and metadata; acquisitions; electronic resources management; and preservation, bindery, and physical processing. The survey question identified four areas of responsibility commonly found under the umbrella

Table 3. Technical Services Departments or Units Assessed within the Last Five Years (*N* = 62)

Department or Unit	Libraries	Percent
Cataloging/metadata	35	56.5
Acquisitions	35	56.5
Electronic resource management	28	45.2
Preservation/bindery/physical processing	16	25.8

of technical services. These vary from institution to institution and are combined into a variety of departmental configurations within those institutions. The goal of this part of the survey was not to identify how the technical services units or departments are configured, but whether the activities traditionally performed by technical services units were assessed within the past five years. Units responsible for cataloging, metadata, and acquisitions were the most likely to have undergone some form of assessment in responding libraries, followed by electronic resources management and units responsible for preservation, binding, and physical processing. Table 3 illustrates the units that were assessed by responding libraries within the last five years.

Responsibility for Assessment

Primary responsibility for conducting technical services assessment lies with the library director, dean, or university librarian in twenty-one of the responding libraries (38 percent). Others identified as holding primary responsibility for technical services assessment include the division head, department head(s), unit head(s), a committee, and in two cases, a single librarian. Table 4 illustrates who in responding libraries holds primary responsibility for technical services assessment.

In addition to the people or units identified in the survey question, six respondents supplied answers to this question. In each case the written response indicated that no single person or unit held primary responsibility for technical services assessment; rather, multiple individuals or units shared that responsibility:

- It varies; we do have a department which does assessment, but work is also done at the division, department, and unit levels
- The technical services librarian provides the library director with information used for assessment
- Department heads and unit heads
- Director, associate director, and staff in technical services
- Library administrative team (associate dean/director, associate director, and assistant director in

Table 4. Primary Responsibility for Conducting Technical Services Assessment (N = 56)

Person or Unit Responsible	Libraries	Percent
Library director, dean, university librarian	21	37.5
Division head	11	19.6
Department head(s)	8	14.3
Unit head(s)	4	7.1
Committee	3	5.4
Single librarian	2	3.6
Single staff member	0	0.0

consultation with department heads and supervisors)

- Library director and a committee

Reporting of Assessment Results

Libraries report the results of their technical services assessment activities in many ways, with the most prevalent being through the library's annual report. Other ways that these activities are shared are through informational reports to library administration, a mass email to all library employees, a library or campus newsletter article, presentations, or a website. Table 5 illustrates the various ways assessment results are communicated to others.

In addition to the responses identified in the survey question, sixteen additional responses were supplied by the survey respondents. These included a variety of written reports, and the following other methods:

- Assessment report
- Five-year audit report
- Department outcome assessment reports
- Emails and presentations when appropriate to faculty and students
- Internal discussions between department heads
- Report to the Provost
- Information is included in the College's Fact Book
- Part of performance evaluation
- Annual assessment report
- Report within WEAVEonline (www.weaveengaged.com/weaveonline.html)
- Internal communications
- Discussions with library director
- Library committee report
- Surveys and questionnaires submitted to external accrediting or collegial organizations
- Internal self-study results were made available to the finalists in our library director search

Table 5. Methods of Reporting Assessment Results (N = 62)

Methods of Reporting	Libraries	Percent
Annual report	38	61.3
Informational report to library administration	32	51.6
Mass email to library employees	7	11.3
Library newsletter article	5	8.1
Presentations	5	8.1
Campus newsletter article	1	1.6
Mass email to campus employees	0	0.0

Table 6. Outcomes Based on Assessment Activities (N = 35)

Outcome Reported	Libraries	Percent
Reallocated staff	14	40.0
Streamlined processes	10	28.5
Made collection development decisions	10	28.5
Changed vendor or vendor services	4	11.4
Adjusted staff training	3	8.6
Improved communication	3	8.6
Implemented new services	2	5.7
Changed integrated library systems	2	5.7

Outcomes Based on Assessment Activities

This question required survey respondents to record their answer in a text box, and generated thirty-five responses. Many themes that emerged from the outcomes described in the responses provided. Table 6 summarizes these themes as reported by survey respondents.

Specific responses from the survey illustrate these themes. For example, fourteen libraries indicated that they had reallocated staff on the basis of the results of their assessment activities. Several libraries reported that many positions were eliminated, and one library was able to justify filling a vacant position with statistics collected as part of their assessment activities. Some of their comments include the following:

- We reallocated a position from print to electronic resources management.
- We have shifted staff from bindery preparation to assist with storage activities.
- We have shifted staff to monitor reports of incorrect links or problems with electronic resources based on statistics and feedback from the librarians.
- We have increased the number of student assistants.
- We have reallocated staff time among acquisitions,

cataloging, and serials in response to e-resources.

- We have realigned staff responsibilities.
- We have shifted and eliminated duties.
- Staff have been reassigned to different tasks (metadata cataloging, serving on the reference and circulation desks, and creating library exhibits).

Ten libraries reported that they streamlined processes because of their assessment activities. In some cases, libraries eliminated procedural steps to streamline their processes, and in other cases, they eliminated entire functions or services. Some of their comments include the following:

- We changed some ordering procedures to provide quicker access and less hassle for the business department.
- We adopted shelf-ready processing.
- We have trimmed costs by cutting back on stripping and covering.
- We eliminated shelflisting and writing call numbers on the verso of the title pages.
- We are currently assessing approval plan returns with the hope of eliminating all (or most), in order to move into more shelf-ready plans.
- We have streamlined our government documents workflow.
- We ceased binding, check-in and claiming.
- We changed our monthly authority control processing to a quarterly process, thereby saving money.

Another common theme that emerged from this question involved collection development decisions. Ten libraries reported that they made collection decisions based on their technical services assessment activities. These decisions included weeding, reallocation of funds, and transferring materials from one collection within the library to another. Some of the respondents' comments included:

- We decided to add new online resources to the collection.
- We purchased additional databases for specific disciplines.
- We reorganized our collection to co-locate reference books with circulating books, and to allow more reference books to circulate.
- We are currently weeding most of our collection. We are making better decisions on what needs to remain in our collection, what can be de-accessioned and what we need to purchase.

Four libraries changed vendors or vendor services because of their assessment activities. Of those, one library changed its book jobber and another library cancelled the

approval plan because of usage statistics. A third library is considering cancelling their approval plan, and a fourth library reported that they had consolidated their print, electronic serials, and standing orders under one vendor.

Three of the responding libraries reported that they made changes to staff training because of their assessment activities. One library reported that they were providing more training to their staff in new technologies, including electronic resources management. Another library identified cross-training as an area that warrants more attention. Finally, a third library reported that they are developing training materials and adapting policies to achieve efficiencies.

Improved communication was an outcome of assessment identified by three libraries in the survey. In one case, the consolidation of print, serials, and standing orders with one vendor improved communications with that vendor. In another case, communication with teaching faculty regarding collection building was improved because of their assessment activities. In another, new services for faculty were offered that directly improved communication with them. Those services included new-publications email notification, new-book display shelves, and an improved book order and request system.

Finally, two of the responding libraries changed their integrated library system (ILS) because of their technical services assessment activities. One library reported that they were not satisfied with the services offered by their current ILS vendor and are migrating to another system. The second library reported that they are upgrading their current ILS to the software-as-a-service (SaaS) model to eliminate the need to do manual backups and upgrades, thereby enabling the technical services/information technology librarian to devote more time to other services.

The author analyzed the survey results to determine whether the type of assessment conducted affected the outcomes that were reported. Libraries that only gathered statistics or usage data were less likely to report any outcomes. Twenty-two libraries only gathered statistics or usage data. Of those libraries, only ten (45.5 percent) provided examples of outcomes from their assessment activities. This is in contrast to the thirty-five libraries whose assessment went beyond gathering statistics or usage data. Of those thirty-five, twenty-five libraries (71.4 percent) reported outcomes.

The method of assessment also affected the types of outcomes reported by responding libraries. The ten libraries that only gathered statistics or usage data reported outcomes that included reallocating staff, streamlining processes, making collection development decisions, and changing vendor or vendor services. Table 7 illustrates these findings.

Thirty-five libraries used assessment methods that went beyond collecting statistics or usage data. Those libraries reported outcomes that include the four cited in the previous paragraph, but also included adjusting staff training,

Table 7. Outcomes Based on Gathering Statistics or Usage Data ($N = 22$)

Outcome Reported	Libraries	Percent
Reallocated staff	4	18.2
Streamlined processes	2	9.1
Made collection development decisions	3	13.6
Changed vendor or vendor services	2	9.1
Adjusted staff training	0	0.0
Improved communication	0	0.0
Implemented new services	0	0.0
Changed integrated library systems	0	0.0

improving communication, implementing new services, and changing ILSs. It is likely that some forms of assessment, e.g., gathering input from non-technical services librarians and staff, collecting anecdotes or feedback from customers, administering customer service surveys, benchmarking, providing a suggestion box, or conducting focus groups may elicit information and feedback that is useful for a variety of management purposes. Table 8 demonstrates this.

Conclusion

This study revealed that 90 percent of responding academic libraries in Pennsylvania have conducted some form of assessment of technical services activities. The most commonly used form of assessment consists of collecting and reporting statistics, but survey respondents report using a variety of qualitative methods as well. These methods include the use of customer service surveys, focus groups, benchmarking, workflow analysis, collecting feedback from customers, gathering input from non-technical services librarians and staff, and using a suggestion box. The top three goals of technical services assessment are to (1) improve or streamline processes, (2) improve services, and (3) make better decisions. Cataloging and metadata and acquisitions units were the most likely to be evaluated, followed distantly by electronic resources management and preservation, bindery, and processing units. This may reflect the variety and relatively small size of the academic institutions that were surveyed. Smaller institutions are almost certainly more likely to have units or people responsible for acquisitions and cataloging, and they may be less likely to have a unit or person specifically responsible for electronic resources management or preservation.

According to the survey results, responsibility for technical services assessment resided with the dean or director more often than with other administrators or managers.

Table 8. Outcomes Based on Forms of Assessment in Addition to Gathering Statistics or Usage Data ($N = 35$)

Outcome Reported	Libraries	Percent
Reallocated staff	10	28.6
Streamlined processes	8	22.9
Made collection development decisions	7	20.0
Changed vendor or vendor services	2	5.7
Adjusted staff training	3	8.6
Improved communication	3	8.6
Implemented new services	2	5.7
Changed integrated library systems	2	5.7

Again, this may be due to the relatively small size of the academic institutions surveyed. Larger institutions may be more likely to push responsibility for technical services assessment down to the managerial or administrative head of those units or divisions. The results of assessment activities are reported primarily through either the library's annual report or informational reports to the library's administration. Outcomes of assessment activities included the reallocation of staff, more streamlined processes, and making decisions related to collection development.

It is clear that while most Pennsylvania academic libraries perform some assessment of technical services activities, the assessment is heavily weighted toward quantitative assessment and the collection of statistics. Academic libraries would benefit from an assessment toolkit at their disposal that would facilitate the planning and implementation of a qualitative assessment program. Such a toolkit should include instructions and suggestions for how academic library managers and administrators could create an assessment program that evaluates their technical services units and activities. It should also include examples of customer service surveys, focus group questions, benchmarking surveys, workflow analysis projects, and other types of qualitative and quantitative assessment practices that administrators could emulate, adopt, and modify for use in their libraries.

Further research on this topic would be useful. Studies that focus on specific assessment methods, such as the use of customer service surveys, focus groups, or benchmarking, would be helpful. Research on whether the type of assessment conducted correlates to specific outcomes would also be of interest. The author's current research involves the use of benchmarking as a tool for assessment in cataloging, and her future research plans include the replication of this study on a national scale. The author is hopeful that the increased attention on assessment will lead to a more programmatic and consistent use of assessment tools to evaluate the effect of technical services activities on their customers.

References and Notes

1. Association of College and Research Libraries, *Value of Academic Libraries: A Comprehensive Research Review and Report*, researched by Megan Oakleaf (Chicago: Association of College and Research Libraries, 2010), accessed June 13, 2013, www.acrl.ala.org/value.
2. Association for Library Collections and Technical Services, "Turning Statistics into Assessment: How can Technical Services Measure the Value of Their Services?" accessed October 9, 2013, www.ala.org/alcts/turning-statistics-assessment-how-can-technical-services-measure-value-their-services.
3. *Proceedings of the Library Assessment Conference: Building Effective, Sustainable, Practical Assessment, September 25–27, 2006, Charlottesville, VA* (Washington, DC: Association of Research Libraries, 2007); *Proceedings of the 2008 Library Assessment Conference: Building Effective, Sustainable, Practical Assessment, August 4–7, 2008, Seattle, WA* (Washington, DC: Association of Research Libraries, 2009); *Proceedings of the 2010 Library Assessment Conference, Building Effective, Sustainable, Practical Assessment, October 24–27, 2010, Baltimore, MD* (Washington, DC: Association of Research Libraries, 2011), accessed June 13, 2013, <http://libraryassessment.org/bm~doc/proceedings-lac-2010.pdf>.
4. *Library Assessment Conference: Building Effective, Sustainable, Practical Assessment, October 29–31, 2012, Charlottesville, VA* (Washington, DC: Association of Research Libraries, 2012), accessed June 13, 2013, <http://libraryassessment.org/bm~doc/2012Program.pdf>.
5. Stephanie Wright and Lynda S. White, *SPEC Kit 303 Library Assessment* (Washington, DC: Association of Research Libraries, 2007).
6. *Ibid.*, 22.
7. Sheri Webber, "Applying Program Assessment Techniques to Electronic Resources Management," *Technical Services Quarterly* 22, no. 1 (2004): 9–20.
8. Gail Herrera et al., "Technical Services Serials and Monographic Ordering Assessment," *Technical Services Quarterly* 24, no. 1 (2006): 45–62.
9. Patricia Dragon and Lisa Sheets Barricella, "Assessment of Technical Services Workflow in an Academic Library: A Time-and-Path Study," *Technical Services Quarterly* 23, no. 4 (2006): 1–16.
10. Gail Herrera et al., "Technical Services Cataloging and Database Maintenance Assessment," *Technical Services Quarterly* 23, no. 3 (2006): 51–72.
11. Paoshan W. Yue and List Kurt, "Nine Years after Implementing the Unthinkable: The Cessation of Periodical Check-in at the University of Nevada, Reno," *Serials Librarian* 61, no. 2 (2011): 231–52.
12. Anne Chase and Tony Krug, "New Techniques in Library Technical Services at the Appalachian College Association," in *Library Workflow Redesign: Six Case Studies*, ed. Marilyn Mitchell, 8–20 (Washington, DC: Council on Library and Information Resources, 2007).
13. Debra K. Andreadis et al., "Cooperative Work Redesign in Library Technical Services at Denison University and Kenyon College," in *Library Workflow Redesign: Six Case Studies*, ed. Marilyn Mitchell, 39–49 (Washington, DC: Council on Library and Information Resources, 2007).
14. Christopher B. Loring, "Increasing Productivity through Workflow Redesign at Smith College," in *Library Workflow Redesign: Six Case Studies*, ed. Marilyn Mitchell, 50–59 (Washington, DC: Council on Library and Information Resources, 2007).
15. Norm Medeiros, "Managing Electronic Resources in the Tri-College Consortium," in *Library Workflow Redesign: Six Case Studies*, ed. Marilyn Mitchell, 60–72 (Washington, DC: Council on Library and Information Resources, 2007).
16. Muriel Godbout, "Preparing an Item for Circulation While Streamlining the Workflow between the Acquisitions and Cataloging Offices," *Indiana Libraries* 26, no. 4 (2007): 59–67.
17. Rebecca Schroeder and Jared L. Howland, "Shelf-Ready: A Cost-Benefit Analysis," *Library Collections, Acquisitions & Technical Services* 35, no. 4 (2011), 129–34.
18. Kristof Stouthuysen et al., "Time-Driven Activity-Based Costing for a Library Acquisition Process: A Case Study in a Belgian University," *Library Collections, Acquisitions & Technical Services* 34, no. 2 (2010), 83–91.
19. *Ibid.*, 90–91.
20. Karen E. K. Brown, "Use of General Preservation Assessments: Process," *Library Resources & Technical Services* 49, no. 2 (2005): 90–106.
21. Karen E. K. Brown, "Use of General Preservation Assessments: Outputs," *Library Resources & Technical Services* 50, no. 1 (2006): 58–72.
22. Mary Miller, "Archivist, Assess Thyself: On-line Tools for Preservation Assessments," *MAC Newsletter* 35, no. 3 (2008): 25–26.
23. Erin Stalberg and Christopher Cronin, "Assessing the Cost and Value of Bibliographic Control," *Library Resources & Technical Services* 55, no. 3 (2011): 124–37.
24. Magda El-Sherbini and Sherab Chen, "An Assessment of the Need to Provide Non-Roman Subject Access to the Library Online Catalog," *Cataloging & Classification Quarterly* 49, no. 6 (2011): 457–83.
25. Erik Mitchell, "Assessing the Value of Metadata in Information Services," *Technical Services Quarterly* 30, no. 2 (2013): 187–200.
26. Deana Groves, "Online Work Tools: A Look at 20 Academic Libraries Technical Services Web Pages," *Library Collections, Acquisitions & Technical Services* 29, no. 4 (2005): 395–402.
27. Kavita Mundle, Harvey Huie, and Nirmala S. Bangalore,

- “ARL Library Catalog Department Web Sites: An Evaluative Survey,” *Library Resources & Technical Services* 50, no. 3 (2006): 173–85.
28. The website on which the directory of Pennsylvania academic libraries is no longer available. Another resource for similar information is the *2012 Directory of Pennsylvania Libraries*, accessed June 13, 2013, www.portal.state.pa.us/portal/server.pt/community/bureau_of_library_development/8810/online_library_directory/606694.
 29. Pennsylvania has four state-related universities: Lincoln University, Temple University, Pennsylvania State University, and the University of Pittsburgh.
 30. The Pennsylvania State System of Higher Education includes fourteen universities: Bloomsburg University of Pennsylvania, California University of Pennsylvania, Cheyney University of Pennsylvania, Clarion University of Pennsylvania, East Stroudsburg University of Pennsylvania, Edinboro University of Pennsylvania, Indiana University of Pennsylvania, Kutztown University of Pennsylvania, Lock Haven University of Pennsylvania, Mansfield University of Pennsylvania, Millersville University of Pennsylvania, Shippensburg University of Pennsylvania, Slippery Rock University of Pennsylvania, and West Chester University of Pennsylvania.

Appendix A. Survey Invitation Sent to Library Directors

I would like to invite your institution to participate in a brief survey on Pennsylvania academic library technical services assessment practices. The purpose of the survey is to investigate what assessment activities are conducted, who is responsible for technical services assessment, how the results of the assessment activities are shared with others, and how those results are used to improve services, or for other purposes. Please forward this message to the person in your organization who holds primary responsibility for carrying out technical services assessment activities:

<https://surveys.libraries.psu.edu/TakeSurvey.aspx?SurveyID=7130969>

The survey includes 12 questions and should take no longer than 10–12 minutes to complete. All questions are optional, and you can quit the survey at any time. No identifying information will be shared in any way, whether through presentation or publication; all survey respondents and institution names will remain confidential.

For the purposes of this survey, technical services are defined as units responsible for Cataloging/Metadata, Acquisitions, Electronic Resources Management, and Preservation/Bindery/Physical Processing.

For the purposes of this survey, customers are defined as faculty, staff, students, and/or members of the general public that use your resources for research or other purposes.

In addition to the online survey, I would be interested

in obtaining any documentation related to technical services assessment that you are able to share. This may include:

- Links to online statistics or reports
- Print documents reporting on assessment activities (e.g., annual report)
- Procedural documents regarding assessment activities

Please send URLs for documentation to rlm31@psu.edu or mail print documents to Rebecca Mugridge, 126 Paterno Library, University Park, PA 16802.

The survey will be open until August 31, 2012. I've attached two Word versions (.doc and .docx) if you would prefer to complete it on paper.

The results of the survey (without any identifying information) will be shared at a presentation at the Pennsylvania Library Association Annual Conference, September 30, 2012, in Gettysburg, PA.

Thank you,
Rebecca L. Mugridge

Head, Cataloging and Metadata Services
Pennsylvania State University Libraries
126 Paterno Library
University Park, PA 16802
email: rlm31@psu.edu
phone: 814-865-1850 fax: 814-863-7293

Appendix B. Survey

Technical Services Assessment: A Survey of Pennsylvania Academic Libraries

Academic libraries regularly assess the services that they provide to their customers, including the faculty, staff, or students of their institutions, and often members of

the general public. Library technical services units serve customers by acquiring library materials, providing timely access to them, and preserving those collections for future

use. This study will look at the assessment activities used by Pennsylvania academic libraries' technical services units to evaluate the success of their activities.

For the purposes of this survey, technical services are defined as units responsible for Cataloging/Metadata, Acquisitions, Electronic Resources Management, and Preservation/Bindery/Physical Processing.

For the purposes of this survey, customers are defined as faculty, staff, students, and/or members of the general public that use your resources for research or other purposes.

Please complete only one survey response per institution.

1. What is the name of your institution? (Optional: This information will not be shared; it is only to ensure that there is only one survey response per institution.)
2. Is your institution public or private?
 - a. Public
 - b. Private
3. How many employees (Full Time Equivalent) work in the Library? You may answer in fractions, e.g., 4.5 FTE.
 - a. Librarians
 - b. Staff
 - c. Hourly Staff/Students
4. How many employees (Full Time Equivalent) work in Technical Services? You may answer in fractions, e.g., 4.5 FTE.
 - a. Librarians
 - b. Staff
 - c. Hourly Staff/Students
5. Does your library conduct assessment of technical services activities?
 - a. Yes
 - b. No
6. Which specific assessment methods do you currently use or have used in the past to assess technical services activities? Select all that apply:
 - a. Gather statistics
 - b. Gather usage data
 - c. Collect anecdotes or feedback from customers
 - d. Conduct customer service surveys
 - e. Conduct focus groups
 - f. Gather input from non-technical services librarians or staff
 - g. Anonymous suggestion box
 - h. Benchmark with other institutions
 - i. Other (please describe)
7. What are the goals of the technical services assessment activities at your institution? Select all that apply:
 - a. Improve services
 - b. Explore offering new services
 - c. Improve or streamline processes
 - d. Reallocate staff or other resources
 - e. Compare with other institutions
 - f. Make better decisions
 - g. Inform strategic planning activities
 - h. Other (please describe)
8. Which of the following departments or units has your library assessed within the past five years?
 - a. Cataloging/Metadata
 - b. Acquisitions
 - c. Electronic Resources Management
 - d. Preservation/Bindery/Physical Processing
9. Who has primary responsibility for conducting technical services assessment activities?
 - a. Library Director, Dean, University Librarian
 - b. Division Head
 - c. Department Head(s)
 - d. Unit Head(s)
 - e. Committee
 - f. Single librarian
 - g. Single staff member
 - h. Other (please describe)
10. How do you report the results of your technical services assessment activities? Select all that apply:
 - a. Informational report to library administration
 - b. Library newsletter article
 - c. Campus newsletter article
 - d. Mass email to library employees
 - e. Mass email to campus employees
 - f. Annual report
 - g. Presentations
 - h. Web site
 - i. Other (please describe)
11. Please provide examples of outcomes that you have made to technical services' policies, procedures, or services based on information that you learned from your assessment activities.
12. Please provide any additional information about your library's technical services assessment activities that might help with the analysis of this survey.

Power and Change in the US Cataloging Community

The Case of William E. Studwell's Campaign for a Subject Cataloging Code

Steven A. Knowlton

The US cataloging community is an interorganizational network with the Library of Congress (LC) as the lead organization, which reserves to itself the power to shape cataloging rules. Peripheral members of the network who are interested in modifying changes to the rules or to the network can use various strategies for organizational change that incorporate building ties to the decision-makers located at the hub of the network. The story of William E. Studwell's campaign for a subject heading code illustrates how some traditional scholarly methods of urging change—papers and presentations—are insufficient to achieve reform in an interorganizational network, absent strategies to build alliances with the decision makers.

The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man.

—George Bernard Shaw¹

I came in and said I wanted to help. Dead silence. "Who sent you?" the committeeman said. I said, "Nobody." He said, "We don't want nobody nobody sent."

—Abner Mikva²

Steven A. Knowlton (steven.knowlton@memphis.edu) is Collection Development Librarian at the University of Memphis.

Submitted August 22, 2013; tentatively accepted pending minor revision November 4, 2013; revision submitted November 19, 2013; accepted for publication January 23, 2014.

The author is grateful to Perveen Rustofram for introducing him to the idea of interorganizational networking, and to William Studwell, Lois Chan, Michael Gorman, John Hostage, Sheila Intner, and Mary K. Pietris for sharing their memories.

In some ways the early 1990s was a time of wonders, in the wider world and in libraries: as long-standing international tensions eased, library patrons began to enjoy expanded access to materials via online services. These *anni mirabiles* gave hope to the long-cherished dream of a maverick cataloger, as William E. Studwell wrote, "If two incredible occurrences like the dissolution of the Soviet Union and an agreement between Israel and the Arabs can take place, a much more attainable goal like a subject code is well within the realm of possibility." For all his hope, however, Studwell acknowledged that "ignorance, apathy, and negativism" on the part of librarians had all but crushed his aspirations.³ Although Studwell strove mightily to persuade the library community to adopt his idea, his efforts were ultimately fruitless.

An examination of Studwell's campaign for a subject heading code will reveal that mere ideas, no matter their worth, cannot succeed in the face of an interorganizational network that requires knowledge of and access to decision-makers to implement change. The nature of the US cataloging community and its centers of power can be illuminated by studying its structure and exploring how Studwell failed to persuade those who most needed to be persuaded.

Sociologists who study power relationships classify them according to the locus of power—it may reside in an individual, be latent in a social structure, or be made manifest via hierarchy.⁴ However, none of the classic descriptions of such relationships applies exactly to the community of libraries that shares cataloging data in the United States. It might formally be described as an “interorganizational network” that is “characterized by recurring exchange relationships among a limited number of organizations that retain residual control of their individual resources yet periodically jointly decide over their use.”⁵ Many libraries, serving unique communities of users, may develop their own cataloging data that are shared freely with other libraries in the expectation that they will be able to use data generated by their partners when the need arises; other libraries simply use the records on offer without contributing any of their own.

However, unlike in most nonlibrary networks, the participants in shared cataloging are not on equal footing in defining the terms of their interactions. For reasons of history and economics, the largest participant in the network—the Library of Congress (LC)—dominates the discussion about how cataloging data are to be formatted. In the case of the most commonly used subject access vocabulary, the Library of Congress Subject Headings (LCSH), LC maintains complete control over the list of headings.⁶ Libraries are free to adapt the records for local use (see Sanford Berman's collected writings for examples of this approach).⁷ However, libraries that create records for use by other institutions using LCSH typically comply with the standards established by LC for the subject headings because other libraries in the network often expect the records to resemble LC records and have configured their systems to operate using LC-compatible records.

Initiating and sustaining change within the interorganizational network that is the shared cataloging community presents numerous challenges—some that are described in the literature about organizational change, and others that can be understood using the tools of network theory. This study analyzes a case of failed organizational change to illuminate the challenges of organizational change within a network dominated by a single partner that has a monopoly on the terms of exchange. The campaign by William E. Studwell to persuade LC to adopt a subject cataloging code illustrates the limits on network partners imposed by LC's control over data formatting rules.

This paper will begin by describing the structure of interorganizational networks and will show how the US cataloging community functions as one. It will then explore the ill-fated attempts by Studwell to reform LCSH and examine why an understanding of power and change are crucial to a reformer's chances of success.

The Nature of Interorganizational Networks

The interorganizational network is a strange beast—to a business writer, it is “neither market nor hierarchy,” but a librarian might consider it neither a hierarchy nor a vendor.⁸ The formation of interorganizational networks has many motivations, including seeking cost savings, maintaining access to resources, and developing skills among the staff of member organizations. However, Powell points out that, unlike other forms of resource exchange, in interorganizational networks “the sharing of information . . . often leads to the emergence of common values.”⁹ The interorganizational network, then, has a self-sustaining quality: as members come together to achieve a common purpose, their endeavors create a set of common values that inform future activities.

Despite common goals and values among members of a network, there is not equality of influence on the network's rules and activities. Given that “governance may have definite impacts on network outcomes,” anyone working within a network must understand its power structure—which, in the shared cataloging network, is “lead organization governance.”¹⁰ As Provan and Kenis write, “in lead organization governance, all major network-level activities and key decisions are coordinated through and by a single participating member, acting as a lead organization. Thus, network governance becomes highly centralized and brokered, with asymmetrical power.”¹¹ In the case of the US cataloging network, LC plays an important role in developing cataloging rules and acts as the primary gatekeeper of the distribution of cataloging metadata within the network, while reserving to itself the ability to make changes to the controlled vocabulary and authorities.

Governance, however, can be distinguished from leadership. Governance concerns “how the network is structured.”¹² Leadership is “making things happen,” and may occur within or without the formal structures of governance.¹³ For things to happen, a leader (whether a person or an organization) is required to bring the governing body to agreement that the initiatives under discussion are beneficial to the members of the network—and in the case of a lead organization-governed network, that the proposals will redound to the good of the lead organization in particular.

A would-be leader from outside a lead organization is faced with multiple challenges. In addition to the ordinary challenges facing all leaders—correctly analyzing situations,

developing appropriate solutions to problems, and implementing them throughout a bureaucracy—those on the periphery of a network must also somehow penetrate the barriers to access presented by the lead organization's governance model. This task is made doubly difficult not only by the formal structures inhibiting leadership from the margins, but also by the informal (but no less powerful) interactions in which those who hold power are able to control the very discussions about their control.

The formal structures of lead organization governance require that someone, often a person highly placed, must approve of initiatives led by outsiders. But even bringing those initiatives to the attention of such powerful actors is hindered by the nature of power relations within networks. In a meta-analysis of studies on interorganizational networks, Brass et al. found that the centrality of a decision-maker within the network is more indicative of his power to influence decisions than is any behavior he exhibits.¹⁴ Bradshaw and Boonstra point out that organizational power is self-perpetuating: "In organizations, the distribution of power is often characterized by stability. This stability results from a commitment to decisions concerning the realization of the business strategy, the structuring of the organization, and the distribution of power that emerged from the past."¹⁵ Compounding this concentration of power are the tools used to variously include or exclude those seeking to influence decision-makers. Hardy and Clegg note, "A variety of barriers are available to the more powerful groups to prevent subordinates from fully participating in the decision-making process through the invocation of procedures and political routines. The use of these mechanisms has been termed non-decision-making, because it allows the more powerful actors to determine outcomes from behind the scenes."¹⁶

One seeking to be a change agent in an interorganizational network must identify where power is truly located and build ties that allow one to bypass the institutional barriers erected to keep marginal network members out of the decision-making process. Yukl identifies a variety of tactics for persuading power brokers to make a change, but notes that "change agents who have political power and skill are more likely to be successful in initiating and facilitating major changes in large organizations."¹⁷ Yukl's list of tactics (in descending order of "perceived effectiveness" according to a poll of managers) includes rational persuasion, inspirational appeals, collaboration, consultation, appraisal, coalition tactics, ingratiation, pressure, exchange, and personal appeal.

When Studwell approached the cataloging community with his ideas for change, he lacked important ties to centrally located decision makers and misjudged the power of his ideas and the effectiveness of his presentation of the ideas. He began from a position on the periphery of the network and failed to make meaningful connections to those with power to implement changes; furthermore, his use of

a limited number of tactics was hampered by his failure to apply the tactics in the ways that are known to be most effective.

The US Cataloging Community as an Interorganizational Network

Although the US cataloging community has been an interorganizational network for many years, it was not founded as one. The actions of LC and developments in technology have gradually created a series of incentives for libraries to rely on LC as the hub of a data-sharing network, which has become formalized more recently.

Cataloging in the US was systematized in the nineteenth century by numerous librarians working separately—Charles Jewett, William Poole, Ezra Abbot, Charles Cutter, Frederick Perkins, Melvin Dewey and Mary Salome Cutler, K. A. Linderfelt, and others developed their own cataloging codes.¹⁸ An 1893 survey found at least seven different sets of rules in active use in American libraries.¹⁹ The profusion of codes gave way to a spirit of cooperation, and in 1908, the American Library Association (ALA) published a cataloging code that was widely adopted.²⁰ The ALA code was for descriptive cataloging only and did not address subject headings. Subsequent descriptive cataloging codes have been adopted by ALA in conjunction with other English-speaking library organizations. However, to date there is not a cooperatively developed code for creating subject headings. American catalogers still rely on subject headings formulated by LC or on rules promulgated by LC for devising new headings.

LCSH grew from a list of headings prepared by the ALA in 1895 and adopted by LC for its own use in 1898.²¹ After LC began distributing its catalog cards to other libraries in 1901, the use of LC's subject headings—and therefore Cutter's rules—slowly became nearly universal.²²

After 1901, use of LC cataloging copy grew exponentially. By 1914, 1,986 libraries in the United States and Canada were buying catalog cards from LC, and the number grew to 5,738 in 1935, which represented a large majority of the libraries on the continent.²³ In short order, the libraries of the United States had moved from an environment of many cataloging codes and philosophies to a monoculture of cataloging according to LC standards. As early as 1908, the ALA Cataloging Code was designed to conform to LC practices.²⁴ Henderson remarked that "once LC had begun to issue *some* cards, the libraries expected it to fill *all* their cataloging needs."²⁵ Later, the broad adoption of LC Classification (LCC) in larger libraries had much to do with "the simple fact that the LC symbols appeared more consistently and completely on Library of Congress printed cards," saving libraries the trouble of classifying their books according to Dewey Decimal or some other scheme.²⁶

Libraries that were purchasing LC cards sought to maintain consistency by using LC's subject headings in their own original cataloging. There was public demand for LC to share the updated list of subject headings that had been adopted since the ALA list was published in 1895. LC had begun an internal authority file in 1898 and used it to prepare the first edition of *Subject Headings Used in the Dictionary Catalogs of the Library of Congress* in 1909.²⁷ That list, renamed *Library of Congress Subject Headings*, has been through thirty-three print editions and is now mostly used as a data file accessible via the Internet.

For various reasons that have been explored elsewhere, LCSH evolved into a system "based on precedent and analogy rather than on formal rules."²⁸ Its harshest critics pointed out that some headings were "absolutely hilarious, outrageously offensive, or just plain mysterious."²⁹ A large body of library literature criticizing LCSH accumulated over the years, often calling for LC to be more forthcoming about the methods of formulating headings or to develop formal standards for creating headings.³⁰ The Vatican Library prepared a cataloging code that incorporated rules for creating subject headings on the basis of LC practice; however, an English translation was not available until 1948, and it was never presented as a guide for American catalogers.³¹

LC responded to such criticisms by publishing Haykin's *Subject Headings: A Practical Guide*, issuing the regular periodical *Cataloging Service Bulletin*, printing *A Guide to Subdivision Practice*, and eventually making public its internal *Subject Cataloging Manual: Subject Headings (SCM)*.³² Through the 1960s and 1970s, LC committed itself to incremental changes that constituted "improvement of the list in its present terms. . . . This course provides the obvious advantages of orderly evolution."³³ These improvements and publications were of immense practical value but did little to stanch the tide of criticism about the structure of LCSH.

For many years, use of LC's cataloging data was largely a take-it-or-leave-it proposition: a library could order LC's cards and use or modify them, but had no means to provide cataloging data or useful criticism back to LC. An attempt in the 1930s and 1940s to create a formal network for libraries to contribute cataloging data to LC foundered, largely on LC's reluctance to use many of the records contributed by partner libraries.³⁴ However, in the late 1960s, the development of the MARC format for computerized storage of bibliographic data, along with telephony-based data exchange, allowed for libraries to develop electronic networks for sharing cataloging records—the earliest, OCLC, was online in 1971 and immediately successful at increasing productivity and reducing costs.³⁵ At this point, "LC made a defining shift in its approach to cooperative projects," using the OCLC database to share its serials records and allowing selected libraries to modify them for the use of all.³⁶ The Cooperative Online Serials Program, or CONSER, was followed by

cooperatives for name authority records (NACO) in 1977, subject authority records (SACO) in 1992, and bibliographic records (BIBCO) in 1995; collectively these networks are the Program for Cooperative Cataloging (PCC).

Although these cooperative efforts are, according to Wiggins, "very democratic in nature, with most members having voting rights," the rules by which records are created are those of LC.³⁷ All proposals for changes to established authority records must be cleared by LC before they are used by other libraries in the program, and the creation of new records proceeds according to rules established by LC. Although libraries across the country take advantage of OCLC, and PCC members participate in shared governance of the cooperative, LC reserves for itself the power to "determine outcomes" in formulation of LCSH, as Hardy and Clegg have named this process.

As an interorganizational network, the cataloging community in the United States has at its center LC. An examination of the case of one librarian at the periphery of the network who sought to change the way the network operated will illustrate the institutional power to preserve prerogatives and the limitations on those who seek to be change agents.

William E. Studwell's Campaign for a Subject Heading Code

To the reader perusing the cataloging literature of the 1980s and 1990s, one name appears repeatedly in the tables of contents of numerous journals: William E. Studwell (1936–2010). In fact, Studwell was adjudged among the most prolific writers on library topics in each of those decades.³⁸ Many of his papers were focused on a single topic: establishing a subject cataloging code, similar to the Anglo-American Cataloging Rules (AACR) for descriptive cataloging. Despite efforts so vigorous that Henderson characterized his activities as a "crusade," Studwell and those who participated in his lobbying had little effect on the institutional policies governing subject headings.³⁹ His initial presentation of his ideas kicked off a brief period of debate, but interest waned quickly. Notwithstanding his copious output, Studwell has seldom been referenced by other authors, and a subject cataloging code has not yet been adopted. Studwell failed to form political relationships close to the core of the network, and his use of certain tactics, such as rational persuasion, inspirational appeals, and coalition tactics failed not only because of his distance from the center of power but also because his use of such tactics was often less adept than necessary.

William E. Studwell's Background and Career

Studwell began his academic career at the University of Connecticut, where he studied history as an undergraduate

and earned a master's degree in European history. His ability to speak and read Russian led to a position at LC's Soviet and Russian division, and while working there he earned his master of library science degree from Catholic University in 1966. In 1970, he started as head cataloger at Northern Illinois University in DeKalb, becoming principal cataloger in 1983 and earning promotion to full professor; he enjoyed a long career in cataloging before retiring in 2001. He made many contributions to the profession, such as designing the index for the 18th edition of *Dewey Decimal Classification*, serving on many committees of professional organizations, editing publications, presenting talks, and writing both a book of exercises for training catalogers and a practical guide for subject cataloging of films and videos.⁴⁰ Most prominent of his professional activities was his writing: by the time he retired, Studwell had published 3 monographs and 119 papers on topics of librarianship. In addition to his professional interests as a librarian, Studwell wrote extensively on the lives of composers and songwriters, ballets and operas, and popular songs. He achieved a small measure of renown as one of the world's leading authorities on Christmas carols.⁴¹

Studwell's activism on behalf of reforming LCSH must be considered in the context of cataloging in the 1970s and 1980s. This period saw many profound changes to the way catalogers went about their work. The rules for descriptive cataloging had changed twice in a dozen years, with the second change (AACR2, implemented in 1981) requiring retrospective changes to thousands of catalog cards; the International Standard Bibliographic Description (ISBD) and its derivatives were introduced; and the first computerized catalogs went online.

Despite reforms in the administration of LCSH, discontent with the system remained strong among many catalogers. A brief survey of paper titles may provide some idea of the passions aroused by LCSH: "Subject Headings Trauma"; "Subject Headings Muddle"; "Poland is Not Yet Defeated, Or: Should Catalogers Rewrite History? With a Discourse on When is an Island Not an Island?"; "The End of Specificity"; "Coping with Subject Heading Changes"; "Subject Headings, Silly, American—20th Century—Complications and Sequelae—Addresses, Essays, Lectures"; "Library of Congress Subject Headings: Is Euthanasia the Answer?"; and "Can Subject Headings Be Saved?"⁴² In this environment, a self-described "gadfly" could see opportunities to put forth ideas for change that would find an accepting audience.⁴³

Studwell's Approach to LCSH

By the early 1980s, Studwell was in agreement with those who called for change in LCSH, and he began to publish his views frequently in library journals. His first attempts at publicly advocating reform took the shape of a series of ten

lengthy papers, published in *Cataloging and Classification Quarterly* between 1982 and 1987. Each paper proposed additions to the period subdivisions used for subject headings related to a geographic area (such as Ethiopia—Economic conditions—1889–1974).⁴⁴ In these papers (often written in collaboration with colleagues), he proffered suggestions for more than 200 separate jurisdictions—each requiring research into the history and existing subject heading period subdivisions of a region. LC later adopted some, but not all, of his suggestions. It is interesting to note that Studwell's articles in this series consistently repeat that the "proposed additions given are suggestions . . . not to provide absolute answers, but to promote awareness of the incompleteness of LC's period subdivisions."⁴⁵ There is no indication that Studwell contacted anyone at LC to propose new subdivisions.

The Subject Heading Code: First Proposals

Studwell's next, and most momentous, effort to reform LCSH was the proposal of a subject heading code: that is, a set of rules similar to AACR by which subject headings would be formulated and assigned. He was not the first librarian to make such a proposal, as he was careful to note. In 1944, Henry B. Van Hoesen proposed "Twelve Rules for Economy in Subject Headings," and in 1979, Sanford Berman published "Proposed: A Subject Cataloging Code for Public School and Community College Libraries."⁴⁶ However, these efforts were practical suggestions to improve the practice of assigning headings; what Studwell proposed was a more thorough delineation of the principles underlying subject headings—a "comprehensive theoretical code" that would cover the philosophy, structure, and form of subject headings. Studwell's first publication of his proposal came in fall 1985, with "Why Not an 'AACR' for Subject Headings?"⁴⁷ In this paper, he outlined the past efforts of his colleagues and proposed a plan and process for creating a subject heading code (he favored collaboration between LC and other librarians, much as had been done in the creation of AACR); he also defended the usefulness of LCSH against those who favored abolishing it. Studwell acknowledged LC's efforts at sharing information regarding their practices, but averred, "This data is very useful, but unfortunately leaves too many questions unanswered. . . . What is really needed is a comprehensive set of guidelines designed to serve all aspects of subject cataloging and which are flexible enough to accommodate the seemingly unending requirements for change."

Over the next two years, Studwell followed up his initial proposal with papers aimed at convincing academic librarians and map librarians of the necessity for a subject heading code.⁴⁸ He also gave presentations at the Seminar on the Acquisition of Latin American Library Materials in May

1987 and the Canadian Committee on Cataloging in October 1987. With the fervor of an evangelist, Studwell took his message to every audience that would hear him.

In December 1987, Studwell attracted massive attention to his idea by placing an article in *American Libraries*, the magazine distributed to all ALA members.⁴⁹ In "The 1990s: Decade of Subject Access," Studwell asserted that the emerging technology of keyword searching would not alleviate the problems of subject access presented by the state of LCSH. He proposed that "with the formulation of a theoretical subject heading code, the third phase in the maturation of modern cataloging will be completed," the first two phases having been the rationalization of descriptive cataloging rules under AACR and the creation of LC's online authority files. Presciently, Studwell also described obstacles to the creation of a subject heading code. They included general resistance to change, a lack of foundational principles (like the Paris Principles which had been the foundation of AACR), and the heavy workload of LC's cataloging staff. He concluded, however, that a concerted effort from librarians outside of LC could relieve that institution of some of the effort and produce a subject heading code by the end of the twentieth century.

The primary rationale presented by Studwell for such a massive undertaking was that

despite some opinion to the contrary, the many retrieval problems of LC subject headings will not diminish with the increased use of computers to access materials. Keyword searching will aid somewhat in the subject-retrieval process, but it can by no means substitute for a logically structured, semantically effective subject-heading system that provides qualitatively accurate and quantitatively adequate headings for the spectrum of human knowledge.

To compensate for "the very heavy workload of LC's Subject Cataloging Division," Studwell volunteered "to serve as an intellectual clearinghouse external to LC to gather and preserve the ideas and suggestions others may contribute toward the betterment of LC subject headings. . . . If the clearinghouse activity does not appeal to some, the alternative avenues of publication or direct contact with LC are always available."

Reaction to the Proposal for a Subject Heading Code

Once Studwell had the library community's ear, reactions to his proposals came frequently in the next few years. Mary K. D. Pietris, chief of LC's Subject Cataloging Division, was allowed a response to his piece "The 1990s: Decade of Subject Access" on the same page in *American Libraries*. It

seems that Studwell's paper had taken her by surprise; she even sounds a bit defensive:

The need expressed to the Library of Congress by its constituents has always been for LC to explain its principles and policies for creating and assigning subject headings. In response to this need, in the last three years the Library has published two editions of the *Subject Cataloging Manual*. . . . The Library plans to develop sections for the *Manual* that describe the basic philosophy of assigning headings and of creating new headings. . . . The Library frequently raises issues for the consideration of the American Library Association through the ALA committee responsible for matters of subject access [the Subject Analysis Committee (SAC)] . . . we also respond to issues brought to our attention by the Subject Analysis Committee. . . . We believe that our current practice of working with ALA's SAC is effective, and that a more complete *Manual* is needed. We are not aware of any needs relating to a code that the *Manual* will not satisfactorily fill.⁵⁰

Relatively early in his campaign for a subject heading code, Studwell reached a point of crisis, born largely from his politically naive approach. Recalling Bradshaw and Boonstra's admonitions that "the change agent must align with those in power and then influence them to desire and accept the changes," one can see that Studwell's approach of presenting a preformed idea that served as an implicit public criticism of LC was diametrically opposed to the successful approaches to change management identified by those who have studied organizational change.⁵¹ Studwell persisted for several more years, mostly through writing and speaking, and less so through political action.

Despite Pietris' reaction, other catalogers sided with Studwell. Intner (later a collaborator with Studwell on a monograph about cataloging film and videos) published "ASCR: The American Subject Cataloging Rules (Part 1)" in July 1988, and followed with "The Trouble with Harry: ASCR (Part 2)" in September.⁵² She not only proposed a name for the subject heading code, she suggested some of the principles to be used, such as defining terms used as subdivisions and creating a standard for the use of subdivisions. Most importantly, she suggested that a subject heading code should be based on observed search behavior among library patrons. Wajenburg's "The Future of Cataloging Standards," published in September 1990, also lauded Studwell's goal, but feared it might be "utopian."⁵³

Pietris had made very clear the method through which LC would consider proposals for a subject heading code: formal consideration by the ALA's Subject Analysis Committee.

SAC, not to be confused with the Subject Authority Cooperative (SACO), is charged

to study problems and recommend improvements in patterns, methods, and tools for the subject and genre/form analysis and organization of library materials, including particularly classification and subject headings systems, and to provide liaison for those areas of interest between . . . ALA and non-ALA organizations that have an interest in and concern for these activities.⁵⁴

This committee discussed the subject heading code at the 1988 ALA Midwinter Meeting. It was noted that no one had made a formal proposal to either LC or ALA.⁵⁵ The group again discussed the code at the 1988 ALA Annual Conference in July, but no proposal for a subject heading code was adopted.⁵⁶

A savvy advocate of the subject heading code might have tried to employ what Yukl calls “coalition tactics”: “Mention credible people who support your proposal. . . . Bring someone along to help you in an influence attempt. . . . Get other people to provide evidence or an endorsement. . . . Ask for help from someone with higher authority.”⁵⁷ Perhaps the latter is most crucial. In a 2010 telephone interview with the author, Intner recalled that Studwell was not involved with ALA committees, and was not a familiar face to members of the SAC. As a peripheral member of the network of cataloging agencies, Studwell’s voice was easily disregarded by those with gatekeeping responsibilities. Had he attempted to work with members of SAC to introduce a resolution regarding a subject heading code, his ideas would at least have had some formal notice.

Negative reaction to the idea of a subject code in print came from Reynolds, who published “In Theory There is No Solution: The Impediments to a Subject Cataloging Code” in July 1989.⁵⁸ Unlike other papers on the topic published at the time, Reynolds did not reference Studwell’s proposal. Instead, she noted that subject catalogers had yet to agree on the purpose of subject headings, let alone principles for their formulation. Her assertion that the code was needed, but could not be attained, led her to disdain efforts to create a code. She did, however, advocate incremental steps to improve subject headings—many of which were similar to those proposed by Studwell in his two series on subject headings, “Subject Suggestions” and “Cataloging Forum: Subject Access Theory” (see below).

Further Development of Studwell’s Ideas

Studwell remained quite active in his quest to establish a subject heading code. In early 1988, he published (in collaboration with Paule Rolland-Thomas) “The Form and

Structure of a Subject Heading Code.”⁵⁹ This paper laid out, for the first time, Studwell’s conception of the practical necessities of a subject heading code. The authors envisioned two sections. The first section, containing the rules of subject cataloging, would have three parts: the theory behind LCSH (including logic and structure of headings, and grammar), specific rules applying to subject headings (including how and when to use secondary headings), and a series of subparts consisting of special rules for subject areas such as art or music. The second, and main, section would consist of lists of headings and subdivisions, with notes on their use—it would be loose-leaf and updated regularly.

In 1988, Studwell began a series of “Subject Suggestions” in *Cataloging and Classification Quarterly* relating to subject headings for various disciplines, including geography, science, literature, language, art, and social sciences. Through these pieces, Studwell brought attention to specific shortcomings in LCSH, and he developed concrete proposals to address those flaws. The “Subject Suggestions” included criticism of faulty logic in subject heading structures, omissions of important subdivisions, and missing cross-references. They were, in essence, samples of the type of work that Studwell planned to use in formulating a subject heading code.

Studwell also continued to explicate the advantages of a subject heading code in a series of papers in *Technicalities*. These papers ranged from those that explained the need for a code in terms of “user-friendly subject access” to dissecting resistance to the code as “Codeophobia.”⁶⁰ They included a regular column in *Technicalities*, “Cataloging Forum: Subject Access Theory,” that ran from September 1989 to August 1993, and covered LCSH (and the subject heading code in particular) through the developments of the early 1990s. Read together with the “Subject Suggestions,” the columns are a compendium of most of the information considered necessary by Studwell to assemble a subject heading code.

Simultaneous Developments in Subject Headings

From 1989 to 1991, the cataloging community made progress toward a more rational method of formulating and assigning subject headings; that it occurred simultaneously with Studwell’s continuing efforts to call attention to his plan is noteworthy. An important step was the publication of “A Subject Cataloging Code?” by Lois Mai Chan in 1989. While Chan disagreed with Studwell’s call for a complete set of rules (her feeling was that the SCM covered most contingencies), she agreed on the need for a statement of principles. Her tone was chary about the feasibility of the enterprise, however:

Who will develop the code? There appear to be two alternatives: (1) outside of the Library of Congress or (2) by the Library of Congress. . . . It would be unfortunate if either group takes on the responsibility without participation from the other. . . . The question is, then, who will take primary responsibility for the overall planning and code development? Three criteria should be considered in determining the vesting of responsibility: (1) available resources, (2) efficacy and efficiency, and (3) implications for implementation. In applying these criteria, the experiences in the development of AACR2 could be used as a point of reference.⁶¹

The fact that a librarian of Chan's prominence as one of the preeminent theorists and teachers of cataloging chose to write on the subject heading code is an indicator that the idea had gained some intellectual currency. Her note about using the development of AACR2 as a model might have given Studwell some important political direction, which he failed to follow.

Many developments related to a subject heading code followed in 1990; some were Studwell's work, and others came from LC or ALA. Studwell published a 114-page monograph, *Library of Congress Subject Headings: Philosophy, Practice, and Prospects*, which sold about nine hundred copies around the world, according to a 2006 letter Studwell wrote to the author.⁶² In the monograph, Studwell addressed issues raised by critics of a subject heading code, and developed thirty-two "Principles Relating to the LCSH System" (in structure, terminology, documentation and other topics). Some are principles derived from actual use of LCSH, but others are proposals for a logical basis from which to construct subject headings. He also developed fifteen "Principles Relating to the Application or Interpretation of LCSH," including considerations of display in online catalogs.

Studwell's monograph was his best chance at mastering the technique Yukl calls "rational persuasion": "logical arguments and factual evidence that a request or proposed change is important for the organization and feasible for the target person."⁶³ Combined with political connections, it is the most powerful technique for organizational change. However, it requires "persuasive skill, expertise about the request or proposal, and credibility with target persons."⁶⁴ In Studwell's case, his failure to refer to the work of others who had preceded him regarding subject headings undermined his claims to credibility.

Some of the "principles" that Studwell suggested should form the basis of a subject heading code included the following: "Consistency is the single most important characteristic in subject cataloging"; "Structural elements in LC subject headings must be simple"; "Rival headings' must be eliminated from LC subject headings"; and "Consistent and

clearly understood terminology must be used in LC subject headings."⁶⁵ These are fine practical suggestions for the format and structure of LCSH; however, they fail to address the semantic issues that should inform principles of any code for organizing information.

Considering Chan's and Studwell's recommendations that a subject heading code proceed along the lines of AACR, one would surmise that a statement of principles for subject access would resemble the "Paris Principles" for author and title entry that were the foundation of both editions of AACR. The Paris Principles provide an explanation of "Functions of the Catalogue" ("The catalogue should be an efficient instrument for ascertaining whether the library contains a particular book") and "Structure of the Catalogue" ("To discharge these functions the catalogue should contain at least one entry for each book catalogued") and clarify when a particular form of entry should be chosen under which circumstances.⁶⁶ Studwell's "principles" articulate nothing at such an elemental level, and they seem uninformed by the work of Charles Cutter, whose notions of "specific entry" and "direct entry" form the basis of any discussion about subject access. Later scholars who elaborated on Cutter's work, such as Pettee, Haykin, Dunkin, and Miksa, are also absent from Studwell's book.

Studwell's attempt to elevate practical matters to the level of principles was criticized by reviewers. Rinehart wrote, "The book seems peculiarly limited in that Studwell makes little or no acknowledgement of the contributions of history in the development of subject headings; no work of Charles Cutter appears even in the general bibliography, which is described by the author as 'good background material on the subject.'" Salmond commented that by concentrating on a list of technical gripes instead of first principles "it fails to convince that a philosophically-based code of subject cataloging is a possibility, or even a good idea."⁶⁷ By contrast, an endorsement came from Schnelling, who wrote, "if LCSH are improved, along the principles outlined and summarized by Studwell (and by the authors cited in the book), LCSH will become an instrument of subject cataloging feasible in the online age and rendering the investment that goes into it rewarding."⁶⁸

Although Studwell hoped his book would serve as "a collegial attempt to help improve the understandability and clarity of the system . . . and in other ways make the Library of Congress subject heading system and its application of even greater value to the cataloger and the user," it seems to have largely been ignored in the scholarly debate about LCSH.⁶⁹ Of seventeen citations to the book recorded in Google Scholar on July 23, 2013, nine of them were in Studwell's own later papers. A limiting factor on the effectiveness of rational persuasion is "perceived expertise and credibility"; by failing to engage subject heading research at its intellectual foundations, Studwell undermined his own

credibility as a proponent for change.⁷⁰

With the publication of his book, Studwell felt progress had been made toward a code. In two papers published in early 1990, he summarized the state of the movement for a code: ALA announced a major conference on the code for its Annual Conference in June, literature reviews had covered the topic for the first time, and LC promised to publish a work covering the principles underlying LCSH. Studwell stated that the library community was at a crossroads: either it could make a strong push to work collectively to create a code, or else it must settle for the SCM.⁷¹ Studwell presented papers at the Illinois Library Association and the Michigan Library Association in 1990, but his largest audience (more than six hundred people) was at the 1990 ALA Annual Conference.

The 1990 Annual Conference assembled some eminent voices to speak for a subject code. Among the speakers were Michael Gorman (editor of AACR2 and later president of ALA; at the time he was Dean of Library Services at the Henry Madden Library, California State University, Fresno); Mary Dykstra (a critic of the syndetic structure of LCSH and then Director of the School of Library and Information Studies at Dalhousie University); and Liz Bishoff (an authority on controlled vocabulary and later president of the Association for Library Collections and Technical Services, then Manager for Cataloging and Database Services at OCLC). Again, coalition tactics were being used to “influence the target” decision-makers; however, the absence of any speakers from LC made this tactic less effective.⁷²

Studwell himself spoke at the conference; besides summing up his arguments published over the previous years, he made a passionate personal plea:

In retrospect, I view my particular function in the movement toward a subject code to be somewhat similar, in a very minor way, to Martin Luther's role in the Reformation. At first Luther was just a local parish priest who was dissatisfied with policies and practices of the Catholic Church. At first I was just a local principal cataloger dissatisfied with the policies and practices of LC subject headings. Luther posted his 95 theses on the door of his church in Wittenburg in 1517. I published my seminal article on the subject code in *Cataloging and Classification Quarterly*, in 1985. After these initial probes, the two challenges to authority steadily grew and grew.

At a certain point, Luther was confronted by Church officials and was asked to back down on his efforts to reform. Luther, in one of the great moments in history, declared that his activities would continue and boldly proclaimed, ‘Here I stand!’ Like Luther, I too can say, ‘Here I stand,’

ready to devote my time, energy, and intellect towards continuing improvement and codification of LC subject headings. All of you out there should also, in similar manner, stand up for the subject code. Onward!⁷³

Aside from presenting a misunderstanding of Luther's pre-Reformation career—not simply a parish priest, he was the Chair of Biblical Theology at the University of Wittenburg—Studwell made a jumble of his attempt at the tactic of “inspirational appeal.”⁷⁴ This “attempt to develop enthusiasm and commitment by arousing strong emotions and linking a request or proposal to a person's values and ideals” is most successful when it appeals to the audience's self-image and links to a clear and appealing vision.⁷⁵ Librarians are often self-sacrificing, but martyrdom for the sake of an improved subject access system is probably beyond the average librarian's notion of a worthy death. Studwell's self-aggrandizing manner limited the appeal of his vision; although he claimed to be founder of a “movement,” he was a marginal participant in the interorganizational network who had failed to make the connections necessary to become influential in the decision-making hub.⁷⁶

Studwell's credibility may have been undermined to some extent by his determination to make a “movement” out of normal scholarly courtesies. Consider this announcement from 1988:

As a result of the November 1987 article, correspondence with two interested and supportive individuals was transacted. . . . The most concrete result was the development of an article on LC subject headings for geology. . . . As a result of other articles and a paper dealing with a comprehensive theoretical code of LC subject headings, the following developments have occurred: [here he lists the discussion of the topic at various meetings and the production of more articles.]⁷⁷

An announcement made in 1991 states:

All the articles, speeches, books, and meetings in recent years appear to be bearing potential fruit. The first clear written sign of it was possibly a May 17, 1990 letter received by this author. Sent by Lucia J. Rather, Director for Cataloging at LC, the letter was in response to an inquiry. Among other information, Rather confirmed an earlier oral pronouncement at ALA Midwinter, January 1990, about Lois Chan being asked to prepare “a document describing subject heading principles and practices as is currently carried out at the Library of Congress.” . . . More important than

these announcements was the specific language used by Rather. The opening sentence, “Thank you for your letter of March 27 regarding work on the development of an LC subject heading code,” was quite revealing. It could easily be interpreted as LC starting to edge toward the construction of a subject code although such an action was not explicitly stated.

Also of great interest was Rather’s statement concerning the work to be done by Chan, “We plan to use her document as input to new investigations regarding the future of LCSH.” It clearly suggests that LC is seriously considering substantial and meaningful changes to LC subject heading policy and practice. One of the possibilities, of course, is the development of a comprehensive all purpose theoretical subject heading code. . . . Another statement by Rather reinforces this apparent psychological outlook by LC. Her final sentence was “I appreciate your interest in this area which is of concern to us all.” The key words here are “concern” and “us all.” Rather is thereby indicating both the importance of the matter and the sharing of the handling of the problem between LC and others.⁷⁸

Studwell probably misled himself with this reading of Rather’s letter. Pietris, in a 2010 email to the author, reported that “we never thought that a separate body should write a subject heading code if that code was to guide the headings developed by and applied at the Library of Congress—the logical group to write such a code would be LC itself. . . . I believe that Mr. Studwell read more into his communications than was warranted.”

LC Makes Changes

Studwell’s work and that of others regarding improved subject headings did not occur in a vacuum. In November 1990, LC published *Library of Congress Subject Headings: Principles of Structure and Policies for Application* by Lois Mai Chan.⁷⁹ In sixty-five pages, Chan outlined fifteen principles of heading construction and eight general guidelines for assigning subject headings, along with many rules for special materials. The work is thorough, yet substantially supports Studwell’s contention that there is no firm set of principles. Most principles have caveats indicating that, while a principle usually applies to subject headings, certain exceptions (sometimes too numerous to list) exist.

In December 1990, “there followed a widely disseminated request by Glen Zimmerman, Director for Technical Processes Research at LC, for comments and responses to several position papers about LC subject headings.”⁸⁰ In

addition, LC announced a conference on the use of subject subdivisions, and commissioned several technical proposals to improve subject subdivisions. The conference, held at Airlie, Virginia, in May 1991, recommended six changes to the use of subject subdivisions, and LC agreed to a trial run for five years.⁸¹ At the end of the trial, it was agreed to accept all the changes.⁸²

The adjustments in subdivision rules were a major step toward rational assignment of subject headings; all categories of subdivisions were assigned a standard order within a subject heading, allowing users and catalogers to consistently predict how a heading would be structured. Studwell called it “nothing but good news” but at the same time managed to claim the shift of policy as “one which this author has been suggesting in writing since 1982.”⁸³ After the announcement of changes arising from the Airlie conference, LC continued to make smaller changes to individual subject headings to incrementally make LCSH more rational; many of the changes paralleled ideas that had been mooted during the discussion of a subject heading code.

Studwell’s role in these developments is debatable. Building on a literature survey about the topic of a subject headings code, in which more than 50 percent of the writings were his own, Studwell presented the innovations as responses to recent publications on the topic.⁸⁴ However, one might see them as a continuation of LC’s ongoing efforts to explicate LCSH, which had been happening since the 1960s. Chan, while acknowledging in a 2005 book that her monograph was developed “perhaps in response to pressure,” wrote to the author in 2010 that the commissioning and publication of the book were Rather’s decision.⁸⁵

Studwell was hopeful that these developments would lead to a formal subject heading code. In the summer of 1991, he wrote that many communications from LC had encouraged him in his efforts, and that he believed a strong push from the library community would cause LC to commit to creating a code shortly.⁸⁶

Stagnation of Studwell’s Activism toward a Code

Over the next few months, Studwell’s papers became more pessimistic. He wrote that the movement for a subject heading code must succeed soon, or else library patrons would reject the entire scheme.⁸⁷ Throughout 1991 and 1992, Studwell continued to write about the theory and practice of subject cataloging, with an emphasis on the subject heading code, although other authors were not addressing the topic as often. In the spring of 1992, he expressed his frustration at the lack of positive movement by LC toward a code. Despite what he had perceived as encouraging signs in 1990 and 1991, there had been no follow-up in terms of

establishing a committee to consider a subject heading code, or even in appointing an individual to serve as an intellectual leader, such as Seymour Lubetzky had done for AACR. Studwell was bold enough to publicly offer his services in that capacity (“providing excellent credentials”), but was politely rebuffed.⁸⁸ By the summer, he had concluded that LC, like many large institutions, was affected by its bureaucratic culture: it suffered on the one hand from reluctance to adopt bold new measures for fear of criticism, and on the other from a resistance to outsiders’ participation in decision-making.⁸⁹

In his own writings, however, Studwell provides evidence that he may have imparted his own wishful thinking to the likely outcomes of the process underway at LC:

In response to an inquiry from me, primarily about whether LC planned to continue the path toward revision and improvement of LC subject headings, Glenn A. Zimmerman . . . wrote the following in a letter of August 12, 1991: “Although it is a bit premature to give you specifics, I can say that we are continuing the trend toward change at LC. . . . We have received a great deal of input from you and many others ‘in the field’ and are at a stage where we will be taking some actions. Our plate is rather full now, and it is time to deal with the many items on it.”

Zimmerman’s vague promise of “change” was elevated in Studwell’s columns to a hope that “LC takes the high road of a formal comprehensive all-purpose theoretical subject heading code accompanied by the appropriate adjustment and modification to LC headings and their application.”⁹⁰

In Studwell’s mind, it was a moment of crisis in which the future of LCSH was being decided by bureaucratic inertia.⁹¹ As noted by Pietris in her letter to the author, however, it seems that LC had never seriously considered a complete subject headings code; their internal deliberations concluded that continued improvement of the SCM, accompanied by changes to the subdivision structure, was sufficient to meet the future needs of LCSH users.

As LC persisted in its silence regarding further action, Studwell was a “lone voice” on the topic of a subject headings code by 1992, and Stone declared that the movement for a code was “virtually dead.”⁹² Studwell refused to acknowledge that the code would not be achieved, and he continued not only to write his *Technicalities* column, but to give talks and to write papers urging map librarians and music librarians to consider a subject heading code.⁹³ By fall 1993, he noted that LC continued to stand by the SCM, which appeared to be more evidence that LC was not seriously interested in improving subject access. Yet he held out hope that the public sentiment for government reform then

being expressed by the general populace would also bring reform of subject access. His were the only papers on the subject heading code that year, however.⁹⁴

Studwell Looks Back

In the summer of 1994, *Technical Services Quarterly* published a paper with the shocking title, “Who Killed the Subject Code?”⁹⁵ In it, Studwell—while refusing to categorically accept that no subject heading code would ever be created—responded to Stone’s assertion that the movement was virtually dead by conducting an inquest. Looking back on his efforts at reform, Studwell took heart from the numerous changes in LCSH (not limited to the subdivisions conference, but including changes in individual headings, cross-references and structure) that his colleagues and he had spurred LC to adopt, and he noted that other authors continued to call for standardization of LCSH, even if not explicitly on Studwell’s terms.⁹⁶

Looking over the reasons for the failure of the library community to adopt a code, he found some blame for LC, for ALA (“although the code was discussed at several SAC meetings, this group did not follow through in an effective manner”), for online catalogs (and the illusion that keyword searching eliminates the need for bibliographic control), for himself (poor health made him unable to draft a proposed code), and most of all for “professional ignorance, apathy, and negativism.”⁹⁷ Despite the setbacks he encountered, Studwell never wrote any more bitterly than this.

A year later, Studwell marked the tenth anniversary of his first paper on the subject code (“Why Not an ‘AACR’ for Subject Headings?”) in “Ten Years After the Question: Has There Been an Answer?”⁹⁸ He credited good timing for the interest his 1985 paper generated (it came long enough after AACR2 for the library community to have adjusted to the changes in descriptive cataloging), and took comfort in the great progress toward more standardized subject headings that had been achieved; despite that, he continued to call for a subject heading code.

Studwell reserved his last words on the subject heading code for a pair of 1997 papers.⁹⁹ Nearing retirement, he noted research showing that libraries were failing to keep up with the many piecemeal changes to LCSH doled out over the years by LC; perhaps a single statement of principles, and the accompanying wholesale changes (such as occurred with AACR2) would have better served subject access. He concluded, “By mostly bypassing the issue of written principles to guide the world’s most important subject access system, LC has, in effect, hoped that the problem, like a bad dream or an undesirable person, would just go away. But no matter how much LC, this author, and others who opposed the idea, may try to ignore the lack of guiding principles for

LCSH, the specter seems to remain.”¹⁰⁰

It is interesting to note how, in Studwell’s estimation, organizational change should have occurred. Studwell proposed, and waited for, SAC, LC, or other librarians to take action. Despite the clear message from LC that proposals were required through the proper channels, Studwell never seemed to acquire the knowledge that “power is a relational phenomenon.”¹⁰¹ Yukl advises that “it is very helpful to have sympathetic representatives in key administrative positions or on decision groups.”¹⁰² Despite Studwell’s furious pace of activity, he never seemed to secure allies within LC.

Studwell’s success in achieving a subject heading code was limited by his outsider status. This author has had the privilege, as a member of SAC, of witnessing the implementation of Library of Congress Genre/Form Terms (LCGFT) during the years 2011–2013. While many factors were important in the success of this idea, perhaps the most crucial was the presence of an LC librarian on the project team; she has direct access to LC’s decision-makers and could easily communicate SAC members’ concerns to LC administrators. The presence of a large group of librarians working jointly on this project is another factor in its success; as Studwell noted, he largely worked alone and was unable to deliver a complete draft of a subject headings code.

Studwell’s prolixity may have, in the end, damaged rather than enhanced his credibility as a critic. By issuing endless columns, papers, and presentations, he failed to ground his critiques in the deep knowledge and scholarly apparatus that are most indicative of intellectual authority. In addition to his failure to cite or refer to foundational thinkers in subject access, his work was subject to criticisms such as Fischer’s comment in a literature review that states, “His publications tend to be somewhat redundant in their arguments,” and John Hostage’s letter to the author noting, “The footnotes in his articles almost always cited other articles by him. It would have increased his credibility if he had cited the work of others more.”¹⁰³

Conclusion

William E. Studwell never achieved his goal of the adoption of a subject headings code. Nonetheless, he continued to write on librarianship throughout his career and well into his retirement. He took solace that “the overall improvement to LCSH that occurred during the late 1980s and early 1990, which came to pass largely because of pressure from many librarians outside LC, including me,” had alleviated some of the pressing problems he identified early in his campaign.¹⁰⁴

Studwell was credited by Shubert with “attracting the attention of the American library community to the need for a ‘comprehensive, all-purpose theoretical code for Library of

Congress subject headings.”¹⁰⁵ However, his own goals were much broader—to see the adoption of such a code. In the end, no such code has been adopted. In correspondence to the author, Studwell wrote in 2006,

Various persons told me I was crazy or delusional or something similar for trying to change the philosophy and practices of the world’s largest library, and a U.S. federal agency to boot. But although the final goal was not achieved, I firmly believe that at least half of my mini-goals were quietly and tacitly enacted by LC in the late 1980s and 1990s. . . . LCSH is much better than it was about twenty-five years ago, that is, before I began to “attack” the LCSH establishment.

Although it was promulgated after Studwell’s retirement, the *Functional Requirements for Subject Authority Data (FRSAD): Final Report* is a document that may point to a future subject heading code. Its purpose is to “produce a framework that will provide a clearly stated and commonly shared understanding of what the subject authority data/record/file aims to provide information about, and the expectation of what such data should achieve in terms of answering user needs.”¹⁰⁶

Studies of interorganizational networks such as the US cataloging community have consistently found that when decision-making occurs at the hub of the network, peripheral participants must establish ties to those in the center if they hope to wield influence. Many important techniques for organizational change require the acquiescence of those in power; without it, all requests for change can be deferred by bureaucratic gatekeepers.

Studwell, it seems, never learned these lessons—he failed to observe the bureaucratic niceties of submitting a proposal through the SAC. For all his admirable traits of doggedness, idealism, and productivity, his neglect of the formalities required by the network’s lead organization prevented his proposals from receiving serious consideration; and his absence of allies within LC was more damaging to the prospects for his plan. For those seeking to be change agents within the library community, Studwell’s story provides numerous lessons: it is best to be strategic, bureaucratic, and credible—and ideally, it is strategic to position oneself at the hub of the network rather than the margins. While Studwell considered himself as a Luther of librarianship, perhaps he was more a William Jennings Bryan—a man whose “ability to lose worthy causes with unpersuasive arguments was uncanny.”¹⁰⁷ Studwell was a persistent advocate of change whose ideas certainly were part of an ongoing conversation between librarians that led to improvements in LCSH. His remarkable record of scholarship is a testament to his curiosity and drive, and the

ultimate frustration of his campaign for a subject headings code is an object lesson in navigating interorganizational networks.

References and Notes

- George Bernard Shaw, *Maxims for Revolutionists* in *Man and Superman: A Comedy and a Philosophy* (1950; repr., New York: Brentano's, 1938), 238.
- Quoted in Milton L. Rakove, *We Don't Want Nobody Nobody Sent: An Oral History of the Daley Years* (Bloomington: Indiana University Press, 1979), 318.
- William E. Studwell, "Who Killed the Subject Code?" *Technical Services Quarterly* 12, no. 1 (1994): 39.
- Patricia Bradshaw and Jaap Boonstra, "Power Dynamics in Organizational Change: A Multi-Perspective Approach," in *Dynamics of Organizational Change & Learning*, ed. Jaap J. Boonstra, 279-300 (Hoboken, NJ: Wiley, 2004).
- Mark Ebers, "Explaining Interorganizational Network Formation," in *The Formation of Interorganizational Networks*, ed. Mark Ebers (New York: Oxford University Press, 1997), 4.
- LCSH, of course, is not the only vocabulary in use by libraries; the Sears List of Subject Headings and Medical Subject Headings are both popular. But LCSH dominates subject cataloging for academic, research and many public libraries.
- For examples, see Sanford Berman, *The Joy of Cataloging: Essays, Letters, Review & Other Explosions* (Phoenix, AZ: Oryx, 1981).
- Walter W. Powell, "Neither Market Nor Hierarchy: Network Forms of Organization," in *Research in Organizational Behavior*, vol. 12, ed. Barry M. Staw and L. L. Cummings (Greenwich, CT: JAI, 1990), 323.
- Ibid.*, 325.
- Keith G. Provan, Amy Fish and Joerg Sydow, "Interorganizational Networks at the Network Level: A Review of the Empirical Literature on Whole Networks," *Journal of Management* 33, no. 3 (2007): 503.
- Keith G. Provan and Patrick Kenis, "Modes of Network Governance: Structure, Management and Effectiveness," *Journal of Public Administration Research & Theory* 18, no. 2 (2008): 235.
- Gordon Müller-Seitz, "Leadership in Interorganizational Networks: A Literature Review and Suggestions for Future Research," *International Journal of Management Reviews* 14, no. 4 (2012): 430.
- Chris Huxham and Siv Vangen, "Leadership in the Shaping and Implementation of Collaboration Agendas: How Things Happen in a (Not Quite) Joined-Up World," *Academy of Management Journal* 43, no. 6 (2000): 1160.
- Daniel J. Brass et al., "Taking Stock of Networks and Organizations: A Multilevel Perspective," *Academy of Management Journal* 47, no. 6 (2004): 795-817.
- Bradshaw and Boonstra, "Power Dynamics in Organizational Change," 285.
- Cynthia Hardy and Stewart Clegg, "Power and Change: A Critical Reflection," in *Dynamics of Organizational Change & Learning*, ed. Jaap J. Boonstra (Hoboken, NJ: Wiley, 2004), 238.
- Gary Yukl, "Interactions in Organizational Change: Using Influence Tactics to Initiate Change," in *Dynamics of Organizational Change and Learning*, ed. Jaap J. Boonstra (Hoboken, NJ: Wiley, 2004), 309.
- Charles Coffin Jewett, *Smithsonian Report on the Construction of Catalogues of Libraries, and Their Publication by Means of Separate, Stereotyped Titles: With Rules and Examples* (Washington: Smithsonian Institute, 1853); Mercantile Library of Boston, *Catalogue of the Mercantile Library of Boston* (Boston: Mercantile Library Association; printed by John Wilson and Son, 1854); Ezra Abbot, "Mr. Abbot's Statement Respecting the New Catalogues of the College Library," in *Report of the Committee of the Overseers of Harvard College Appointed to Visit the Library for the Year 1863: Together with the Accompanying Documents* (Boston: The College, 1864); Charles A. Cutter, "Rules for a Printed Dictionary Catalog," in US Bureau of Education, *Public Libraries in the United States: Their History, Condition, and Management* (Washington: Government Printing Office, 1876); Frederick Beecher Perkins, *San Francisco Cataloging for Public Libraries: A Manual of the System Used in the San Francisco Free Public Library* (San Francisco: The Library, 1884); Melvil Dewey and Mary Salome Cutler, *Rules for Author and Classed Catalogs: As Used in Columbia College Library, with 52 Facsimiles of Sample Cards* (Boston: Library Bureau, 1888); Klas August Linderfelt, *Eclectic Card Catalog Rules* (Boston: Charles A. Cutter, 1890).
- W. C. Lane, "Cataloging," in *Abstracts of Papers, etc.: World's Fair Congress and Chicago Conference, July 13-22, 1893*, special issue, *Library Journal* (July 1893): 238-40.
- Terry M. Heisey, "Early Catalog Code Development in the United States, 1876-1908," *Journal of Library History* 11, no. 3 (1976): 218-48.
- Alva T. Stone, "The LCSH Century: A Brief History of the Library of Congress Subject Headings, and Introduction to the Centennial Essays," *Cataloging & Classification Quarterly* 29, no. 1-2 (2000): 1-15.
- Martha M. Yee, "'Wholly Visionary': The American Library Association, the Library of Congress, and the Card Distribution Program," *Library Resources & Technical Services* 53, no. 2 (2009): 68-78.
- Paul Edlund, "A Monster and a Miracle: The Cataloging Distribution of the Library of Congress, 1901-1976," *Quarterly Journal of the Library of Congress* 33, no. 4 (1976): 383-421.
- Paul Dunkin, "From Pig to Man," in *Toward a Theory of Librarianship: Papers in Honor of Jesse Hauk Shera*, ed. Conrad H. Rawski, 339-49 (Metuchen, NJ: Scarecrow, 1973).
- Kathryn Luther Henderson, "'Treated with a Degree of

- Uniformity and Common Sense': Descriptive Cataloging in the United States, 1876-1975," *Library Trends* 25, no. 1 (1976): 232.
26. Doralyn J. Hickey, "Subject Analysis: An Interpretive Survey," *Library Trends* 25, no. 1 (1976): 277.
 27. J. C. M. Hanson, "The Subject Catalogs of the Library of Congress," *Bulletin of the American Library Association* 3 (1909): 385-97.
 28. Sally Jo Reynolds, "In Theory There is No Solution: The Impediments to a Subject Cataloging Code," *Library Quarterly* 59 (1989): 224; see also Edith Scott, "J. C. M. Hanson and His Contribution to Twentieth-Century Cataloging" (PhD diss., University of Chicago, 1970); Francis L. Miksa, *The Subject in the Dictionary Catalog from Cutter to the Present* (Chicago: ALA, 1983).
 29. John R. Likins, "Subject Headings, Silly, American—20th Century—Complications and Sequelae—Addresses, Essays, Lectures," *Technical Services Quarterly* 2, no. 1-2 (1985): 3-11.
 30. For a review of literature critical of LCSH, see Monika Kirtland and Pauline Cochrane, "Critical Views of LCSH—*Library of Congress Subject Headings*: A Bibliographic and Bibliometric Essay," *Cataloging & Classification Quarterly* 1, no. 2-3 (1982): 71-94; Steven Blake Shubert, "Critical Views of LCSH Ten Years Later: A Bibliographic Essay," *Cataloging & Classification Quarterly* 15, no. 2 (1992): 37-97; and Karen S. Fischer, "Critical Views of LCSH, 1990-2001: The Third Bibliographic Essay," *Cataloging & Classification Quarterly* 41, no. 1 (2005): 63-109.
 31. Wyllis E. Wright, ed., *Vatican Library: Rules for the Catalog of Printed Books* (Chicago: ALA, 1948).
 32. David J. Haykin, *Subject Headings: A Practical Guide* (Washington, DC: Government Printing Office, 1951); Library of Congress, Subject Cataloging Division, *Library of Congress Subject Headings: A Guide to Subdivision Practice* (Washington, DC: The Library, 1981); Library of Congress, Subject Cataloging Division, *Subject Cataloging Manual: Subject Headings* (Washington, DC: The Library, 1984).
 33. Richard S. Angell, "Library of Congress Subject Headings—Review and Forecast," in *Subject Retrieval in the Seventies: New Directions. Proceedings of an International Symposium Held at the Center of Adult Education, University of Maryland, College Park, May 14 to 15, 1971*, ed. Hans Wellisch and Thomas D. Wilson (Westport, Conn.: Greenwood, 1972), 161; see also Stone, "The LCSH Century."
 34. Barbara B. Tillett, "Catalog It Once for All: A History of Cooperative Cataloging in the United States Prior to 1967 (Before MARC)," *Cataloging & Classification Quarterly* 17, no. 3-4 (1993): 3-38.
 35. Allen Kent, "The On-Line Revolution in Libraries, 1969-," *American Libraries* 10, no. 6 (1979): 339-42; Edwin E. Olson, Russell Shank, and Harold A. Olsen, "Library and Information Networks," *Annual Review of Information Science & Technology* 7 (1972): 279-321.
 36. Beacher Wiggins, "The Program for Cooperative Cataloging," in *Proceedings of the Taxonomic Authority Files Workshop, Washington, D.C., June 22-23, 1998*, ed. Stanley D. Blum (San Francisco: California Academy of Sciences, 1998), accessed July 23, 2013, <http://researcharchive.calacademy.org/research/informatics/taf/proceedings/wiggins.html>.
 37. Ibid.
 38. John Budd and Charles A. Seavey, "Characteristics of Journal Authorship by Academic Librarians," *College and Research Libraries* 51, no. 5 (1990): 463-70; Ann C. Weller, Julie M. Hurd, and Stephen E. Wiberley, "Publication Patterns of US Academic Librarians from 1993 to 1997," *College & Research Libraries* 60, no. 4 (1999): 352-62.
 39. Kathryn Luther Henderson, "Subject Headings," in *Encyclopedia of Library History*, ed. Wayne A. Wiegand and Donald G. Davis Jr. (New York: Garland, 1994), 605.
 40. William E. Studwell, "Curriculum Vitae," Office of the Dean of University Libraries, Northern Illinois University; Dorothy E. Jones, "William E. Studwell," *Music Reference Services Quarterly* 6, no. 4 (1998): 99-101.
 41. Bob Herguth, "William Studwell," *Chicago Sun-Times*, December 14, 1994; *Contemporary Authors* (Farmington Hills, Mich.: Gale, 2002), s.v. "Studwell, William E."
 42. Dorothy Kanwischer, "Subject Headings Trauma," *Wilson Library Bulletin* 49, no. 9 (1975): 651-54; Michael Pope, "Subject Headings Muddle," *RQ* 15, no. 2 (1975): 129-31; Hans H. Wellisch, "Poland is Not Yet Defeated, Or: Should Catalogers Rewrite History? With a Discourse on When Is an Island Not an Island?" *Library Resources & Technical Services* 22, no. 2 (1978): 158-67; Patrick Wilson, "The End of Specificity," *Library Resources & Technical Services*, 23, no. 2 (1979): 116-22; Gregor A. Preston, "Coping with Subject Heading Changes," *Library Resources & Technical Services* 24, no. 1 (1980): 64-68; Likins, "Subject Headings, Silly, American"; David Henige, "Library of Congress Subject Headings: Is Euthanasia the Answer?" *Cataloging & Classification Quarterly* 8, no. 1 (1987): 7-19; Mary Dykstra, "Can Subject Headings Be Saved?" *Library Journal* 113, no. 15 (September 15, 1988): 55-58.
 43. William E. Studwell, "A Prose Ode to Sandy Berman from a Fellow Gadfly," *Technicalities* 23, no. 5 (2003): 3.
 44. William E. Studwell, "Library of Congress Subject Heading Period Subdivisions for Southeast Asia: Some Proposed Additions," *Cataloging & Classification Quarterly* 2, no. 3-4 (1982): 31-43; William E. Studwell and Narindar K. Aggarwal, "Library of Congress Subject Heading Period Subdivisions for East Asia: Some Proposed Additions," *Cataloging & Classification Quarterly* 3, no. 4 (1983): 65-78; William E. Studwell and Narindar K. Aggarwal, "Library of Congress Subject Heading Period Subdivisions for West Asia and the Near East in General: Some Proposed Additions," *Cataloging & Classification Quarterly* 4, no. 1 (1983): 37-52; William E.

- Studwell and David A. Hamilton, "Library of Congress Subject Heading Period Subdivisions for Latin America: Some Proposed Additions," *Cataloging & Classification Quarterly* 4, no. 3 (1984): 39–74; William E. Studwell, Elaine Rast, and Cheryl Felmlee, "Library of Congress Subject Heading Period Subdivisions for Africa: Some Proposed Additions," *Cataloging & Classification Quarterly* 4, no. 4 (1984): 51–97; William E. Studwell, "Library of Congress Subject Heading Period Subdivisions for Australia, New Zealand and Selected World Islands: Some Proposed Additions," *Cataloging & Classification Quarterly* 5, no. 3 (1985): 67–78; William E. Studwell and David A. Hamilton, "Library of Congress Subject Heading Period Subdivisions for Eastern Europe, Excluding the Soviet Union: Some Proposed Additions," *Cataloging & Classification Quarterly* 6, no. 1 (1985): 39–60; William E. Studwell and David A. Hamilton, "Library of Congress Subject Heading Period Subdivisions for the Soviet Union: Some Proposed Additions," *Cataloging & Classification Quarterly* 6, no. 3 (1986): 63–83; William E. Studwell, "Library of Congress Subject Heading Period Subdivisions for the History of Canadian Regions, Provinces, and Territories: Some Proposed Additions," *Cataloging & Classification Quarterly* 7, no. 3 (1987): 121–26; William E. Studwell, "Library of Congress Subject Heading Period Subdivisions for the History of the Individual States of the United States: Some Proposed Additions," *Cataloging & Classification Quarterly* 8, no. 1 (1987): 121–31.
45. Studwell and Hamilton, "Library of Congress Subject Heading Period Subdivisions for Latin America," 73.
 46. Henry B. Van Hoesen, "Perspective in Cataloging, with Some Applications," *Library Quarterly* 14, no. 2 (1944): 102–3; Sanford Berman, "Proposed: A Subject Cataloging Code for Public School and Community College Libraries," *HCL Cataloging Bulletin* 39 (1979): 1–5.
 47. William E. Studwell, "Why Not an AACR for Subject Headings?" *Cataloging & Classification Quarterly* 6, no. 1 (1985): 3–9.
 48. William E. Studwell, "Academic Libraries and a Subject Heading Code," *Journal of Academic Librarianship* 12, no. 6 (1987): 372; William E. Studwell, "Map Libraries and a Subject Heading Code," *Information Bulletin (Western Association of Map Libraries)* 18, no. 2 (1987): 157–58.
 49. William E. Studwell, "The 1990s: Decade of Subject Access," *American Libraries* 18, no. 11 (1987): 958–59.
 50. Mary K. D. Pietris, "LC: New Manual, Not Code, Needed," *American Libraries* 18, no. 11 (December 1987): 958.
 51. Bradshaw and Boonstra, "Power Dynamics in Organizational Change," 283.
 52. Sheila S. Intner, "ASCR: The American Subject Cataloging Rules," *Technicalities* 8, no. 7 (1988): 5–7; Sheila S. Intner, "The Trouble with Harry: ASCR (Part 2)," *Technicalities* 8, no. 9 (1988): 5–7.
 53. Arnold S. Wajenberg, "The Future of Cataloging Standards," *Illinois Libraries* 72, no. 6 (1990): 494–97.
 54. American Library Association, Association for Library Collections and Technical Services, "CaMMS Subject Analysis Committee," last modified November 14, 2013, accessed November 15, 2013, www.ala.org/alcts/mgrps/camms/cmtes/ats-ccsac.
 55. "San Antonio Midwinter Report," *RTSD Newsletter* 13, no. 2 (1988): 9–15.
 56. William E. Studwell, "Subject Heading Clearinghouse for Map Catalogers: A Follow-up," *Western Association of Map Libraries Information Bulletin* 20, no. 1 (1988): 22.
 57. Yukl, "Interactions in Organizational Change," 313.
 58. Reynolds, "In Theory There is No Solution," 224.
 59. William E. Studwell and Paule Rolland-Thomas, "The Form and Structure of a Subject Heading Code," *Library Resources & Technical Services* 32, no. 2 (1988): 167–69.
 60. William E. Studwell, "User-Friendly Subject Access," *Technicalities* 8, no. 10 (1988): 10–11; William E. Studwell, "Codephobia: Five Possible Reasons Why Some Persons Do Not Support a Theoretical Code for LC Subject Headings," *Technicalities* 9, no. 2 (1989): 13–14.
 61. Lois Mai Chan, "A Subject Cataloging Code?" *Cataloging & Classification Quarterly* 10, no. 1–2 (1989): 199–202.
 62. William E. Studwell, *Library of Congress Subject Headings: Philosophy, Practice, and Prospects* (Binghamton, NY: Haworth, 1990).
 63. Yukl, "Interactions in Organizational Change." 309.
 64. *Ibid.*, 302.
 65. Studwell, *Library of Congress Subject Headings*, 14, 15, 25, 38.
 66. International Conference on Cataloguing Principles, "Statement of Principles," in *Foundations of Cataloging: A Sourcebook*, ed. Michael Carpenter and Elaine Svenonious (1961; repr. Littleton, CO: Libraries Unlimited, 1985).
 67. Constance Rinehart, review of *Library of Congress Subject Headings*, by William E. Studwell, *Library Resources & Technical Services* 36 (1992): 248; Rachel Salmond, review of *Library of Congress Subject Headings* by William E. Studwell, *Australian Library Review* 9 (1992): 239.
 68. Heiner M. Schnelling, review of *Library of Congress Subject Headings* by William E. Studwell, *International Classification* 19, no. 3 (1992): 166.
 69. Studwell, *Library of Congress Subject Headings*, 6.
 70. Yukl, "Interactions in Organizational Change," 308.
 71. William E. Studwell, "More Developments in the Subject Headings Arena," *Western Association of Map Libraries Information Bulletin* 21, no. 2 (1990): 100; William E. Studwell, "The Subject Code: Two Unanswered Questions," *Library Resources & Technical Services* 34, no. 2 (1990): 228–30.
 72. Yukl, "Interactions in Organizational Change," 303.
 73. William E. Studwell, "A Subject Code: Do We Have One? Do We Need One?" *Technicalities* 10, no. 10 (1990): 15.
 74. Heiko A. Oberman, *Luther: Man between God and the Devil*

- (New Haven, CT: Yale University Press, 2006), 161.
75. Yukt, "Interactions in Organizational Change," 302, 310–11.
 76. The "seminal" article Studwell mentioned was, according to Google Scholar on July 23, 2013, cited only eight times—six of those by Studwell himself; however, Shubert, "Critical Views of LCSH Ten Years Later," 48, does credit him with sparking a wider discussion of the subject heading code in the cataloging community.
 77. Studwell, "Subject Heading Clearinghouse for Map Catalogers: A Follow-up," 22.
 78. William E. Studwell, "Something's Going on at LC; Or, A Code by any Other Name would Still be a Code," *Technicalities* 11, no. 7 (1991): 10–11.
 79. Lois Mai Chan, *Library of Congress Subject Headings: Principles of Structure and Policies for Application* (Washington, DC: Library of Congress Cataloging Distribution Service, 1990).
 80. William E. Studwell, "Will the Real Year of the Subject Code Please Stand Up?" *Technicalities* 11, no. 8 (1991): 4.
 81. Martha O'Hara Conway, ed., *The Future of Subdivisions in the Library of Congress Subject Headings System: Report from the Subject Subdivisions Conference* (Washington, DC: Library of Congress, Cataloging Distribution Service, 1992).
 82. "Library of Congress Five-Year Progress Report on Subject Subdivisions Conference Recommendations," *Cataloging Service Bulletin* 75 (Winter 1997): 47–53.
 83. William E. Studwell, "Hallelujah and Hurrah! A Major Recommendation for Change in LC Subject Headings by the Subject Subdivisions Conference," *Technicalities* 11, no. 11 (1991): 13.
 84. Studwell, "The Subject Code: Two Unanswered Questions," 228–30.
 85. Lois Mai Chan, *Library of Congress Subject Headings: Principles and Application*, 4th ed. (Westport, CT: Libraries Unlimited, 2005), 11.
 86. Studwell, "Something's Going on at LC," 10–11; Studwell, "Will the Real Year of the Subject Code Please Stand Up?" 4.
 87. William E. Studwell, "Sumer and Consumer: More about the Future of LC Subject Headings," *Technicalities* 11, no. 9 (1991): 8–9; William E. Studwell, "Going Up Or Going Down? The Elevator Dilemma for LC Subject Headings," *Technicalities* 11, no. 10 (1991): 15–16; William E. Studwell, "Cutterism, Codism, and Consumerism: The Past, Present, and Future of LC Subject Access," *Technical Services Quarterly* 9, no. 1 (1991): 19–25.
 88. William E. Studwell, "LC's Full Plate: A Time for Decision-Making about LC Subject Headings," *Technicalities* 12, no. 4 (1992): 6; William E. Studwell, "Who Will be the Osborn and Lubetzky of Subject Cataloging? A Question of Leadership in LC Subject Heading Policy Making," *Technicalities* 12, no. 5 (1992): 15–16.
 89. William E. Studwell, "Who's Afraid of the Subject Code?" *Technicalities* 12, no. 6 (1992): 9–10.
 90. Studwell, "LC's Full Plate," 6.
 91. William E. Studwell, "The Three-Pronged Fork in the Road: A Detective Mystery of the Twenty-First Century," *Information Bulletin (Western Association of Map Libraries)* 23, no. 1 (1991): 42–43; William E. Studwell, "Looking Back at the 1990s: Two Scenarios from the Future Concerning LC's Subject Access System," *Technicalities* 12, no. 7 (1992): 8–9.
 92. Alva T. Stone, "That Elusive Concept of Aboutness: The Year's Work in Subject Analysis, 1992," *Library Resources & Technical Services* 37, no. 3 (1993): 277–98.
 93. William E. Studwell, "A Tale of Two Decades; Or, the Decline of the Fortunes of LC Subject Headings," *Information Bulletin (Western Association of Map Libraries)* 25, no. 2 (1994): 73–74; William E. Studwell and Dawn A. Ericksen, "Music Libraries and a Subject Heading Code," *Music Reference Services Quarterly* 1, no. 1 (1992): 73–75.
 94. William E. Studwell, "LC's Head in the Sand; Or, Why the Subject Cataloging Manual is Not Enough," *Technical Services Quarterly* 10, no. 3 (1993): 45–50.
 95. Studwell, "Who Killed the Subject Code?" 39.
 96. Masse Bloomfield, "A Look at Subject Headings: A Plea for Standardization," *Cataloging & Classification Quarterly* 16, no. 1 (1993): 119–23; Karen M. Drabentstott, "Period Subdivisions in the Library of Congress Subject Headings System: Some Thoughts and Recommendations for the Future," *Cataloging & Classification Quarterly* 15, no. 4 (1992): 19–45.
 97. Studwell, "Who Killed the Subject Code?" 38.
 98. William E. Studwell, "Ten Years After the Question: Has there been an Answer?" *Cataloging & Classification Quarterly*, 20, no. 3 (1995): 95–98.
 99. William E. Studwell, "Ignore It and It Will Go Away: . . . but It's Still there!" *Technicalities* 17, no. 4 (1997): 1; William E. Studwell, "'Much Ado about Little; Or, Why can't LC Produce a Set of Principles for LC Subject Headings?" *Technicalities* 17, no. 7 (1997): 19.
 100. Studwell, "Ignore It and It Will Go Away," 13.
 101. Bradshaw and Boonstra, "Power Dynamics in Organizational Change," 283.
 102. Yukt, "Interactions in Organizational Change," 309.
 103. Fischer, "Critical Views of LCSH, 1990–2001," 72.
 104. Studwell, "Ignore It and It Will Go Away," 1.
 105. Shubert, "Critical Views of LCSH Ten Years Later," 48.
 106. Marcia Lei Zeng, Maja Žumer, and Athena Salaba, eds., *Functional Requirements for Subject Authority Data (FRSAD): A Conceptual Model* (Berlin: De Gruyter Saur, 2011).
 107. Gerard N. Magliocca, *The Tragedy of William Jennings Bryan: Constitutional Law and the Politics of Backlash* (New Haven, CT: Yale University Press, 2011), 149.

Notes on Operations

E-Book Cataloging Workflows at Oregon State University

Richard Sapon-White

Among the many issues associated with integrating e-books into library collections and services, the revision of existing workflows in cataloging units has received little attention. The experience designing new workflows for e-books at Oregon State University Libraries since 2008 is described in detail from the perspective of three different sources of e-books. These descriptions highlight where the workflows applied to each vendor's stream differ. A workflow was developed for each vendor, based on the quality and source of available bibliographic records and the staff member performing the task. Involving cataloging staff as early as possible in the process of purchasing e-books from a new vendor ensures that a suitable workflow can be designed and implemented as soon as possible. This ensures that the representation of e-books in the library catalog is not delayed, increasing the likelihood that users will readily find and use these resources that the library has purchased.

The increase in the availability of e-books in the past decade has transformed how our society communicates information. As publishers transition from print to electronic, or at least provide their publications in both print and digital form, readers are changing their preferred reading formats.¹ E-books have affected the academy as well. Many university bookstores now sell e-textbook access to students while some universities have experimented with using textbooks on e-readers.²

Academic libraries have been affected as well, with 95 percent of American university libraries purchasing e-books.³ Both scholarly and popular titles are increasingly available from a variety of publishers and e-book vendors. Internet-based e-books have the advantages of being accessible anywhere, require no shelf space, never need mending, and have features that are not available with print, such as keyword searching of text. They also have disadvantages when compared to print, including greater management for licensing and technological requirements, as well as restrictions on printing, interlibrary loan, course reserves, and the number of simultaneous users.

Libraries are making e-books accessible to their users via online public access catalogs (OPACs) and, for monographic series, indirectly through library websites, often referred to as "A to Z lists." (A third, future possibility for user discovery of e-books would involve the selection of e-book titles from a knowledge base and subsequent reliance on a discovery service to index the e-books.) OPAC access integrates e-books with a library's other resources, providing an advantage over website access as users can retrieve metadata on both electronic and print resources with one search. Research has shown that loading bibliographic records for e-books into the OPAC increases their discovery and use.⁴ To facilitate cataloging and promote the use of their e-books, many vendors and publishers provide MARC bibliographic records for their titles. This is an especially useful service because many publishers sell their e-books in packages containing hundreds or even thousands of titles; cataloging such sets title-by-title is beyond the capacity of many cataloging departments. However, the poor quality of vendor

Richard Sapon-White is Head of Cataloging and Metadata Services, Oregon State University, Corvallis, Oregon

Submitted March 21, 2013; tentatively accepted June 24, 2013, pending modest revision; revision submitted August 22, 2013; accepted for publication October 1, 2013.

records is often a concern; alternate sources can provide high-quality bibliographic records for e-books.

To catalog e-books efficiently, traditional technical services workflows for print materials need to be modified. A major difference from print is that no physical piece arrives at the library to trigger the processing of an e-book. Without boxes to open, barcodes and call number labels to apply, or security strips to insert, e-books “arrive” ready to catalog as soon as a cataloging unit has been notified that an e-book has been purchased. For e-books, the principal tasks for technical services staff include licensing and purchasing, downloading bibliographic records, and, often, batch editing of those records. Since e-book publishers provide bibliographic records to libraries in a great variety of ways, cataloging workflows may need to be created *de novo* for each vendor.

At Oregon State University Libraries (OSUL) before 2008, e-book packages were rarely purchased, and firm orders for individual e-book titles were seldom sent to vendors, primarily because of their limited availability and lack of adequate platforms for user access. When vendors began to offer discounted packages, especially of science and technology e-books, OSUL began actively acquiring them from publishers and vendors. This led the libraries, in 2011, to set a policy favoring the purchase of electronic over paper resources whenever possible. Since then, OSUL has purchased e-books from many different vendors, resulting in different workflows for each vendor. These workflows differ according to the sources of bibliographic records, the quality of those records, the methods used to load records into the catalog, and the staff involved in e-book processing. Established workflows are documented on the OSUL wiki.⁵ This paper examines three e-book workflows at OSU in detail to highlight the successes and difficulties encountered in their

design. Through this case study of cataloging unit workflow design, other academic libraries can better understand potential problems and solutions. Since the focus is on cataloging workflow, aspects of e-book acquisitions such as licensing and negotiating fees are not covered in this paper.

Literature Review

In the context of a library cataloging and/or metadata department, workflow is the sequence of steps applied to an information resource from the point of acquisition by the library to the point where the resource is represented by a record in the library's catalog. A description of the cataloging workflow for e-books might include the processes that the e-books undergo (i.e., downloading bibliographic records into the local catalog, editing URLs to incorporate proxy information, or editing records to ensure they meet local cataloging standards), the staff responsible for each step, and the time taken for staff to perform each step. This literature review examines various aspects of e-book workflows, although few articles address workflow directly.

Wu and Mitchell describe workflows for collections of e-books at the University of Houston Libraries (UHL), which has relied heavily on vendor-supplied bibliographic records.⁶ They state that the problem for catalogers is not that e-books are difficult to catalog but that their workflow is difficult to manage because of the unpredictability of vendor record quality. While the PCC's guidelines for provider-neutral records has simplified cataloging at the individual MARC field and record level, it does not address the problems faced when batch processing vendor records.⁷ This is because e-book bibliographic records come from many sources and follow few standards. Purchasing individual e-books, although likely to

follow a traditional workflow, presents the challenge of being difficult to track through the process. Workflows for e-books at the UHL vary depending on whether purchased singly or in batches. Open access titles are handled differently from reference works. The management of batches of records requires different skills of their catalogers than traditional cataloging of tangible books. They also discuss the problem of not showing UHL e-book holdings in WorldCat because of their use of vendor records and lack of an easy step for identifying matching bibliographic records. The importance of communication between the acquisitions and the cataloging department concerning the arrival of new e-resources is also discussed.

Dealing with the problems encountered when loading vendor-supplied records is a common theme in e-book literature. Martin and Mundle discuss the cataloging of Springer e-book collections at the University of Illinois at Chicago (UIC).⁸ They describe the problems with using vendor-supplied MARC records in three areas: poor record quality (i.e., lack of authorized headings), loading problems, and access problems (i.e., broken links). They conclude that while vendor records may be provided at no charge, costs are incurred by the staff time and effort to revise those records. While workflow is not described, these problems needed resolution to establish a smooth workflow for e-books.

The library also decided to load vendor records into their OPAC to facilitate access to a package of 12,000 e-books.⁹ They charged a task force of three catalogers to evaluate vendor records for quality. Task force members required that vendor records be provided in MARC format, adhere to national cataloging standards for full records, and include subject headings—either Medical Subject Headings (MeSH) or Library of Congress Subject Headings (LCSH). Problems

encountered again included quality issues (presence of extraneous and unnecessary fields), load issues (improper formulation of the MARC 001 and 003 fields needed for overlaying records), and access issues (lack of dual URLs in each record as desired). Through examination of sets of vendor records, they identified problems with vendor-supplied MARC records and developed guidelines for other libraries to use to incorporate vendor-supplied records into their catalogs. Bulk corrections were made using MarcEdit, a popular freeware tool capable of batch editing MARC records,¹⁰ but some records needed individual attention. In addition to addressing vendor-supplied MARC records, the authors describe the original cataloging of health science e-books, which lacked vendor-supplied records.

Other articles focus on the poor quality of vendor-supplied bibliographic records.¹¹ They typically describe the procedures used to revise records to meet cataloging standards. Global editing functions in integrated library systems (ILS), and utilities such as MarcEdit have facilitated such database maintenance.

Libraries have experienced difficulties when loading vendor-supplied records into their catalogs. Victoria University provided access to e-books from NetLibrary by loading vendor-supplied MARC records into its catalog.¹² The records were of high quality, but the process of loading them was problematic, including the unwanted generation of order records. Although reporting on various technical problems during two record loads, no information is given about which staff were responsible for e-book processing, how often loads occurred, or how much time elapsed before records became available to the library.

Gedeon and Meyer described the acquisition and cataloging of e-books at Western Michigan University.¹³ Focusing on seven e-book vendors, they noted how titles are acquired,

including both subscription and free. Some vendors provided package deals while others supplied works title-by-title. They also used vendor-provided records for e-books, but the records lacked quality and authority control. Loading the records into their catalog required the collaboration of a systems librarian, a programmer, and a catalog librarian. Revision of the records by cataloging staff was an additional expense of the e-book purchase and delayed loading of the records into their ILS.

At the University of Colorado Denver's Auraria Library, a study was conducted to assess bibliographic records for titles freely available on the Internet.¹⁴ Before loading, a sample of the MARC records was examined for quality. Although record quality was determined to be poor and diacritic incompatibility with the local system caused the insertion of extraneous characters, the library decided to proceed with loading the records. Making the records available through the catalog, as opposed to merely linking to the entire collection from the library's webpage, was considered to be valuable because the catalog provides aggregation and the e-books collection helped fill gaps in the library's physical collections. As more open access, digitized books—such as the more than five million available from the Hathi Trust (www.hathitrust.org)—become available, libraries will need to plan and manage how best to provide access to them.

Vendor-supplied records can require significant editing, especially when access points need to be revised to match authority records. At Virginia Tech, incoming vendor-supplied records are first sent to the library's authority control vendor for processing. Based on the headings report from the vendor, unmatched headings are edited using MarcEdit, with some additional revisions done via their ILS. The report does not identify who at their institution performs this work,

but it does provide the sequence of quality control editing.¹⁵ Similarly, many libraries are concerned about the vendor records supplied with packages of e-books as the records generally do not meet standards for quality control, both in description and in authorized headings. Some have devised means of cleaning up the records, using batch editors such as MarcEdit.¹⁶

Since both the Anglo-American Cataloguing Rules, 2nd edition (AACR2) and Resource Description and Access (RDA) require separate records for each e-book publisher or distributor, an e-book available from multiple vendors is often represented in OCLC by a plethora of records. Guidelines for e-book cataloging changed significantly in 2009 with the publication of the Program for Cooperative Cataloging (PCC) guidelines on the creation of provider-neutral bibliographic records for e-books. The guidelines address the issue of multiple records for the same intellectual content by removing all provider-specific data from the bibliographic record. This single generic e-book record has multiple MARC 856 fields, each with a provider-specific URL.¹⁷

Oregon State University Libraries Overview

Oregon State University is a land, sea, sun, and space grant institution with approximately 26,000 students and 3,500 faculty. The OSUL holdings include more than 1.4 million volumes, 14,000 serial subscriptions, and more than 500,000 maps and government documents. A main library and veterinary medicine library on the Corvallis, Oregon, campus are complemented by two branch libraries serving remote facilities of the university.

The libraries acquire approximately 15,000 monographs annually in addition to receiving about 5,000 government documents. Of the firm-ordered and approval plan

monographs, approximately 95 percent have copy available in OCLC (either Library of Congress- or member-contributed) with full-level cataloging, including call numbers and subject headings. Until recently, most cataloging copy at OSUL was downloaded in a “fast-cat” process by a support staff member. Since 2010, almost all firm orders and approvals arrive as shelf-ready books with an associated file of bibliographic records. The head of cataloging is the only professional cataloger in the unit, with time split between administration of the unit and providing original and complex copy cataloging. Until recently, other members of the unit included 7.5 FTE library technicians responsible for cataloging monographs and serials. In 2012, a reorganization of the Center for Digital Scholarship and Services, which includes the cataloging unit, reduced the unit size to four FTE. The cataloging unit participates in the Name Authority Cooperative Program (NACO), the Subject Authority Cooperative Program (SACO), and the Cooperative Online Serials Program (CONSER). OSUL uses Innovative Interfaces’ Millennium ILS.

OSUL belongs to the Orbis Cascade Alliance (OCA), a consortium of thirty-seven academic libraries in the Pacific Northwest. OCA provides many services, including consortial pricing on databases, a union catalog (Summit), and a patron-driven acquisitions (PDA) program.

OSUL purchases e-book packages in the humanities, life sciences and physical sciences. This e-book purchasing policy complements one of purchasing e-serials whenever possible as the libraries transition from a print institution to a predominantly electronic one.

Workflows

Before 2010, print resources moved through OSUL’s technical services in

a workflow familiar to many libraries. The acquisitions department handled ordering (including downloading a brief bibliographic record for each title), receiving, and paying invoices, and passed resources to the cataloging department to search for a bibliographic record in OCLC and subsequent cataloging. A cataloger edited the record if one was found or created an original record if no record was found, then downloaded the record to the local system, attaching an item record and completing physical processing of the book. Since 2010, OSUL has received shelf-ready books from its major vendor as well as a file of bibliographic records from OCLC for each set of orders. This operation is primarily handled by acquisitions staff. Occasional titles needing call numbers or subject headings, or requiring original cataloging, are passed along to the cataloging unit for completion.

The workflow for e-books is quite different:

- For each publisher or distributor, license negotiations and contracts are often required before ordering can begin. Staff within acquisitions and collection development perform these roles, which will not be discussed here.
- Notification of the purchase of one or more e-books needs to be communicated to cataloging staff because no physical piece is passed along to monographic catalogers. This is necessary for both individual, firm-ordered titles and e-book packages. For the former, acquisitions staff notify the cataloging unit at the time of order because titles are immediately available and no order record is needed in the library catalog. For packages, the collection development department alerts the cataloging unit of the impending purchase so that catalogers can

determine the best method for acquiring bibliographic records to load into the catalog.

- Order and receipt may happen almost simultaneously, with access provided immediately on payment of the order. Workflows for print books assume a lapse in time between ordering and receiving; therefore these needed to be modified for e-books. With immediate access to electronic titles following purchase, library users do not need an order record in the catalog to be aware of an upcoming purchase.
- Each publisher or vendor has its own way of supplying bibliographic records. Bibliographic records may be available directly from vendors, downloaded title-by-title or in batches from OCLC, or sold in publisher-specific sets from OCLC.
- Bibliographic records may not exist for the electronic version but can be derived from the print version record.

With the exception of PDA titles (i.e., those unpurchased), the e-books discussed below were permanent acquisitions. As such, OSUL wanted to have these titles in the public catalog as well as the OCA union catalog, Summit. For them to display in the latter, all of the titles needed to have holdings set in OCLC. Some vendors’ e-books were available for interlibrary loan, so having OSUL’s holdings in OCLC is a significant service to users.

OSUL has purchased e-books from many vendors and publishers, including E-Book Library (EBL), Springer Science+Business Media (Springer), and Morgan and Claypool. The library also circulates Kindles; all of the e-books downloaded to these devices are cataloged. Workflows for the Kindle titles have been detailed in another article.¹⁸ In addition to these purchases, OSUL has loaded

more than 400 records made available by the Colorado Library Consortium for freely available Project Gutenberg e-books.

OSUL has been involved in two PDA projects, both using EBL as the vendor. The first project involved a contract between OSUL and EBL; the later project, begun in July 2011, was a similar contract between OCA and EBL. All titles appeared in the OPAC and involved monthly or weekly loading of a file of bibliographic records. Once a title had been viewed a set number of times, the library automatically purchased it.

To illustrate how much variation exists in each vendor's e-book program, the details for four vendors appear below: EBL purchased titles, EBL PDA projects, Springer, and Morgan and Claypool.

EBL

In September 2008, OSUL signed a contract with EBL and Blackwell North America (BNA) to purchase e-books from a variety of publishers, primarily science and technology titles. These were to be ordered individually by subject librarians.

EBL offered free MARC records for these purchases, which could be downloaded into a local catalog. Since OSU's existing workflow involved downloading a bibliographic record at the time of ordering, the initial decision was to use the vendor's records at the point of ordering. These could later be overlaid with an OCLC record. The vendor records had the following characteristics:

1. Call numbers with "eb" appended to the date. For example, "QA612.7 .N452010eb" was used for the title *Algebraic Methods in Unstable Homotopy Theory*. This method simplifies the identification of e-books by users when scanning a list of call numbers.

2. MARC 650 subject fields had a first indicator blank and second indicator "4." This indicates that the source of the subject heading is not specified and is likely not from *Library of Congress Subject Headings*.
3. Each record included the corporate body added entry (MARC 710 field) "E-books Corporation Pty. Ltd.," which is not an authorized heading.
4. None of the records included OCLC control numbers.

At that time, OSUL also contracted with OCLC Cataloging Partners to provide quality bibliographic records for all of the EBL orders as well as tagging records in WorldCat with OSUL's holdings symbol. This three-way arrangement involved EBL, with whom orders were placed; BNA, OSUL's primary book vendor at that time and the entity responsible for billing; and OCLC, to provide the bibliographic records. The purchase of an e-book title from EBL triggered a process that resulted in OCLC sending a bibliographic record to OSUL approximately eight weeks after the order was placed. Unfortunately, only one bibliographic record was actually delivered during the first year of ordering although over two hundred titles were purchased. For this reason, OSUL ultimately cancelled the contract with OCLC Cataloging Partners and chose to catalog the EBL titles one-at-a-time, following each order. The process of downloading vendor records into the catalog was discontinued. To ensure timely cataloging, the head of cataloging trained a library technician in electronic resource cataloging using the Program for Cooperative Cataloging (PCC) provider-neutral e-monograph record guidelines. The library technician was able to search for and adapt cataloging copy from OCLC or create original records when needed. The backlog of EBL titles created during the first year of ordering

was eliminated in two months.

The current workflow for e-books ordered from EBL follows:

1. Acquisitions staff place an order for each title through EBL's website. EBL emails a confirmation of the order and a notification of the title's availability to acquisitions staff.
2. Acquisitions staff notify a library technician in the cataloging unit of the title once it has been ordered.
3. The cataloging unit library technician proceeds as with any print title, including searching OCLC, downloading a bibliographic record if one exists or creating a record if none is found. The technician then attaches an item record in the local system indicating that the title is available to the university community via the Internet. Cataloging a title usually happens within twenty-four hours of it being ordered.
4. Library users who find the title need to enter their university identification number and password to read the e-book.

EBL Patron-Driven Acquisitions (PDA)

In June 2010, OSUL began participating in another EBL service, a patron-driven acquisitions program (PDA). EBL provides bibliographic records for titles of potential interest to OSUL users. The records include links to the e-books at EBL's website. After users view a title an agreed upon number of times, OSUL automatically purchases the e-book.

At the beginning of the program, EBL created a list of titles to match a profile based on subject and publishers. To avoid duplication of titles already owned, OSUL sent EBL a file of the ISBNs for all post-2006 imprints. These titles were then deleted from any sets of e-book records sent to OSUL by EBL.

Each month, EBL emailed OSUL a file of MARC records to load into the catalog. The size of the file has changed over time, starting at about 4,500 titles and currently numbering 12,000. On receipt of the file, the previous month's records are deleted from the catalog before the new records are loaded. Millennium's Data Exchange module is used for record loading. The records are minimally edited, primarily adding proxy data to the URL and changing the material type byte to the symbol "@" The latter indicates that the record represents an e-book and enables searchers to limit queries to e-book records. While the loading and editing of these monthly bibliographic record files was originally done by the head of the cataloging unit, a library technician now handles the task.

The EBL bibliographic records lack the quality usually desired in a university catalog. Name headings may not conform to the form found in the National Authority File, subject headings are often overly broad, and titles are sometimes provided in their prepublication form. For example, the title *The Role of Internal Audit in Corporate Governance in Europe* has the corporate heading "(ECIIA), European Confederation of Institutes of Internal Auditing." The correct heading lacks the acronym in parentheses. In addition, the heading is tagged as if it were a conference name. Similarly, the editor's name does not appear in the descriptive fields and the form of the name as an added entry lacks the date of birth that appears in its authorized form (i.e., "Schartmann, Bernd" instead of "Schartmann, Bernd, 1962-"). Finally, although "Auditing, Internal" and "Corporate governance" are valid subject headings, the only subject heading provided by EBL is "Business"—with no geographic subdivision for Europe.

The task of revising subject headings on thousands of temporary bibliographic records is too time-consuming. The effort would also need to be

repeated monthly with each new record load; leaving the records as they are results in a much simpler process.

Once an order has been triggered, an acquisitions staff member is notified and the title is cataloged like any other e-book purchased from EBL. When the full record is downloaded from OCLC, it overlays the existing EBL-provided record. When the next month's file is downloaded, the purchased title is no longer included in the file.

Springer

OSUL contracted with Springer Verlag to purchase subject-related e-book sets. These subject sets comprise hundreds of titles, resulting in the need to find simple solutions to catalog a large number of titles quickly and efficiently. Approximately 8,500 e-books have been purchased from Springer from February 2009 through March 2012.

Initially, Springer provided two methods to acquire bibliographic records for its titles. First, vendor-created records could be downloaded free of charge from the Springer website. As with the EBL records described above, these were of poor quality. Typically, the ISBN was recorded in the MARC 001 field, the title was recorded in title case, the extent of item was given simply as "v. : digital," and the subject headings were overly broad. To illustrate this last point, *Multichain Immune Recognition Receptor Signaling: From Spatiotemporal Organization to Human Disease* has the subject heading "Medicine." In addition, and contrary to current practice, the series was traced only in a series statement (MARC field 440) rather than using the combination of series statement and uniform title added entry (MARC fields 490 and 830). These vendor-supplied records often list all authors in the statement of responsibility and trace all authors as added entries. While this is permissible in RDA, most libraries at the time of this writing are

still using AACR2 as their catalog code and recording all authors is not an acceptable practice.

Springer's bibliographic records also lack OCLC control numbers. This number is useful in retrieving a bibliographic record in OCLC, usually of better quality, so that OSUL can set its holdings. Tagging records with OSUL's symbol is critical for showing holdings in WorldCat as well as in the Summit union catalog. Searching for OCLC records one at a time would require considerable staff effort and time, a prohibitively inefficient way of processing large numbers of titles.

These records have an advantage in that they are available shortly after publication. They could be overlaid later with a fuller bibliographic record matching on ISBN, although ISBN-matching presents a problem itself. Because many libraries use a single record approach, a record could already be present in the library's catalog for a print version that includes the ISBN for the electronic version. If a library uses a separate record approach to electronic versions but the record used for a print version includes the ISBN for the electronic, then the print will be retrieved with the e-ISBN, causing confusion as to which version the library actually owns.

As a second avenue for acquiring bibliographic records, Springer originally maintained a spreadsheet that included OCLC control numbers for its e-books; the spreadsheet was freely available on its website. The spreadsheet listed the ISBNs (both for the electronic and the print versions) for each title, plus series, OCLC control number, copyright year, Springer subject collection and the "added to WorldCat until" date. This date was when the entry was made in the spreadsheet. The spreadsheet was updated several times a year on an irregular schedule.

The head of cataloging periodically downloaded this spreadsheet and edited it to exclude collections not

purchased and titles for which records had already been downloaded. The remaining titles were those that OSUL had purchased. OCLC control numbers from the spreadsheet were then used to batch download bibliographic records to the local ILS, attaching OSUL's holdings symbol to the OCLC record at the same time. Once the records were downloaded, some minor editing was done, including adding proxy data to the URL in the Electronic Location and Access field (MARC field 856), changing the material type to "@" (for e-resources—a local practice), and removing 856 fields for publisher's descriptions.

Although this process appears to be straightforward, it was not a foolproof way of retrieving bibliographic records for all of the library's purchases. Because Springer did not create bibliographic records in OCLC, the publisher had to rely on library catalogers elsewhere to create records for Springer titles. Since there can be a time lag between when an e-book is published and when it is cataloged, relying on Springer's spreadsheet would only retrieve records for some of the purchased titles. For each set of purchased titles, some had OCLC records available immediately while others did not. OSUL found that for some titles, the lag time between publication of a title and the appearance of an OCLC record (and therefore inclusion in the spreadsheet) could be as much as a year or more. Fortunately, this situation applied only to a small number of titles for each set.

OSUL chose to use the spreadsheet, loading bibliographic records for purchased titles as they became available. Titles without a record in the local ILS would continue to be accessible through the Springer website, although users would need to know to go to the website to find them, a situation that was highly unlikely. The periodic examination of Springer's spreadsheet was done approximately quarterly by the head of the cataloging unit.

To assess how many of the purchased titles from Springer were not yet represented in the ILS, staff loaded Springer-provided MARC records and set the system to reject any ISBN that matched an existing record. About thirty titles not previously cataloged were added to the ILS. The process was quite time-consuming and imperfect, as e-ISBNs also appeared on print records, producing inaccurate matches. Fortunately, the percentage of titles purchased that lacked records in the system was very small.

In 2011, Springer changed how it provides records for its e-books. The publisher arranged with OCLC's Collection Sets service to provide bibliographic records from WorldCat at no cost to libraries. Through this service, a "subscription" can be set up to provide notifications when a new set of bibliographic records became available. Although the time-lag issue described above has persisted, the process of downloading records as they become available has been greatly simplified. The head of cataloging continues to perform this task because it involves restricted permissions. However, the task could conceivably be passed on to a library assistant following training and adjusting permissions in the ILS.

Morgan and Claypool

In 2010, OSUL purchased Morgan and Claypool's Synthesis I and II collections of e-books in computer science and engineering. Morgan and Claypool provides bibliographic records for these collections that are freely available for downloading from their website. Optionally, libraries can also purchase a "collection set" of bibliographic records from OCLC. These MARC records have been created by OCLC member libraries for the titles in the Synthesis collections.

Unlike other publisher-provided MARC records, Morgan and Claypool's bibliographic records are good

quality and follow prevailing cataloging standards. Morgan and Claypool contracted their cataloging to a company with skilled and knowledgeable catalogers, Special Libraries Cataloging.¹⁹ As with the other vendor-supplied records, however, these records do not include OCLC control numbers and so no mechanism is provided by which the publisher is able to tag the OCLC record with a library's holdings symbol.

OSUL opted to purchase the collection set from OCLC since setting holdings in WorldCat is a critical step for resource discovery. The process for downloading the records is straightforward. Staff navigate to the OCLC website, place the order for the record set, and after processing the charges, the set is ready to transfer by ftp to the OSUL catalog using Millennium's Data Exchange module. Initially, the head of cataloging performed this work to deal with any problems, but this task was readily passed along to a library technician following minimal training.

Discussion

The four workflows described above are summarized in table 1.

Since embarking on an aggressive program of purchasing e-books, OSUL has learned much about designing workflows that best integrate the cataloging of these resources into the unit's daily routines. The factors having the greatest effect on designing cataloging workflows for e-books are

- whether bibliographic records are ordered and downloaded in bulk or individually;
- the method for downloading bibliographic records;
- the quality of the bibliographic records, including description, subject analysis and the presence or absence of OCLC control numbers; and
- training personnel.

Table 1. Summary of Characteristics for E-book Workflows at OSUL.

Vendor	Source of Bibliographic Records	Method of Downloading	OSU Personnel Performing Task	Use PCC Vendor Neutral Policy Guidelines?
EBL	WorldCat via Connexion	One by one	LT3	Yes
EBL Patron-Driven Purchase Program	EBL	Batch file download	LT3	No
Springer	WorldCat via Connexion*	Batch search and download	Head of cataloging	Yes
Morgan & Claypool	WorldCat Cataloging Partners	Purchased set	Head of cataloging	No

*Records for Springer titles are now available through WorldCat Cataloging Partners.

The source of bibliographic records for e-books often determines much of the workflow. Records downloaded directly from a vendor allow for a simple process. Some vendors periodically notify the library staff when new records are available, as was the case with OSUL's PDA program with EBL. With minimal editing, OSUL was able to coordinate these monthly downloads, although needing to accept less-than-ideal record quality. The source of records for most of OSUL's purchased e-books was OCLC, although three different methods of acquiring them were used: downloading record sets through the WorldCat Selection Sets program, the WorldCat Cataloging Partners program, and downloading individual records via OCLC's Connexion client. For some e-book sets, such as University of California Press titles (not described above) or Springer books, batch downloading using Connexion was quick and easy. The source of records usually correlated with their quality, as vendor records often required much editing, while OCLC records required little if any editing.

Vendor records are appealing to use because they are often available free of charge. For libraries that are not OCLC members or have limited staff, these records provide a quick way of providing some kind of catalog access to e-books. The quality of that access, however, may be poor. Many

vendor records do not follow current descriptive standards, lacking statements of responsibility and subject headings, having titles entirely capitalized, or using unauthorized forms of name headings. Such records could be used as place-holders in the catalog until better records are found to overlay them, but the maintenance and deletion of vendor records requires considerable staff time and effort—a cost that library decision makers must consider when vendors offer “free” bibliographic records along with their e-books. If dealing with a small number of titles, the best practice is to avoid loading vendor records and, instead, download records on a title-by-title basis, as is often done with printed works in conventional cataloging workflows.

OSUL is an OCLC member library, and quality bibliographic records for e-books are considered critical for discovery. That quality includes the presence of an OCLC control number. Interlibrary loan depends on these identifiers, as does the OCA Summit catalog. If a vendor's records include the OCLC control number, the process of tagging the matching OCLC records with a library's holdings symbol is greatly simplified. Unfortunately, in many instances, vendors do not have access to control numbers and cannot supply them in bibliographic records. When evaluating vendor records, the presence of the

OCLC control number should be a significant factor in decision-making.

Staff training is an important consideration when integrating e-book cataloging into the department's daily work. For staff accustomed to cataloging print materials, the process of downloading vendor records may seem strange since no physical pieces exist. Copy catalogers may need to download the book to view its title page and compare with the OCLC record when cataloging title-by-title. A thorough understanding of the standards in place for cataloging electronic resources and especially the PCC's policy on vendor-neutral records can go a long way toward alleviating anxieties about cataloging e-books. Staff may need to learn to download records from vendor's websites or open up zipped files of bibliographic records.

Initially, OSUL's head of cataloging and metadata services took responsibility for designing the workflow for each e-book vendor and handled the downloading and cataloging for a sample batch of the first few titles. Once procedures were established and documented, whenever possible, he trained a staff member to handle this work.

Staff also need to be familiar with the e-book cataloging workflows to know how to retrieve and edit records. Because nearly every vendor's records have their own workflow, written procedures that are readily accessible to

catalogers should be distributed to staff, archived and kept up-to-date. These procedures are present on the unit's wiki along with other unit policies and procedures.²⁰ Adding the library's proxy data and a public note to the MARC 856 fields rounded out the topics to be covered when training staff to catalog e-books.

Communication and planning are essential to ensuring that workflows are designed in advance of e-book acquisitions. This can help avoid the situation where the collection development department is expecting titles in an e-book package to be cataloged, but the cataloging unit has not yet been notified that the e-books have been purchased. The timely communication of such information requires that those deciding on the purchase of e-book packages notify the cataloging unit as early as possible in the process. The cataloging manager can then request information from the publisher or vendor about the availability of bibliographic records and begin planning from whom those records will be acquired (i.e., the vendor, OCLC, or some other source), how they will be downloaded into the catalog, how much post-download editing will be required, and which personnel will be responsible for this process. When the e-books then become available, the cataloging unit is already prepared to catalog them. Without the input of catalogers, and with many collection development librarians lacking the expertise to evaluate the quality of a vendor's MARC records, vendor promises of free MARC records and easy catalog access may sound very attractive. Understanding the reach of WorldCat records makes for an easy decision to forgo using vendor records.

One problem that OSUL continues to struggle with is the number of duplicate e-book purchases. With so many incoming streams of e-books, the libraries sometimes purchase a title without realizing that it is a duplicate.

For example, a Springer title may be purchased individually via EBL, but the same title has also been purchased as part of a subject-defined set. Such errors in purchasing were initially discounted, and the records sometimes merged when they were discovered. However, the problem appears to be increasing as more e-book records are loaded into the catalog. At present, we have not yet found an adequate solution to this problem and are relying on chance discoveries to take care of the duplicate records.

Lastly, another step in the cataloging process needs to be noted. OSUL uses Innovative Interfaces' Millennium ILS. Millennium uses load tables that translate incoming MARC records into Millennium's proprietary record format. Load tables also can be used to delete or add specific fields from incoming records. For some of the previously mentioned workflows, new load tables were created to download MARC records with the least amount of post-download editing, such as adding the OSUL proxy into the uniform resource locator (URL). While creating a new load table can be a straightforward process, libraries using Millennium may need load table training and troubleshooting assistance when new e-book packages are purchased. Other library systems may require similar steps to ensure that the downloading of e-book records is performed as efficiently as possible.

Conclusion

OSUL has found that each new e-book vendor requires the design of a workflow tailored to the quality and method of downloading bibliographic records for its publications. With publishers increasingly moving to electronic publication and the rapidly growing number of available e-book titles, libraries need to be expert designers of workflow. The present study highlights several aspects of establishing workflows of which

library managers should be aware.

First, staff need training in multiple methods of downloading and manipulating bibliographic records. Facility with using bibliographic software such as MarcEdit and understanding the capabilities of the local ILS should enable cataloging staff to readily participate in the design of new workflows. An agile staff eager to learn new ways of doing their tasks can help ensure that new sources of e-books and bibliographic records are quickly integrated into the daily work of the cataloging unit.

Second, the transition from a traditional workflow to newly developed ones should be a matter of concern beyond the cataloging unit. Communication between collection development and technical services is critical to linking the purchase of e-books with their timely cataloging. Both departments need to be aware of how e-book workflows differ from those for tangible resources so that resources are processed as soon as they are available from the vendor.

Third, staff need to document e-book procedures so that all staff are aware of the differences between vendors. Making such documentation widely available ensures that the absence or departure of personnel does not result in workflow failure.

Last, feedback needs to be provided to vendors about record quality and the importance of linkage with WorldCat. Many libraries rely on WorldCat, at least in part, for their presence on the web as well as for interlibrary loan and other services. The provision of poor-quality records without any connection to that shared bibliographic system is an obstacle for libraries to share their holdings with other institutions.

The problem of purchasing duplicate titles from multiple vendors is one that has not yet been fully addressed at OSUL. Further research needs to be done on the extent of this problem and on ways to mitigate it.

References and Notes

1. Annette Lamb and Larry Johnson, "Nurturing a New Breed of Reader," *Teacher Librarian* 39, no. 1 (October 2011): 56–63.
2. Jeffrey R. Young, "This Could Be the Year of E-textbooks, If Students Accept Them," *Chronicle of Higher Education*, September 7, 2009, accessed March 21, 2013, chronicle.com/article/The-Year-of-E-Textbooks-/48305.
3. Rebecca Miller, "Dramatic Growth: LJ's Second Annual Ebook Survey," *Library Journal*, October 12, 2011, accessed February 11, 2013, www.thedigitalshift.com/2011/10/ebooks/dramatic-growth-ljs-second-annual-ebook-survey.
4. Marc Langston, "The California State University e-Book Pilot Project: Implications for Cooperative Collection Development," *Library Collections, Acquisitions & Technical Services* 27, no. 1 (2003): 19–32.
5. "Electronic Resources Workflows," Oregon State University Libraries, Center for Digital Scholarship and Services, accessed August 20, 2013, wiki.library.oregonstate.edu/confluence/display/TechServ/Electronic+Resources+Workflows.
6. Annie Wu and Anne M. Mitchell, "Mass Management of E-Book Catalog Records: Approaches, Challenges, and Solutions," *Library Resources & Technical Services* 54, no. 3 (July 2010): 164–74.
7. Becky Culbertson, Yael Mandelstam, and George Prager, *Provider-Neutral E-Monograph MARC Record Guide: Includes Revisions to September 2011* (Washington, DC: Program for Cooperative Cataloging, 2009), accessed March 21, 2013, www.loc.gov/aba/pcc/bibco/documents/PN-Guide.pdf.
8. Kristin E. Martin and Kavita Mundle, "Notes on Operations: Cataloging E-Books and Vendor Records: A Case Study at the University of Illinois at Chicago," *Library Resources & Technical Services* 54, no. 4 (October 2010): 227–37.
9. Kavita Mundle, "Integration of Electronic Books into Library Catalogs: The UIC Library Experience," *Acquisitions Librarian* 19, no. 3/4 (2008): 389–407.
10. MarcEdit, accessed September 20, 2013, people.oregonstate.edu/~reaset/marcedit/html/index.php
11. See Kristin E. Martin, "Cataloging e-Books: An Overview of Issues and Challenges," *Against the Grain* 19, no. 1 (February 2007): 45–47; Elaine Sanchez et al., "Cleanup of NetLibrary Cataloging Records: A Methodical Front-End Process," *Technical Services Quarterly* 23, no. 4 (2006): 51–71.
12. Lesley Nelson and Frances O'Neil, "Electronic Monographs in the Academic Library: An Implementation Story," *LASIE: Library Automated Systems Information Exchange* 32, no. 2/3 (August/December 2001): 13–20.
13. Randle Gedeon and Bettina Meyer, "E-books at Western Michigan University: A Case Study," *Against the Grain* 17, no. 1 (February 2005): 52–54.
14. Jeffrey Beall, "Free Books: Loading Brief MARC Records for Open-Access Books in an Academic Library Catalog," *Cataloging & Classification Quarterly* 47, no. 5 (2009): 452–63.
15. Mary Finn, "Batch-Load Authority Control Clean-Up Using MarcEdit and LTI," *Technical Services Quarterly* 26, no. 1 (2008): 44–50.
16. Carrie A. Preston, "Cooperative e-Book Cataloging in the OhioLINK Library Consortium," *Cataloging & Classification Quarterly* 49, no. 4 (2011): 257–76.
17. Culbertson, *Provider-Neutral E-Monograph MARC Record Guide*.
18. Richard Sapon-White, "Notes on Operations: Kindles and Kindle E-Books in an Academic Library: Cataloging and Workflow Challenges," *Library Resources & Technical Services* 56, no. 1 (January 2012): 45–52.
19. "Morgan & Claypool Publishers MARC Records," Morgan & Claypool, accessed August 2, 2013, www.morganclaypool.com/page/marc.
20. "Electronic Resources Workflows," accessed August 2, 2013, wiki.library.oregonstate.edu/confluence/display/TechServ/Electronic+Resources+Workflows.