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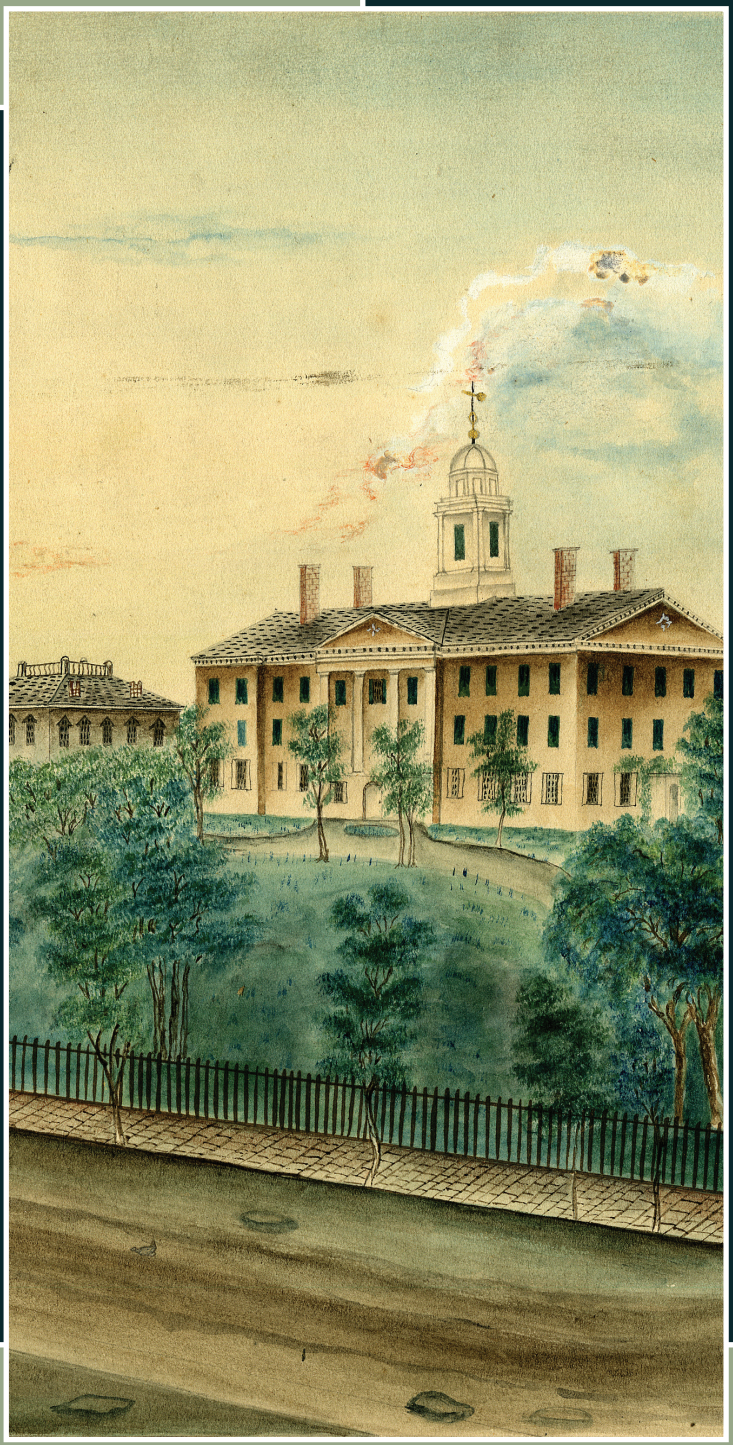

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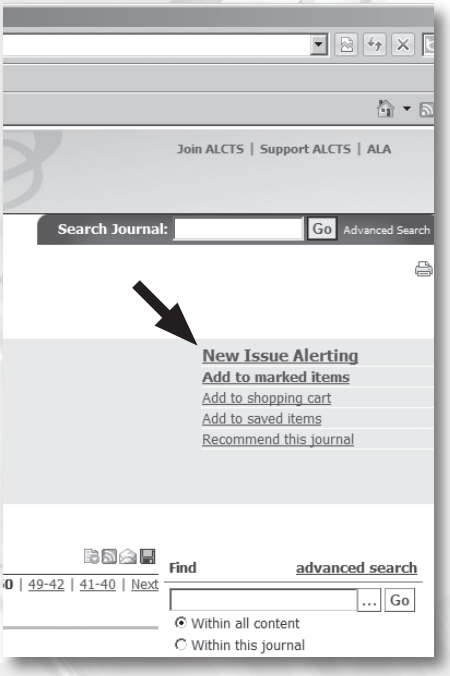
Many of us will miss the familiar experience of sitting down to peruse the latest issue of *LRTS* straight from the mailbox. The ALCTS office is looking at options for those who may wish to order, for a fee, a print copy of any future *LRTS* issue. We will keep you posted.



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Cover image: Watercolor painting of Rutgers College, by T(heodore) Sanford Doolittle, ca. 1850s. Special Collections and University Archives, Rutgers, the State University of New Jersey, New Bruswick, New Jersey.

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Editorial: Next Steps

Mary Beth Weber

Welcome to the inaugural issue of the e-only *Library Resources and Technical Services* (*LRTS*)! We are starting the year with a new publication model for *LRTS*. The content and quality of the journal will remain constant, as will the submission criteria and review process. The difference is that you will no longer receive a print copy of the journal, and it will instead be delivered directly to your e-mail. Transitioning to e-only provides new opportunities. It removes page limits required for print and will enable full color copy (perfect for viewing *LRTS* covers and illustrative matter that accompanies papers). It will also enable us to explore new publication models used by other e-only scholarly journals. I am confident things will proceed smoothly under the watch of Tim Clifford of ALA Production Services, *LRTS*'s production editor, and Christine McConnell of ALCTS, *LRTS*'s manager. Tim has handled other ALA journals' transition to e-only, and Christine has addressed issues related to subscriptions and publicity. I rest assured it will be a seamless transition.

Regarding the quality of *LRTS*, I am pleased to note that the journal was cited in Judith M. Nixon's paper "Core Journals in Library and Information Science: Developing a Methodology for Ranking LIS Journals" as one of the top ten journals as cited by library directors and deans.[1] As a peer-reviewed scholarly journal, papers submitted to *LRTS* undergo a double-blind review by the expert reviewers who serve on the *LRTS* Editorial Board. This is true for all submissions, including those submitted by members of the editorial board.

Eliminating the costs of printing the journal and postage will save ALCTS money and will also enable ALCTS to deliver your copy of *LRTS* directly to your e-mail. However, moving to e-only will not speed up the processes associated with reviewing papers and preparing issues of *LRTS*. It may seem as if papers submitted to *LRTS* undergo a long journey from submission to publication, yet there are a number of important processes that take place along the way. Papers are submitted via the Editorial Manager manuscript-submission system after authors have registered themselves in the system. Once received, the paper is carefully matched with two reviewers who work independently of each other. The editorial board consists of ALCTS members with writing and subject expertise and includes representation from ALCTS's various divisions. Reviewers are given about twenty-one days to review a paper and submit their comments in Editorial Manager, and I am alerted when all reviews are complete. I then compile the reviewers' comments and convey them, along with a marked up copy of the paper, to the author(s). At this point, the author is asked to revise the paper and resubmit it. I should note that I have yet to receive a paper, regardless of how well written and researched it might be, that does not require some type of revision. Some papers undergo one revision and are accepted for publication. Others may require a second round of double blind review and the author will resubmit a second revision.

In my January 2014 annual report to the ALCTS board of directors, I reported that for the period of June 2013 to January 2014, thirty-nine papers were submitted to *LRTS*. From that number, nineteen (46 percent) were rejected. This is

testament to the rigorous review given to papers submitted to the journal. My work includes reviewing and copyediting papers, in addition to the review provided by editorial board members. I check each citation to ensure that it has been properly formatted and is accurate. The authors may receive several inquiries during the review process.

To generate content, I do extensive outreach to potential authors when I attend conferences and presentations. I also subscribe to a number of discussion lists and have contacted individuals about writing a paper based on the surveys or research they are doing. Additionally, I welcome emails from individuals with potential paper topics (and I frequently receive these types of inquiries). I am happy to mentor potential authors, as are members of the editorial board. ALCTS has a strong publications program and several venues where authors can publish, including the ALCTS News and the Paper Series. The ALCTS Publications Committee is developing a mentoring program for authors, and I am proud to be part of that effort. Publications are an outgrowth of one's work and as professionals. We benefit from sharing our findings and insights with others.

In closing, I would like to highlight this issue's contents:

- In "Spilling Out of the Funnel: How Serials Cancellations Affect Interlibrary Loan Use and Patron Access to Materials," Steven A. Knowlton, Iulia Kristanciuk, and Matthew J. Jabaily discuss interlibrary loan (ILL) as an alternative means for academic library patrons to access serial titles that their library has canceled. They conducted a study that examined how serials cancellations affect ILL usage, and how reliance on ILL affects patron's access to content.
- Jason C. Dewland and Andrew See discuss the lack of metrics to evaluate Patron Driven Acquisitions (PDA) programs in "Patron Driven Acquisitions: Determining the Metrics for Success." Their paper details how the University of Arizona developed metrics for their PDA, including a list of key metrics that they argue every library with a PDA program should monitor.
- "One Title, Hundreds of Volumes, Thousands of Documents: Collaborating to Describe the Congressional Serial Set" chronicles Purdue University Libraries' participation in the Google Books government documents scanning project. The University of Iowa used a template developed by Purdue and joined as partners in a collaborative process. Suzanne Ward, Patricia Glasson, and Randall Roeder relate the details of the project and how it reached a successful conclusion.
- Academic librarians frequently use citation studies and analyses of usage statistics to determine if their journal collections satisfactorily support the needs of research faculty. In "Combining Citation Studies and Usage Statistics to Build a Stronger Collection," Stephanie H. Wical and R. Todd Vandenbark discuss how they compiled a list of faculty journal publications that covered a thirteen year span from four academic departments at their small regional liberal arts college to generate a list of the journals that faculty cited. They combined an analysis of usage statistics with citation analysis to more strategically look at a Big Deal Package.
- Violeta Ilik provides an overview of the open source web application Viewshare in "Visual Representation of Academic Communities through Viewshare." Her paper summarizes how she generated and customized unique views of data about faculty members at Texas A&M University, specifically their areas of research and data such as PHD granting institution and Virtual International Authority File authority records.

I hope that you enjoy this issue of *LRTS*!

Rererence

1. Judith M. Nixon, "Core Journals in Library and Information Science: Developing a Methodology for Ranking LIS Journals," *College & Research Libraries* 75, no. 1 (2014): 68.

Erratum

Information in v. 58, no. 4 for one of the authors cited in "Positioning Libraries for a New Bibliographic Universe" by Kristin Martin and Kavita Mundle is incorrect. The author's name is Ellen Greenblatt, not Helen Greenblatt. We apologize for the error.

Spilling Out of the Funnel

How Reliance Upon Interlibrary Loan Affects Access to Information

Steven A. Knowlton, Iulia Kristanciuk, and Matthew J. Jabaily

Academic libraries that cancel serials titles typically offer interlibrary loan (ILL) as an alternative means to access these titles.This study examines how serials cancellations affect ILL usage and how reliance on ILL affects patrons' access to content. By analyzing the number of ILL requests from canceled titles, the authors found that cancellations have a very small effect upon overall ILL usage. With the help of Google Analytics, the authors counted patron requests for link resolver access that were converted to ILL requests. When the link resolver was unable to generate a link to full text, it displayed a message to that effect on a link resolver landing page and presented the patron with a choice to request the title through ILL. Google Analytics recorded traffic to and from the link resolver landing page and generated a data set for this study. Analysis of collected data, including ILLiad records, shows that after patrons identify desired articles that require ILL, they only submit ILL requests 31 percent of the time. This means that for every successful ILL request, there are at least two articles desired that are never requested. Implications for collection development are discussed.

When academic libraries cancel journal subscriptions, patrons lose immediate access to the content within those journals.However, patrons whose libraries participate in interlibrary loan (ILL) programs retain the ability to discover the existence of desired content through indexes (often called "databases") and obtain the material from partner libraries. Many librarians are confident that this model of obtaining material is an effective alternative to subscriptions because, as Mortimore writes, a well-run ILL program can "provide access to the right materials at the right time."[1]

The practice of canceling subscriptions and relying on ILL presents two related but distinct concerns for library administrators, concerns that this paper addresses. First, savings from subscriptions budgets may be countered by increased ILL costs. Second, it is not established whether ILL meets patron information needs as well as direct subscriptions do.Accessing content via ILL is a very different experience from accessing it directly from a library portal.A patron seeking content than a subscribed title typically finds the material in an index and can begin reading it within seconds.A patron who uses ILL must undertake additional steps in the library interface to place the ILL request and wait hours

Steven A. Knowlton (steven.knowlton@memphis.edu) is Collection Development Librarian, University Libraries, University of Memphis. **Iulia Kristanciuk** (krstncuk@memphis.edu) is Electronic Resources Library Assistant, University Libraries, University of Memphis. **Matthew Jabaily** (jabailym@gmail.com) is Information Services Librarian at Rhodes College.

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The authors are grateful to Susan Wood for providing interlibrary loan usage figures, to Cody Behles, Laureen Cantwell, and Pam Dennis for their helpful critiques of our methods and drafts, and to Kenneth Ward for his review of our statistics.

or days to read the material. Waiting for the requested material may present a potential problem in the context of the increasing number of millennials among library patrons, who are described in library literature as impatient, "not tolerant of delays, expectant of instant service [and] instant gratification."[2] Regarding the first concern, whether turning from subscriptions to ILL will affect library costs in ILL, Beales suggests that such data can be influential in a library's decision whether to abandon "Big Deal" subscription packages.[3] In particular, the question addressed in this paper is whether increased ILL costs will consume savings from canceled subscriptions.

The second concern addressed in this paper is how reliance upon ILL affects patron access to content. The question addressed in this paper is if patrons who find citations in an index will use content offered through ILL as much as they use directly subscribed content. Even if reliance upon ILL reduces the amount of direct access to content, the interpretation of the significance of that effect varies. Nabe and Fowler, researchers who studied ILL requests after cancellations, offer one view. They found that ILL requests for the cancelled titles were significantly lower than the number of full-text downloads. They concluded that "download statistics are not an accurate indicator of demand."[4] They assert that ease of access via efficient article linking within library portals and on web search engines such as Google artificially inflates usage figures as a user may access an article "without meaning to, or after accessing it, determine it to be of no use."[5]

An alternative to Nabe and Fowler's conclusion may be that, rather than ease of access artificially inflating demand, the inconvenience of using ILL artificially depresses demand. For example, at the University of Memphis (UoM) Libraries, making an ILL request requires the user to take at least two extra steps beyond accessing an article within a subscribed journal. After identifying the desired content in an index and clicking on an "Article Linker" icon to open an article to which the library subscribes, the patron must identify and click on a link labelled "ILLiad," which opens the ILL software interface, and then choose to submit a request within ILLiad.This chore of navigating through the funnel of web pages to access a desired article may deter users from completing an ILL request.

To address the related questions of how cancellations affect ILL usage and how relying on ILL affects patrons' access to content, the authors conducted a study of user behavior related to ILL. To assess how serials cancellations affect ILL requests, the authors duplicated an experiment originally conducted by Calvert and Fleming to test if their

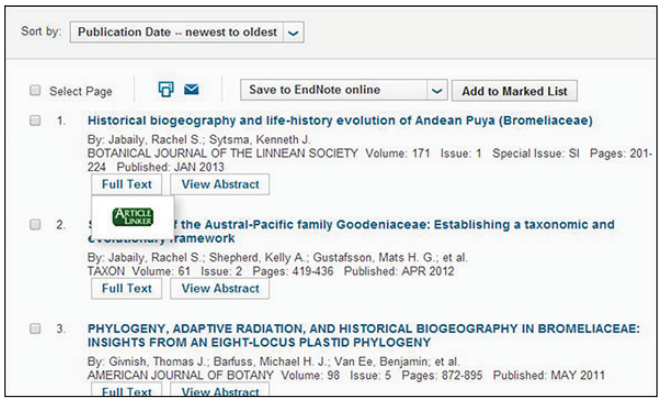

Figure 1. Patron View of an Electronic Index Entry via UoM Libraries

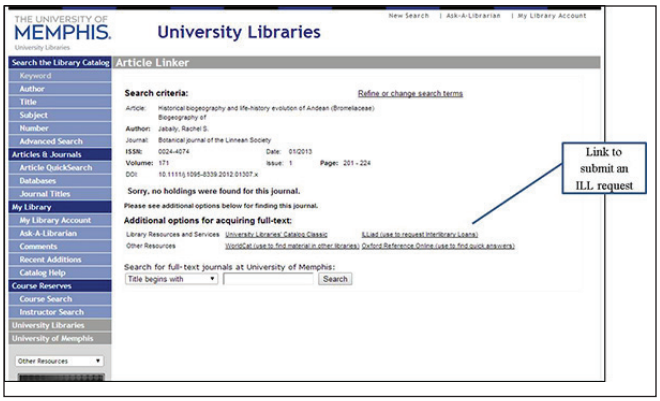

Figure 2. Patron View of Link Resolver Landing Page at UoM Libraries; Note ILLiad Link in Non-prominent Location

results could be reproduced.[6] Calvert and Fleming noticed a spike in ILL use and in response to that change in user behavior investigated whether the increase in ILL use was related to recent serials cancellations. They found no correlation between the cancellations and the increased use of ILL. In addition, the authors conducted a novel study using web analytics to examine to what extent the link resolver landing page deters patrons from completing an ILL request.

Background

The University of Memphis (UoM) is a publicly-supported research university whose library budget has not kept pace with increases in serials prices. In 2012, the UoM libraries reviewed subscriptions and identified 277 titles suitable for cancellation because of low usage, low citation rates, or both. Starting in January 2013, patrons who had previously enjoyed direct access to those titles would need to use ILL to access the content (except in cases where the material was available by a means other than direct subscription, such as an aggregated database.)

At UoM, making an ILL request from an online index is not a seamless process. During the period studied, a patron, upon discovering an article of interest, was required to click on a cryptic icon named "Article Linker" (see figure 1).The patron then navigated a jargon-laden page that offered the availability of ILL in small print hidden among other links (see figure 2). From there, the patron had to register for an ILL account (if not already registered) and finally place the request.To add to the complexity of making a request, if patrons had not previously registered for an ILL account, the citation data were not transferred into ILLiad.This series of steps is known as a "funnel."[7]

UoM uses ProQuest's Serials Solutions 360 Link (www.proquest.com/products-services/360-Link.html) to provide its link resolver service. Link resolver technology controls the linking between the website where the patron discovers an item of interest and the website where the full text resides. Figures 1 and 2 show the default display settings with minor customization. For a researcher who has not been shown the process of authorizing a link resolver request and then converting an unsuccessful link resolver request into an ILL request, these displays may be confusing. (Note: it is the authors' intention to improve the public display of these functions; however, for the duration of this study patrons used the displays shown above.)

As a result of the cancellations of 277 subscriptions, there were 187 titles that patrons could access in 2012 but lacked new content in 2013. The remaining 90 cancelled titles had continued coverage through aggregated databases. The authors used this title list as one of the datasets for our studies.Patrons desiring to access the 2013 content of the cancelled titles had to rely upon ILL to acquire the material through UoM Libraries. The authors used ILL data to examine patron behavior around the ILL function to explore the impact of cancellations upon the libraries' ILL service and upon the patrons' access to content.

Literature Review

In the last two decades, literature about journal cancellations and ILL has frequently discussed the use of ILL data to evaluate prior cancellation decisions and to measure cost-effectiveness of borrowing versus owning serial titles. Although they vary in scope and approach, all studies draw on ILL transaction data obtained from document delivery software, and practically all find minimal impact of serials cancellations on overall ILL usage. Another shared feature of these studies is that they concentrate on studying cancellations of print serials. This differs from the current study and that of Calvert, Fleming, and Hill, which examine

cancellation of online serials. However, because ILL is used to supplement access to journal content regardless of its format, the effects of cancellations are comparable between studies of print and online cancellations. There is also general agreement among the authors of the reviewed literature that ILL *does* represent a cost-effective option for providing access to materials from cancelled journals.Numerous authors, including Jaramillo and Lamborn, Nixon, Walter, Warner, and Welch, emphasize collaboration between libraries and faculty as an essential factor in making judicious cancellations.[8] As Calvert, Fleming, and Hill point out, however, there is a dearth of recent literature on the subject of the impact of journal cancellations on ILL

In the 1990s, several articles followed up on library cancellation projects to compare the cost of filling ILL requests for articles from cancelled journals to the cost of maintaining subscriptions to those journals.Kilpatrick and Preece assessed the impact of a major cancellation project at their library four years after its implementation in 1990. The authors found that "articles from fewer than 5% of the cancelled serial titles were requested on interlibrary loan one or more times."[9] According to the authors, such low demand for articles from cancelled journals justified and supported the library's cancellation decisions. Kilpatrick and Preece calculated that, during the six-month period of the study, the library spent less per article for ILL services than it would have for subscriptions. In a similar study, Wilson and Alexander examined ILL borrowing data from May 1995 to January 1999 and found that, with few exceptions, borrowing was more cost-effective than subscriptions. In most cases, a single year's subscription cost as much or more than three years of borrowing for the same title. Transaction data showed that only 1.4 percent of articles from cancelled titles were requested five or more times.[10]

Hughes collected data about the cost of supplying three types of articles via commercial document delivery (CDD): articles from recently cancelled journals; articles from journals that were owned but were either missing, being bound, or in some other way unavailable to patrons; and articles from journals that were never owned or were cancelled very long ago. The number of requests for articles from recently cancelled journals was the lowest among the three types of requests studied in the pilot (8 percent), and for those articles, using CDD was considerably more cost-effective than subscribing. It cost the library $128.95 to get nine articles from previously cancelled journals, and the cost of subscriptions for the same journals would have been "at least $4,630" per year.[11] Although requests for articles from owned but inaccessible journals and from journals that were never owned were more numerous, the costs associated with obtaining these articles through CDD were still considerably lower than subscriptions to the journals from which articles were requested.

In 1995 Crump and Freund singled out requests for cancelled titles and found that they constituted "just 0.2% of 16,632 interlibrary loan requests submitted by the University of Florida patrons during the research period."[12] A year later in 1996, Gossen and Kaczor compared journal title requests through ILL from academic scientists to two cancellation lists and found that patrons requested articles from only 1 percent of the titles canceled during the study period.[13]

In 1998, using data from an experimental pilot project focused on science and engineering journals, Duda and Meszaros found that the highest number of requests (over 40 percent) for articles from cancelled titles occurred during year one of the pilot (1991) and in 1997—the last year in the researched period. These figures are considerably higher than the number of requests for cancelled titles recorded in the studies conducted by other authors in the 1990s. The authors attribute the 1997 increase in the number of requests for cancelled literature to "the cumulative effect of the cancellation projects."[14] The authors demonstrate that article borrowing costs are substantially lower than subscription costs, and this conclusion aligns well with other studies reviewed in this section.

In 2011, Nabe and Fowler published two accounts of the impact on ILL of breaking Big Deal contracts. Nabe acknowledges that by leaving a Big Deal, his library incurred a significant loss in the overall number of titles; upon further examination, it turned out that a great number of these titles received low to zero use. A more reliable source of data for measuring the impact of leaving the Big Deal, ILL transactions showed that the impact of cancellations was minimal. A comparison of the top 25 percent of precancellation downloads to postcancellation ILL requests revealed that for Wiley titles, ILL demand was 0.9 percent of prior use, and for Elsevier titles it constituted 0.3 percent of prior use. Unlike other studies in this review, this examination of ILL data is vendor-based, and it will require independent verification before it can be compared to other studies. Nabe and Fowler's account of the impact of downsizing from a Big Deal to a "medium" deal on ILL is cursory. Although his library experienced a 47 percent rise in ILL requests after breaking the Big Deal, Fowler believes it to be coincidental and attributes it to "the near-simultaneous implementation of WorldCat Local" at his institution.[15]

Calvert and Fleming conducted the most recent study of the impact of journal cancellations on interlibrary loan, which was published in 2013 by Hill. Having been alerted by the head of ILL to an 11 percent spike in requests between 2011 and 2012, the time when their journal cancellations took effect, Calvert and Fleming examined ILL transaction data from 2010 to 2012 to determine what factors occasioned the spike. They learned that about 4 percent of cancelled titles received ILL requests in 2012; requests for

articles from cancelled journals made up about 2 percent of total ILL requests that year. The authors also noticed that the one cancelled journal that received the most requests had undergone a change in publisher coverage permissions after the cancellation, and that change made it unavailable through aggregators.[16] According to Hill, Calvert and Fleming believe that this decision by the publisher to embargo certain titles accounts for the 11 percent spike in journal requests. Finally, Calvert and Fleming checked ILL data from 2010 and 2011 to determine how many requests were received for cancelled titles prior to being cut. Analysis of ILL data showed that "20 out of the 29 studied journals saw either their first use or an increase in use in 2012," directly relating the 2 percent increase in ILL requests to the recent cancellation project. Hill summed up Calvert and Fleming's study by stating that journal cancellations had minimal impact on the operations of their interlibrary loan department.

Although many papers have reported on the impact of cancellations on internal measurements of ILL, such as number of requests and cost to the library, to the authors' knowledge there have been no studies that measure how many patrons are deterred from placing an ILL request by the additional steps required to complete the transaction. The authors' method of using web analytics has seen some applications for studies of library user behavior.

Web analytics involves using tools that "collect, analyze, and report website traffic data."[17] These tools can be useful in tracking traffic patterns on a webpage to learn whence incoming traffic arrives and where outgoing traffic goes. In library applications, Turner recommends that librarians use web analytics to determine what users are looking for on a library webpage and optimize the page's design.[18] Numerous authors have reported on projects in which they used web analytics to understand patterns of website use and improve the visitor experience.[19] The widespread use of web analytics in libraries prompted the publication of Marek's monograph on the subject.[20] Fagan posits a model by which web analytics can be used to assess progress toward a library's strategic benchmarks.[21]

In library research, Taraghi et al. used web analytics to trace the patterns of user linking from article to article within the Open Journal System (OJS) database.They found that users have a recurrent pattern of navigation when searching for articles.[22] Castro-Gessner, Wilcox, and Chandler of Cornell University used web analytics to trace the origins of visitors to their library's LibGuide research assistance pages; they found that 70 percent of visitors were not affiliated with Cornell.[23] The authors are unaware of any research using web analytics to measure user behavior regarding ILL requests.

To learn more about patterns in user behavior and navigation of serials online, libraries have analyzed link resolver data. Wakimoto, Walker, and Dabbour examined user experiences with the SFX link resolver; about half of their users were confused and closed the link resolver window without attempting to access full text.[24] Chrzastowski, Norman, and Miller provide a helpful guide to generating reports using SFX.[25] Stengel points out that these data tell librarians how users discover needed resources and also reveal the most-searched titles that, for a number of reasons, do not turn into ILL requests and thus are absent from ILL request logs.[26]

Other discussions in the literature about link resolvers and ILL venture beyond collection development to explore other areas of librarianship. Frank and Bothmann studied information-seeking behaviors of undergraduate students.[27] In more systemic studies of the impact of adding an ILL option to the link resolver, Williams and Bailey found that implementation of Serials Solutions reduced ILL requests for materials provided by the library, while Munson and Otto found a correlation between link resolver clickthroughs and ILL requests.[28] Stowers and Tucker described use of link resolver data in collection assessment processes, detailing a number of reports that they used in a comprehensive collection assessment.[29]

Method

This study was conducted in three parts.

Measuring ILL Requests for Cancelled Titles

Part one sought to duplicate Calvert and Fleming's study to see how many ILL requests were made for articles from journals on the list of cancellations.A list of cancelled journals was created in a Microsoft Excel spreadsheet. Each title was checked to see if there was alternate access to full text available in the present year, and a second list was created that included only the journals for which full text for the current year was not available.The list included journal titles ISSNs and eISSNs, which were normalized by removing any dashes or spaces.

Next, OCLC's ILLiad (www.oclc.org/illiad.en.html) was used to generate Excel-formatted reports of all ILL loan activity for the months of January through June 2013 (inclusive). These reports were combined into a single document and filtered to include only the requests that resulted in the delivery of an article to a patron. The list included the publication year of the article, journal title, volume, issue, author, article title, ISSN, and request date. The ISSN field was copied and normalized to remove any dashes or spaces; because the COUNTIF function used to analyze this dataset recognizes character strings, the same ISSN appearing with and without a space recognized as two different character strings.

Table 1. Cancelled Titles with ILL Requests in First Half Of 2013

Cancelled Titles	Titles with Ill Requests	Percentage of Cancelled Titles Requested
187	6	3%

Table 2. All ILL Requests In First Half Of 2013

Total Requests	Requests From Cancelled Titles*	Percentage Of All Requests Represented By Articles From Cancelled Titles
3,845	16	0.2%

*Analysis performed only on articles with a 2013 publication date

The lists of cancelled journals and completed ILL requests were compared by looking for matches in ISSNs using the Excel COUNTIF function. ILL requests with no ISSN listed were manually checked against the cancellation list by journal title. Preliminary matches were double-checked to determine definitively whether the journal cancellation necessitated the ILL request. Results were discounted if the requested article was already available at the library in print but delivered anyway, for example for a distance user, or if the article was older than the range of volumes the publisher offered online.

Measuring Patron Interest in Articles that Did Not Result in ILL Requests from Cancelled Titles

In part two, the instances of patrons using link resolvers to attempt to find a full-text article but not submitting an ILL request were measured.The metric used was the number of access attempts via the link resolver to an article from a cancelled journal. Google Analytics code was added to the footer of the UoM Libraries Serials Solutions pages to count the number of hits to each page. Whenever a patron used the link resolver, Google Analytics recorded access to the Serials Solutions landing page. The recorded Uniform Resource Locator (URL) for link resolver requests uses OpenURL, so the URL included journal ISSN, date, and other key information about the request in a predictable format.

Link resolver request data from January to June 2013 were exported from Google Analytics as an Excel spreadsheet. The URLs were transferred to NotePad++, a source code editor, and the find-and-replace function and regular expressions were used to isolate and normalize the ISSNs from each request.[30] The publication year of each request was similarly isolated. The link resolver request data were then transferred back into the Excel spreadsheet into the proper rows with the rest of the data. The list of ISSNs of the link resolver requests was compared to the list of cancelled journals. The number of hits for each journal was recorded. To determine how many requests were for current materials to which the UoM Libraries provide no access, the spreadsheet was filtered to include only the requests for articles published in 2013.

The method described above counts the number of unique URL requests for each journal, but many of the URLs for specific articles were accessed several times. Each of these accesses was counted by Google Analytics as an individual pageview.To count the number of total pageviews for articles from cancelled journals, the list of URLs and pageviews from Google Analytics was compared to the list of ISSNs of cancelled journals. The URLs that contained ISSNs from the cancellation list were isolated and the counts of pageviews were totaled. Only the number of pageviews for the entire set was recorded, as finding the total for each title would have been very time-intensive.

This study began in the second half of 2013 and examined data from the first six months of the year. In the data collection period, the authors avoided accessing any pages that were being monitored by Google Analytics as part of the study. During the study, however, the authors accessed these pages regularly to verify the URLs listed in the Google Analytics reports.Thus, expanding the time period of the study is not possible because the results would be artificially inflated by the authors' own use.

Comparison Lists

The third part of the study examined two comparison groups. The first group consisted of a sample of thirty-five journals to which UoM Libraries had no access, online or in print. The titles were arbitrarily selected from the lists of ILL requests from previous years. This list of non-subscribed journals was subjected to the same analysis as the cancelled list; the number of ILL requests, unique Serials Solutions hits, and total number of Serials Solutions pageviews were tabulated. The purpose of analyzing this set of journals was to compare the number and ratio of ILL requests and Serials Solutions views to the cancelled set.

A second comparison group was formed using journals to which the UoM Libraries currently offers access online. This group involved forty-nine journals and was arbitrarily selected from the list of journals to which the library subscribes. Again, the number of ILL requests, unique Serials Solutions hits, and Serials Solutions pageviews were tabulated.For this group, an additional step was taken to record the number of clickthroughs recorded by Serials Solutions for the journals.The purpose was to compare the number of Serials Solutions hits and pageviews to the number of clickthroughs recorded by Serials Solutions. This would give some indication of how well the Google Analytics statistics from the Serials Solutions pages approximated the total

Table 3. ILL Requests in First Half of 2013 from Selected Titles

	Unique Articles Viewed	Total Pageviews	ILL Requests	Conversion Rate
A. Titles cancelled after 2012*	24	44	6	13.6%
B. Never subscribed	94	177	62	35.0%
TOTAL OF A & B	118	221	68	30.7%
Currently subscribed	532	921	8	0.87%

*analysis performed only on articles with a 2013 publication date

Table 4. Ratio of Pageviews to Successful ILL Requests

	Number Of Pageviews for Every Successful ILL Request
Titles cancelled after 2012*	6.4
Never subscribed	1.9
TOTAL	2.3

*analysis performed only on articles with a 2013 publication date

potential use via Serials Solutions.

Results

ILL Requests for Cancelled Titles

In the first half of 2013, 3,845 ILL requests were placed. This is a decrease from the first half of 2012, when 5,336 requests were placed. The decrease may be due to the fact that in 2012 UoM signed on to two Big Deal journal packages and began subscribing to several titles that were expected to be heavily used. When cancelled titles were examined specifically, of the 187 titles cancelled only 6, or about 3 percent, received ILL requests in 2013 (see table 1).From the 187 titles cancelled, the library filled only eight ILL requests for articles from the 6 canceled titles, a figure which represents 0.2 percent of ILL requests (see table 2).

Patron Interest in Cancelled Titles that Did Not Result in ILL Requests

In the first half of 2013, there were forty-four instances of patrons following the link resolver from an index entry to the landing page of an article published in 2013 from a cancelled title; those forty-four instances referred to twenty-four unique articles.When extrapolated for the entire year, the figure would be eighty-eight instances of patrons following the link resolver from an index entry to the landing page. Yet, of those forty-four opportunities to make an ILL request for an article from a cancelled title, only six were converted to actual requests.Requests were counted from ILLiad logs, which measured requests submitted via the landing page's link to ILLiad or by directly logging into ILLiad.Only 14 percent of sessions led to patrons completing the ILL request from the landing page; this may be called the "conversion rate."For comparison, the conversion rate from a sample of titles to which UoM has never subscribed is 35 percent (see table 3).

As a control, the authors calculated the conversion rate for titles to which UoM subscribes.Ideally, there should be no ILL requests for subscribed titles. In fact, less than 1 percent of pageviews for currently subscribed titles are converted to ILL requests (see table 3). This result may be attributed to errors in our holdings data that accidentally denied patrons access to titles with active subscriptions.The conversion rate of less than 1 percent for subscribed titles confirms that using Google Analytics accurately tracks user access to library materials.

For the same list of subscribed titles, we compared the number of Google Analytics pageviews to the number of Serials Solutions click-throughs for each title. There were 698 pageviews recorded by Google Analytics and 921 Serials Solutions click-throughs for the set. This implies that our method underestimates the interest in a title; in this sample discovering only about 76 percent of use. This undercounting is likely because Serials Solutions can measure some use that our Google Analytics method cannot. For example, if a patron queries the Serials Solutions database by title and proceeds to the full text, the ISSN is not recorded as part of a URL by Google Analytics but Serials Solutions would count it as a click-through.

Conversion rate may be inverted to show a ratio of pageviews to successful ILL requests.For the cancelled titles, there are 6.4 pageviews for every completed ILL request. For the titles to which the library never subscribed, there are 1.9 pageviews for every completed ILL request. Overall, there are 2.3 pageviews for every completed ILL request (see table 4).

Although the data offered here is intriguing, it is true that the size of the sample is small and the time period

studied was only six months. A more extensive study is likely to produce results that can be reported with a higher level of confidence, based on the commonly accepted principle that larger sample sizes are more likely to exhibit precision.

Discussion

The fact that ILL requests for articles from cancelled titles constituted only 0.2 percent of all ILL requests at UoM confirms Calvert and Fleming's findings and other studies.Cancellation of titles based upon scrutiny of usage and other bibliometric measures will not produce an untenable increase in ILL activity. The cost savings of the cancellations will likely exceed any increased costs from ILL requests.

The notion advanced by many librarians that ILL is a patron-satisfying means of providing access to materials is open to question.Patrons who identify materials of interest via databases and are then directed to use ILL to access material overwhelmingly fail to complete the ILL request, either through following the landing page's links to ILLiad or by directly logging in to ILLiad.

The authors speculate that there are three possible causes for this low conversion rate. First, patrons may have an immediate need for materials. Although the RAPID ILL service can fill requests within hours in many cases, patrons new to the service may not know that and may not complete an ILL request because of the perceived urgency of their research.Second, the awkward interface at UoM may be confusing enough that patrons are unable to identify the means by which to complete the ILL request. The chokepoint of the funnel for ILL requests may be a poorly-designed landing page.Or else the requirement to create an ILLiad username and password before submitting a request may be the point of deterrence.As yet, librarians at UoM have not conducted user studies which might further illuminate this matter. Third, patrons may be reluctant to "impose" upon library staff to make special requests.Again, user studies would help to better understand these matters.

Regardless of the reasons why patrons fail to complete ILL requests after identifying materials of interest, the low conversion rate is a matter of importance in collection development. The results of this study show that cancelled titles are viewed by patrons as similar to titles the library has never held.Cancellation of titles results in a much lower level of access for patrons.

Researchers who desire to explore this topic further may study the effects of ILL in place of subscriptions on patron access to information, and they may consider examining a larger set of titles over a longer period of time.Direct user studies may illuminate some of the obstacles to successful navigation of the index entry-into-ILL request funnel.

Conclusion

Based on these studies, the authors agree that carefully planned serials cancellations are unlikely to produce a large impact upon the level of ILL activity.However, it is probably not accurate to say that ILL is an acceptable substitute for journal subscriptions. For every ILL request, there are at least two articles for which a patron has expressed interest but has not accessed via ILL.

The barriers to access presented by ILL are substantial enough that a large majority of patrons do not convert their search to an ILL request.Libraries planning serials cancellations are advised to investigate whether patrons are comfortable making ILL requests and if the mechanisms for placing ILL requests are easily navigated and understood. Otherwise, many patron information-seeking sessions will terminate at the top of the funnel rather than working through the process to a completed ILL request.

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Notes on Operations

Patron Driven Acquisitions

Determining the Metrics for Success

Jason C. Dewland and Andrew See

Patron Driven Acquisition (PDA) programs have been established in many libraries, but there is no agreed upon set of metrics to evaluate the programs' performance. With that in mind, the University of Arizona (UA) formed the On-Demand Information Delivery (ODID) Metrics Team in January 2012 to establish metrics to evaluate their PDA program. This paper examines the results of the team's findings and provides an extensive analysis of the purchases by Library of Congress (LC) classification, publisher, format, etc. The discussion includes an analysis of the process and challenges of measuring a PDA program based on UA's experience. This paper also provides a list of key metrics that the authors argue that every library with a PDA program should monitor.

Patron Driven Acquisition (PDA) as a collection development tool has become increasingly common for libraries, but there has not been much discussion regarding what constitutes a successful PDA program. What metrics should libraries use to evaluate how the program is working? What metrics should libraries monitor to judge the effects that a PDA program is having on a library collection?

The authors provide an overview of the project initiated by the University of Arizona (UA) libraries to determine what metrics should be used to evaluate their PDA program. This paper examines how the project team identified, crosswalked, and normalized the data that was needed to build a profile of the program. The examination includes analysis of the difficulties that were encountered due to the different e-book platforms, organization of the data, and the sometimes lax data integrity. Finally, the paper reviews initial statistics of the program's purchases and discusses some possible next steps for the program. It is the authors' hope that UA's experience will be of benefit to other libraries that wish to gain a better understanding of their PDA programs.

Literature Review

PDA has its roots in the Just in Time (JIT) and Vendor Managed Inventory (VMI) movements that took place in the early to mid-1980s. JIT was developed by Japanese automotive manufacturers who could not stock large inventories

Jason C. Dewland (jasondewland@email.arizona.edu) is Assistant Librarian, Research, Instruction, and Outreach in the University of Arizona Libraries. **Andrew See** (andrew@email.arizona.edu) is a Library Information Analyst in the University of Arizona Libraries.

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due to limited natural resources such as minerals and iron.[1] In the late 1970s and early 1980s Japanese manufacturing plants were opening in the United States that practiced JIT and VMI. Perhaps buoyed by their competitors' success in the United States, it was at this point that partnerships in managing the supply chain began to develop in the form of VMIs throughout the domestic automotive sector in North America.[2]

The first successful retail supply chain integration was the partnership between Procter & Gamble and Wal-Mart in the late 1980s.[3] These supply chain partners shared each other's inventory systems so that they could communicate by sharing their internal inventory and projected demand estimates that resulted in significant decreases in the cost of goods sold and inventory as a percent of revenue.

The supply chain integration model found in retail was not a good fit for many libraries due to the mission of preservation of collections and the limited availability of small presses' print runs. That began to change in the early 2000s when libraries began experimenting with PDA, but efforts were modest, with universities like Purdue adding only 10,000 volumes over a decade.[4] Successive financial crises coupled with increasing calls to demonstrate an academic return on investment (ROI) and the adoption of the e-book by the consumer ushered in the modern purchase on demand model for e-books.[5]

Several studies have compared the cost per use (CPU) of titles purchased through PDA programs to the CPU of titles purchased using traditional selection methods. For example, Herrera found that the CPU was significantly lower for titles purchased using a PDA model.[6] Both Herrera and Lannon found that the CPU of PDA titles was significantly better than many of the e-book subscription packages.[7] Other studies have examined which subject areas generate the most purchases. An early test of patron-initiated purchases by OhioLINK found that half of all purchases occurred in the health sciences, business/economics, psychology, education/physical education, and engineering subject areas.[8] Delivery time of materials was examined to determine if slow interlibrary loan delivery times would decrease the demand for patron-initiated consortia borrowing. In her study, Curl found that slow delivery time did not significantly decrease patron satisfaction of the program.[9]

As libraries attempt to meet customer demand, offer more resources, and maintain relevant collections, many are using PDA programs to manage their collections. These programs have demonstrated higher circulation than traditionally acquired resources and allow resource managers to get past Trueswell's now infamous 80/20 rule, which suggests that the top 20 percent of a library's circulating material represents 80 percent of its overall circulations.[10] At least one study has shown a higher rate of interdisciplinary selections made by users than by traditional methods.[11]

Project Overview

The UA Libraries implemented a wholly unique PDA program in the summer of 2011. Known as On Demand Information Delivery (ODID), the program expands on the traditional PDA method by acting as the main driver of the collection. While popular PDA practices generally focus on the collection of electronic resources, the UA Libraries uses the ODID program as the primary acquisition method for both electronic and print content. E-book content is exposed through the library catalog and discovery layer, and a purchase is automatically triggered after a set number of uses. Selection records for print material are also available in the library catalog and discovery layer, and an embedded link enables patrons to place a direct order. The resources available to the user are filtered by vendor profiles, allowing the UA Libraries to ensure that content being ordered meets the general collection development criteria. These combined measures have allowed the UA Libraries to expand the discoverability of content to our users, show a significant decrease in the acquisitions budget, and deliver a lower cost per use for titles purchased through the program.

Since July 2011, the UA Libraries have added discovery records for more than 594,000 electronic and 46,000 print titles to the collection. With a focus on providing access to resources to a greater number of users, the ODID program defaults to e-books when possible. The UA Libraries established profiles with our vendor to exclude print records in the OPAC if an electronic version will be published within six months. Additional filters ensure that titles are current scholarly material (five years or newer) and are not textbooks, popular fiction, or manuals. Because of these filters, the UA Libraries can be confident that PDA titles selected by our users fit within the scope of our collection. Welch and Koch's article, which outlines a very similar PDA program at the Cowles Library at Drake University, discusses similar filters, which have shown good results.[12]

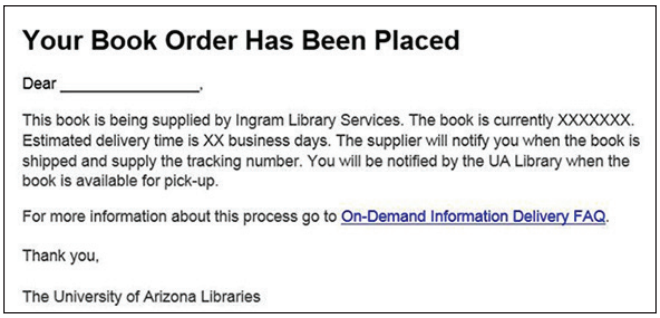
The selection records in the Online Public Access Catalog (OPAC) and in the current discovery tools (Worldcat Local and Summon) greatly expand the discoverability of content. Where the UA Libraries might have previously been constrained by budget limitations in its acquisition of titles prior to the ODID program, the libraries can expose users to far more content and acquire only needed materials. The program has drastically decreased the acquisitions budget since roughly 10 percent of the e-books exposed and 14 percent of the print books exposed have been purchased. The e-book acquisitions statistics parallel those of East Carolina University's Joyner Library where slightly less than 8 percent of e-books were purchased through their comparable PDA program.[13]

The e-book selection records, which are provided by Ingram (available on their MyiLibrary platform), provide

seamless access to the library's users. Purchase triggers vary with each vendor, and once a trigger event occurs, the UA Libraries automatically purchase the title. This is perhaps the easiest and most convenient iteration of PDA as content is immediately available to the user whether they are viewing in preview mode or whether the title has been purchased. The print iteration of PDA is somewhat different in that the catalog records contain embedded order links in the MARC 856 field (where the UA Libraries normally provide a link to full text in traditional electronic resource records). These links connect to the Ingram application programming interface (API), and create a rush firm order. The print book is then sent to the library, shelf ready, and placed on hold for the user.

With any strategy, the live implementation often differs from how it was originally planned and may produce unintended consequences. To address this, the UA Libraries created the ODID User Group. The group was charged with ensuring that the ODID process, from discovery to delivery, was as seamless as possible. As new challenges were discovered after launching the program, the ODID User Group reshaped processes to best meet our users' needs and expectations.

In terms of the user experience for PDA, the current process for customers ordering print titles involves the following: when users select an order link in the catalog, they authenticate using their university ID (NetID), and the request is then sent to the vendor and communicates with their API to determine if the book is in stock. The user is brought to a landing page, indicating that the order has been placed and providing an estimated delivery time (see figure 1). Because it takes roughly twenty-four hours for UA Libraries' catalog to update with the vendor supplied bibliographic and order record (replacing the original order link), users could potentially click on an order record that has already been placed. If this happens, they are brought to a landing page that alerts them to the duplicate order (see figure 2). When the library overlays the order records with the full bibliographic records supplied by the vendor, Technical Services staff use patron information (including name and e-mail address) embedded in a hidden MARC 961 field (which is generally used by vendors for order information) to place a hold on the book. After the hold is placed, the individual's identifying information is deleted from the record. When the item ships from the vendor, users receive an e-mail that includes UPS tracking information (see figure 3). Providing tracking information directly from UPS allows users to get the most up-to-date information regarding when the book will arrive. When the shipment arrives, all books are checked in, which triggers the "hold-available notice" to users. The item is then placed on the hold shelf, where it is held for seven days. If the item is not checked out during that period, it is removed from the hold shelf and shelved in our regular book stacks.



Your Book Order Has Been Placed

Dear _____.

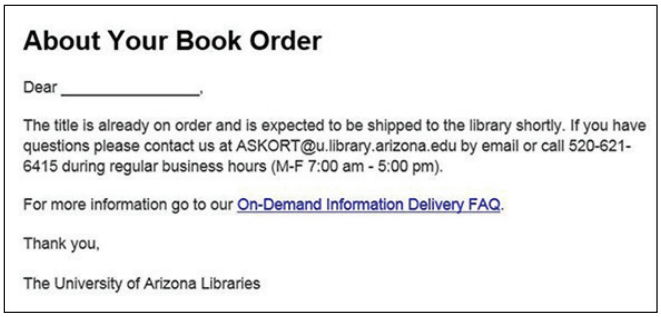
This book is being supplied by Ingram Library Services. The book is currently XXXXXXX. Estimated delivery time is XX business days. The supplier will notify you when the book is shipped and supply the tracking number. You will be notified by the UA Library when the book is available for pick-up.

For more information about this process go to On-Demand Information Delivery FAQ.

Thank you,

The University of Arizona Libraries

Figure 1. Order Acknowledgment Page



About Your Book Order

Dear _____.

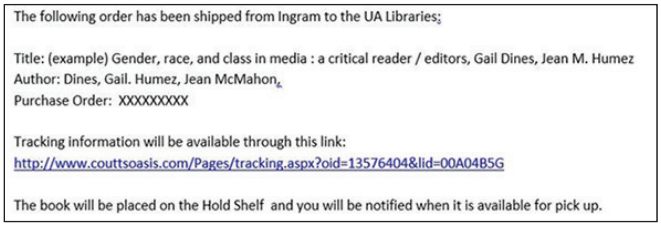
The title is already on order and is expected to be shipped to the library shortly. If you have questions please contact us at ASKORT@u.library.arizona.edu by email or call 520-621-6415 during regular business hours (M-F 7:00 am - 5:00 pm).

For more information go to our On-Demand Information Delivery FAQ.

Thank you,

The University of Arizona Libraries

Figure 2. Acknowledgment of Duplicate Order Page



The following order has been shipped from Ingram to the UA Libraries:

Title: (example) Gender, race, and class in media : a critical reader / editors, Gail Dines, Jean M. Humez
Author: Dines, Gail. Humez, Jean McMahon.
Purchase Order: XXXXXXXXX

Tracking information will be available through this link:
http://www.couttsoasis.com/Pages/tracking.aspx?oid=13576404&lid=00A04B5G

The book will be placed on the Hold Shelf and you will be notified when it is available for pick up.

Figure 3. Order Tracking Information Page

Charge to the Team

The ODID Metrics Project Team was charged with coordinating the design and implementation of the data gathering processes to evaluate the ODID program's effectiveness. It consisted of five members: a librarian and library analyst from the Research Services Team (the team that oversees collection development), a library information associate (LIA) from the Delivery, Description, and Acquisitions Team (the team that handles most of the back-end operational duties for the program), an LIA from the Library Infrastructure Team (the team that handles the physical maintenance of our collection), plus the materials budget, procurement, and licensing librarian. The project addressed two main criteria: (1) should the library have a balanced and efficient set of metrics and processes to assess the ODID program, and (2) should librarians have established processes that result

in readily available data and analyses to inform the ODID decision making process? Decision making for the ODID program required a balanced and efficient set of metrics and data collection processes that incorporated factors such as the evaluation of the quality of resources exposed to the libraries' customers, the amount of use of those resources, the amount of use seen after the purchase of the resources, the cost effectiveness of the program, and the overall customer satisfaction with the program.

Readily available data and analyses were defined to aid in the decision-making process of when to buy what resources versus when to borrow what resources. The data would also support the assessment of the ODID program, assist with identifying areas that might require further refinement, and support the assessment of remaining approval plans. These metrics would need to be provided to the key internal user groups in a dashboard setting that would focus on key performance indicators. The indicators would need to be chosen from a large number of metrics based on a clear decision making process that users could easily understand.

From Metrics to Key Performance Indicators

Phase I of the ODID Project provided the scope, system, and the implementation of the PDA program at the UA Libraries, but it did not develop the assessment metrics and data collection processes. The Phase I team provided a laundry list of potential metrics (more than one hundred suggestions) that could be collected. This list was neither exhaustive nor prescriptive. The key for the metrics project team was to reduce the list of possible metrics down to key performance indicators (KPI) that would define the metrics to best measure the program's outcomes. "KPIs are financial and non-financial metrics used to help an organization define and measure progress toward organizational goals."[14] If the ODID Metrics Team was not successful in determining the proper KPIs, it could lead to diminished patron satisfaction and failure of the program.

As the first step in the process of identifying the KPIs for the ODID program, the metrics team grouped like metrics to make the list more manageable. For example, the metrics regarding expenditures by subject, publisher, LC Class, and date published were combined into one metric since they require the same source for the data. Combining like statistics and removing items that were deemed outside of the scope of the project reduced the list to twenty metrics.

The list of metrics was consolidated into five main categories to provide additional clarity and structure. The categories were financial metrics, patron metrics, performance metrics, usage metrics, and resource metrics. Financial metrics were analyzed by breaking down the costs associated with the program by such factors as cost per a use, cost per use per LC Subject classification category, etc. (see the appendix for the final list of KPIs). Patron metrics focused on customer satisfaction and differences in customer behavior by discipline and patron type. Performance metrics examined how suppliers met the agreed upon performance standards, average delivery time, and out of stock metrics. Usage metrics were defined as those that measured usage, such as circulation and in-house use of print books and e-books. Resource metrics aimed at providing the library with an understanding of the characteristics of the selection pool and the relationship of purchases made to the selection pool.

When the metrics were divided into these categories, the project team ranked and evaluated the metrics based on their importance, understanding the program, and the difficulty of producing statistics. This focused the team's efforts on the statistics that would provide the biggest impact to the library with the least amount of effort. Both the importance of the metric and the difficulty of producing the statistics were assigned a one to three ranking. These two numbers were then multiplied together, which resulted in a blended rank for each metric from one to nine, with one being the most important.

Metrics with a ranking of one were seen as KPIs and were critical in determining the program's success. Metrics with a ranking of two were viewed as primarily descriptive and could be used to determine the program's success. Metrics with a ranking of three did not provide valuable information to the decision makers but may have limited value to understanding the project. These rankings are provided in the impact column in the appendix.

The amount of effort was analyzed for each of the metrics to determine the amount of individual effort that was needed to create the metric. Effort was divided into categories ranked from one to three, with one assigned to metrics where accessing the data was easy or was already being done. A two was assigned to metrics that required a new process to be created. A ranking of three was assigned to metrics for which the data did not exist or it would be extremely difficult to collect, crosswalk, and normalize the data into a usable format. These rankings are shown in the cost effort column in the appendix.

The resulting ranked list of the metrics determined the team's workflow and priorities. The metrics with the lowest scores became the top priority for the team while the metrics with a ranking of nine were not pursued due to lack of relevance and the time required to collect and analyze the responses. The combined rank of the metrics is available in the rank column inthe appendix.

The final list of metrics (see the appendix) provided a total of ten metrics each for electronic and print format. Customer satisfaction surveys were not provided since the work would have required changes in the work processes by

other groups in the library. Circulation reports by LC classification for print materials prior to the implementation of the PDA program were determined to be outside of scope of the project team's charge.

Challenges

After defining the metrics to measure the overall success of the ODID program, the group was tasked to develop data collection workflows for key stakeholders, which included the Research Services Team, the Delivery Description and Acquisition Team, and the Information and Access Oversight Management Group. Part of this deliverable was to design a Microsoft Access database that staff could easily populate with data collected both quarterly and annually. The goal was to create an easy to use data analysis tool for resource managers and administrative personnel.

The main sources of data were the integrated library system (Innovative Interfaces' Millennium), Ingram's OASIS for print resources, and Ingram's MyiLibrary platform for e-books. Other sources of data included information pulled from the library's interlibrary loan system (OCLC's ILLiad) and qualitative data that would be collected from ODID users with surveys delivered at the point of order.

The most challenging aspect of implementing the data collection process was to integrate data from the three previously noted sources into a single database. Data collection is a universal challenge for librarians. In a recent study, Fleming-May and Grogg indicated that manual usage data collection is the biggest challenge for librarians at Association of Research Library (ARL) institutions.[15] It became apparent early in the process that each system generated data in formats that did not integrate well with data from other systems. For example, a list of ISBN numbers from Ingram contained dashes in the 13-digit number, and the ISBN format in the library's ILS lacked dashes. One database had 10 digit ISBNs associated with specific titles, and another contained 13 digit ISBNs. While these particular instances were not too difficult to remedy, they were indicative of data normalization challenges required for the project.

The data being input in Microsoft Access required significant normalization (removing spaces after numbers, eliminating all punctuation, and removing non-ISBN elements from the MARC 020 field). It was a difficult task to retrieve data and clean it up to ensure that information from different systems could be combined to create reports. Microsoft Excel was used primarily to normalize the data, which correlates with the findings of Wical and Kishel who, in a recent statewide study conducted in Wisconsin, found that 66 percent of academic librarians used Excel for collection management data.[16] Most of the data normalization was accomplished using the painstaking find and replace method, for example using the command keys CRTL + F to locate all instances of semicolons and delete them. This process was repeated several times to catch all data incongruences. As an experiment in time saving measures, Open Refine (http://openrefine.org), an open source tool for data normalization, was used to attempt some normalization. After experimentation, the team discovered that the data sets were not consistent enough for Open Refine to be effective. The tool was utilized to try to normalize the publishers' names with limited success.

The team encountered another substantial problem with inconsistent metadata and lack of authority control in bibliographic records. There were several instances of a lack of authority control in bibliographic records, even within the same integrated system, that used different iterations for author's names, publishers, and other descriptive metadata elements. Normalizing inconsistent descriptive metadata became an enormous undertaking as the find and replace strategy used to remove spaces after numbers and dashes within ISBNs evolved into a much more complicated undertaking. Detecting the different iterations of all of the descriptive metadata for Taylor & Francis, for example, led to the discovery that the publisher was also described in bibliographic records as "Taylor and Francis" and "Taylor/Francis" among other variations. There were also instances where descriptive metadata was combined with other data (publication year was added to the ISBN MARC, for example). The challenges encountered when drafting the data collection processes for the metrics emphasize the need for proper authority control and metadata integrity when handling bibliographic data.

Part of the process for using our metrics was the multidepartmental retrieval of data representing the user experience and user behavior (e.g., turnaround time and its impact on use, correlations between ODID and ILL use, and the overall user experience). These data collection processes, as with the collection processes of any qualitative information, became challenging as the correlation between two different services, ODID and ILL, was explored. There have been several studies that used ILL management software to measure PDA success, since the two library services have similarities in meeting patron demand for resources. The University of Mississippi recently conducted a study on PDA titles using the same data management system that UA uses for ILL processing (ILLiad). Their study indicated a positive correlation between purchased PDA titles that were initially requested through ILL.[17] The ODID user group discovered that collecting corollary evidence on user behavior could be challenging. As an example, ILL use is declining as the use of ODID titles is increasing. However, showing a correlation between the two is difficult. ILL staff cancels requests for books that can be obtained through the ODID program with a special cancellation method that enables tracking the

Table 1. Print PDA Purchases

LC Category	Class	Number of Titles	Sum of Cost	Use	Average Price of Book	Cost Per Use	Use Per Book
History of the Americas	E	87	$3,113.72	66	$35.79	$47.18	0.76
Theory and practice of education	LB	91	$3,845.97	57	$42.26	$67.47	0.63
Literature (General)	PN	78	$2,953.96	51	$37.87	$57.92	0.65
Industries. Land use. Labor	HD	69	$3,111.68	50	$45.10	$62.23	0.72
Philology. Linguistics	P	40	$2,594.23	49	$64.86	$52.94	1.23
American literature	PS	54	$1,861.99	42	$34.48	$44.33	0.78
Mathematics	QA	48	$4,278.18	41	$89.13	$104.35	0.85
The Family. Marriage. Women	HQ	56	$2,818.04	40	$50.32	$70.45	0.71
History of the Americas	F	38	$1,290.89	37	$33.97	$34.89	0.97
Sociology (General)	HM	34	$1,926.55	34	$56.66	$56.66	1.00

frequency of ILL requests for ODID titles. The process does not enable us to determine whether the user then proceeds to request the book via the ODID process.

The delivery time of ODID titles can be monitored, as our books are checked in upon delivery and immediately placed on the hold shelf. Determining whether turnaround time affects the probability of the user actually checking out the book is more challenging. This data would require the direct surveying of users and to date, a survey process to gather qualitative feedback from our users has not been initiated. This task was assigned to the ODID user group that is developing a best practices model to launch the survey.

The charge of the ODID metrics group was to draft metrics that would be used to measure the program's overall success, and our findings indicate that the program has been successful. The authors hope that as more libraries adopt similar PDA programs, this particular collection management strategy will become the norm for libraries and future ILSs will yield more streamlined approaches to gathering metrics.

Analysis of Results

The results are analyzed in two sections by their format type: print and electronic. Due to the differences inherent in the two formats and how their usage is calculated, only comparisons of relative rankings (for example, what subjects were more heavily used in print versus electronic format) will be analyzed and no attempt will be made to compare raw usage data between the formats. All the results provided below are taken from the beginning of the program in July 2011 until to December 2013.

Print Format

Books ordered via the print PDA program had a significant amount of use when compared to traditionally acquired books at UA Libraries. Prior to the implementation of the program, around 60 percent of the print books circulated at least once. Since the program started in late 2011, 6,744 print books were purchased in 155 different LC subject categories for a total of $324,617 for an average of $48.13 per book. The total circulation plus renewals of the 6,744 print books during this time period was 17,798, and there were 2.6 uses per book at a cost of $18.24 per a book. The total usage by LC subcategories shows the heaviest use of the print PDA in the social sciences and the humanities with eighteen of the top twenty LC subcategories coming from those areas. See table 1 for details.

Electronic Format

Electronic usage was heaviest in the language and literature and sciences categories, and business, engineering, and history titles also had high usage. History and language disciplines are not typical candidates for high PDA usage based on feedback UA Libraries have received from history faculty, yet these disciplines consistently show high use. Since the beginning of the program, the library has purchased 4,952 titles at a cost of $710,214, which resulted in 1,076,717 total Counting Online Usage of NeTworked Electronic Resources (COUNTER) section requests, for an average cost of $0.66 per a section request.

Language and literature titles were the heaviest used part of the collection and accounted for 21.2 percent of the

Table 2. E-Book PDA Purchases

LC Category	Class	No of Titles	Sum of Cost	Use	Cost per use
Mathematics Computer Science	QA	202	$23,293.95	$66,063.00	$0.35
Linguistics	P	189	$29,002.48	$55,515.00	$0.52
Economic History	HD	163	$15,675.68	$36,350.00	$0.43
Physics	QC	85	$13,419.08	$31,334.00	$0.43
Science	Q	45	$3,989.99	$19,354.00	$0.21
Literature	PN	175	$16,083.70	$16,369.00	$0.98
Asia	DS	94	$9,312.55	$15,487.00	$0.6
Electrical Engineering	TK	67	$8,392.64	$14,210.00	$0.59
Civil Engineering	TA	47	$7,155.34	$12,548.00	$0.57
US History	E	83	$6,950.02	$11,390.00	$0.61

collections usage. Science accounted for 16.4 percent, and business rounded out the top three with 9.6 percent of the total usage. See figure 5 for the most heavily used electronic books by LC subcategory of the subclass.

Cost per use varied by LC class from $0.11 per use for anthropology titles to $5.28 per use for geography titles. The greatest sum was spent on language and literature ($142,970), sciences ($82,683), business ($64,553), and engineering ($63,233). Each category generated a cost per use of $0.63, $0.47, $0.63, and $0.75 respectively.

Next Steps

Since the ODID program began, the UA Libraries have seen a considerable ROI, particularly for PDA e-book titles. Due to the ongoing and sustained use, and a substantially reduced cost per use of our PDA e-books, the program has been expanded to four e-book platforms with the addition of YBP as an additional ODID e-book vendor. YBP provides both the EBL and Ebrary platforms, and the Arizona libraries have recently added EBSCO content through Ingram. In the near future, ProQuest has plans to merge both EBL and Ebrary into a single integrated platform. Methods to generate and analyze usage statistics and purchase data for these additions will later be incorporated into the ODID metrics program.

The National Information Standards Organization (NISO) has drafted best practices for the Demand-Driven Acquisition (DDA) of monographs, which should lay the framework for libraries to adopt similar data and collection management strategies. The best practices draft was available for public comment in spring 2014.[18]

The UA Libraries are currently implementing a new discovery tool, Summon, and whether records will be added directly in Summon or will continue to be added to the OPAC is a major question. The benefit of adding them into Summon is that there will be time/cost savings by relieving technical services staff from having to manage these records in the local system.

The libraries are also in the process of identifying a next generation library management system (NGLMS). A large-scale cleanup of bibliographic records is underway. As both the ODID Metrics Team and another working group created to implement the NGLMS have discovered, new guidelines are needed so that local records are flexible, scalable, and can be exported to work with various data analysis tools.

Currently, there is no program in place to remove old and unordered ODID records from the catalog. The program is still relatively new and this has not posed a major problem to date. Some of the print order records may become problematic as books go out of print or newer editions are printed. The UA Libraries will investigate strategies to address this issue, which could negatively affect the user experience. Collection managers have not yet examined unordered records for print monographs to determine if titles should be added to the collection regardless of patron demand. Though our primary goal is to support UA's research needs, another function of libraries is to record and archive the world's scholarly record. In terms of maintaining a collection that meets this secondary need, some resources may need to be purchased beyond the immediate demand of our users.

Lastly, information resource managers and library administrators will examine current data collection practices and will discuss the viability of sustaining such a large data gathering process. As with many libraries, staff time is stretched to capacity and allocating time to collect data that does not directly support critical strategic priorities is not sustainable. They will discern what data we can scale

back on collecting, assuring that we only capture actionable data.

Conclusion: Implications for Other Libraries

As PDA programs have been widely implemented across all types of libraries, the need to measure the effectiveness of such programs has never been more important. Measuring the effectiveness of our collection development programs is critical to good information resource management. Since libraries have instituted PDA programs for well over a decade, we have an abundance of data, which should allow libraries to gain insight on who their customers are and what their buying habits include. In academic libraries, we can use demographic data acquired at the point of purchase to determine how different academic disciplines are shaping our collection. This information provides an open line of communication with academic departments and administrators whose faculty and students are heavy users of PDA titles. As a result, academic libraries have the potential to gain some leverage in budget discussions and larger strategic planning initiatives where the libraries' importance to academia is in question.

A good metrics program will allow libraries to better oversee the authority control of their data. As was discovered in our study, the lack of authority control over bibliographic data can be a serious roadblock to your ability to measure the success of your program. Of course, the importance of maintaining authority control over bibliographic data is not a new concept. The authors of this paper are providing yet another example of why this is so critical in the information management industry.

Lastly, a well thought out and carefully crafted metrics program will go a long way in allowing libraries to ultimately provide better customer service. As the UA Libraries discovered, promises made to our customers with regard to turnaround time were not being honored. Though a small fraction of customers may report problems with a particular service, the vast majority of customers do not. And without some way to measure how well delivery systems are working, libraries are working in the dark. The UA Libraries were able to successfully use data collected through its metrics to provide substantiated proof to the vendor and, as a result, improve the service for customers.

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Appendix. Priority Matrix

Metrics	Group	Definition	Purpose	Impact	Cost Effort	Rank
Costs of items purchased/ cost per use, $ expended per title exposed, overall level of purchases by subject, by publisher, by LC, by published date	Financial Metrics	Actual invoice amount for each title obtained from the suppliers invoices.	To track costs of the ODID programs	1	1	1
Cost per use	Financial Metrics	Actual invoice amount for each title obtained from the suppliers invoices divided by the use for each item as supplied in use reports, Counter Reports preferred. Use for print items will be derived from III circ. reports. a) cost/use data should include time factor such as total, per year, after year 1; b) for print materials be sure to include both external circulation and in-house use fields.	To track costs of the ODID programs	1	1	1
Expenditures by subject, publisher, LC class, date published	Financial Metrics	Actual invoice amount for each title obtained from the suppliers invoices aggregated by each area— subject, publisher, LC class, date. Obtain from invoices or reports.	To track costs of the ODID programs	2	1	2
Cost analysis, correlation of PDA ODID program and the reduced cost of ILL borrowing. Is this saving us money?	Financial Metrics	Total costs of the ODID books purchased compared to total costs of books purchased in previous models (approval, firm order, etc.) Track Ill levels and see if there are decreases in volume/costs that might be attributable to items being supplied through the ODID program. Track cancellations duplicated in the ODID program.	To track costs of the ODID programs	2	2	4
What savings did the institution experience? Savings on book costs? Amount ($) of approval plan reduced vs. PD costs	Financial Metrics	Total costs of the ODID books purchased compared to total costs of books purchased in previous models (approval, firm order, etc.).	To track costs of the ODID programs	2	2	4
Review LibQual and see if there are questions that need to be added (phase 2?)	Patron Metrics	We want to make sure that we are capturing the user experience about the program at different times. The first is when the users make the request and then at some point in the future after having time to reflect on their overall experience. Using existing LibQual questions.	Customer Satisfaction	3	1	3
Print PDA. What is the level of customer satisfaction?	Patron Metrics	A short multiple choice survey to gauge satisfaction of transaction with brief demographic questions.	Customer Satisfaction	2	3	6
Was there a difference in patron activity or library response based on patron type: faculty, grad, undergrad, dept. affiliation, etc.?	Patron Metrics	Would like to develop a profile for searching behavior and usage by user type and field of study. May be able to set up a look that would help guide users to their preferred research based on their demographics.	Gain a better understanding of how our patrons are using our products	2	3	6

Appendix. Priority Matrix (continued)

Metrics	Group	Definition	Purpose	Impact	Cost Effort	Rank
Look for changes in trends in user behavior	Patron Metrics	Want to know how the program is affecting other areas of the library. The program should reduce the need for ILL and local document delivery, may increase or decrease holds and circulation. Monitor heavy selection activity of materials that have not circulated.	Financial data, circulation data and patron usage to determine if the program has contributed to increased relevance, higher use of the collection, and its effect on other library services.	2	3	6
Track print PDA delivery to be sure fulfillment and speed of delivery meet the established quality standard. Materials will be processed and delivered to the UAL on an average of no more than 5 (desired) days	Performance Metrics	Will determine whether vendor is meeting their QS regarding delivering resource within 3–7 business days	Determine if the vendor meeting the terms of their license agreement.	1	2	2
Track amount of time between UA delivery (i.e.: when it arrives) to availability to customer.	Performance Metrics	Will determine if we are making resources available to the customer in a timely manner.	Information resources should be made available to patrons in a timely manner.	1	2	2
Ability to download or print a reasonable amount of content for personal use. These should be consistent with best industry benchmarks for such services	Performance Metrics	Electronic resources should allow a reasonable amount of downloadable content based on industry "best practices".	Resources should be customer centered and as a result, aggregators allow for the most flexibility in their DRM	3	3	9
What type of material was requested: by subject, by publisher, by LC, by published date	Resource Metrics	This metric will determine what types of On Demand materials (print or electronic format) and firm orders are being requested by patrons by subject, publisher, publishing date, etc.	Library will be able to "sort" requested materials by subject, by publisher, by published date, etc. to determine what impact these items are having on overall collection or to determine scholarly trends, etc.	2	1	2
% of items purchased that were print vs. electronic vs. titles exposed	Resource Metrics	This metric will allow library to determine what percentage of print vs. electronic items are being purchased from discoverable OD records.	To determine what percentage of discoverable items patrons request (or format patrons perhaps prefer) in print vs. electronic format.	3	1	3
Measure the time between placement of orders and the original ingest date for the selection record and records that have never been requested.	Resource Metrics	Will define the time of orders and ingestion date in order to determine if date of publication is a significant factor in whether a book is ordered or not ordered.	To determine how long we should keep the record in the catalog.	2	2	4

Appendix. Priority Matrix (continued)

Metrics	Group	Definition	Purpose	Impact	Cost Effort	Rank
% of items selected to available titles—by subject, by publisher, by LC, by published date (both print and eBook PDA) What % of added PDA titles were selected by customers?	Resource Metrics	This metric will help library determine the percentage of discoverable items that were then purchased.	To determine if there were blind spots in the PDA process that prevent patrons from requesting items in specific subject areas, by publishers, by publishing dates, etc. and to determine how big an impact this has on the library's collection	2	2	4
Circulation/use of all items: approval, print PDA, e PDA: especially subsequent use after purchase	Usage Metrics	The usage data (circulation statistics) of approval items of both print PDA and E PDA. The usage data will also include any subsequent circulation after initial purchase.	This data will show what is circulating from the approvals and will also help determine the effectiveness of the approval plan.	1	2	2
Comparing collection circulation stats between now, a year ago, 5 years ago by LC classification.	Usage Metrics	Set-up baseline circulation data and then do comparison analysis in a year and 5 years using the LC classification.	To show usage and usage patterns over time.	2	3	6
Is there any correlation between the time ordered and the time that it's available to the patron and usage for print PDA?	Usage Metrics	To analyze the potential correlation between lead time of print PDA and whether the length of the lead time will prohibit usage. Examine any correlation between books with holds placed on them and books without holds placed.	To identify if the length of a lead time for print PDA has a negative impact on actual usage.	2	3	6

Notes on Operations

One Title, Hundreds of Volumes, Thousands of Documents

Collaborating to Describe the Congressional Serial Set

Suzanne M. Ward, Patricia A. Glasson, and Randall F. Roeder

As part of its participation in the Google Books government documents scanning project, the Purdue University Libraries agreed to contribute volumes of the Congressional Serial Set *(*CSS*). Realizing that the results would be far more useful if the individual documents within this title were cataloged separately, librarians developed procedures to create brief records and began cataloging* CSS *documents from the 1890s. The University of Iowa became a partner in this collaborative pilot project, and its cataloging staff used the Purdue template and procedures to create records from the* CSS *for individual documents from two years in the 1890s. Purdue staff used those records to barcode their own corresponding* CSS *documents before sending those volumes to Google for scanning. Staff subsequently loaded the records into WorldCat to improve discoverability for scholars. The result of the collaborative cataloging effort was the ability to prepare* CSS *volumes for scanning quickly and efficiently.*

In 1817, construction began on the Erie Canal. Mississippi became a state. Coffee was first planted in Hawaii. Baltimore became the first city in the United States to be lit by gas street lamps. And the publication we now know as the *Congressional Serial Set* (*CSS*) began.

Congress and the executive branch had been issuing documents since 1789, but in our nation's early years these publications were neither numbered nor issued regularly in serial collections.[1] They have since been collected into the *American State Papers*.[2]

Beginning with the Fifteenth Congress (1817), however, documents issued by Congress and, for the next hundred years, many executive documents as well, were systematically numbered and gathered into a series called by a variety of names over time, but which we now know as the *CSS*. The *CSS* contains documents ranging in length from half a page to several volumes. It includes some internal serial titles. It covers a huge variety of topics that interested Congress and the White House over a time span of nearly 200 years. The following are a few examples of these documents:

- *In Favor of Reducing and Regulating the Duties on Teas* (1828)
- *Report from the Secretary of War in Compliance with a Resolution of the Senate, in Reference to the Defense of the Frontier of Maine* (1838)

Suzanne M. Ward (ward@purdue.edu) is Head, Collection Management, Purdue University Libraries. **Patricia A. Glasson** (pglasson@purdue.edu) is Head, Metadata Services at Purdue University Libraries. **Randall F. Roeder** (randy-roeder@uiowa.edu) is Head, Cataloging-Metadata Department, University of Iowa Libraries.

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- *Report of the Committee on Resolution of Legislature of Indiana on the Subject of the Wabash and Erie Canal Land Claim* (1840)
- *Resolutions of Legislature of California in Favor of the Overland Mail and Pony Express* (1862)
- *Petition of Citizens of the Des Moines Valley, Iowa, Praying Protection in their Rights and the Preservation to Them of Their Homes on the Odd-Numbered Sections of Land in Said Valley* (1871)
- *Resolution of Inquiry Relative to Analysis of Beer* (1888)
- *"Titanic" Disaster: Hearing before a Subcommittee of the Committee on Commerce United States Senate* (1912)
- *Limiting Production of Opium to Amount Required for Medicinal and Scientific Purposes* (1944)
- *Black Americans in Congress, 1870–2007* (2008)

Rodney A. Ross wrote that "the Serial Set is an invaluable source of information not only on Congress and the entire federal government, but on every conceivable subject for which the federal government has had an interest."[3] From recognition of the nation's famous citizens to petitions from "ordinary folks" (the 1871 homeowners from the Des Moines Valley, above), the *CSS* records items of historical, political, social, and economic interest for nearly two centuries of our country's history. From paper through microform to CD-ROM and now the Internet, these documents form an unparalleled look at our history from both macro and micro perspectives. They are a wealth of primary historical records that can excite researchers from the high school level onwards. For more information about the *CSS* as a publication, consult Morehead's *Introduction to United States Government Information Sources*.[4]

Discoverability and Access

Identifying individual documents of potential interest to a student, historian, or other researcher often proves daunting. The *Congressional Serial Set*, as its name suggests, is cataloged as a serial. It consists of thousands of volumes, many of which contain anywhere from dozens to several hundred individual documents.

There are a number of printed finding aids available to navigate this resource, but even before the digital age, researchers found these cumbersome to use. Ross remarked that "for a century and one-half the confusing format and poor quality of Serial Set indexes hindered scholars."[5] In 1885, the Government Printing Office (GPO) issued Poore's *A Descriptive Catalogue of the Government Publications of the United States, September 5, 1774–March 4, 1881*.[6] Poore's publication was followed by *Tables of and Annotated Index to the Congressional Series of the United States Public Documents* (1902).[7] Next came Ames's *Comprehensive Index to the Publications of the United States Government, 1881–1893* in 1905.[8] The year 1911 saw the publication of *Checklist of United States Public Documents, 1789–1909*.[9] The twenty-five-volume *Catalogue of the Public Documents of the United States* appeared between 1896 and 1945, covering 1896 to 1940.[10] Some of these publications indexed *CSS* documents plus other US government publications.

Librarians and researchers responded to the fact that these finding aids were complicated to use by writing articles such as "Beginner's Guide to Indexes to the Nineteenth Century U.S. Serial Set" and "The 1909 Checklist Revisited."[11] Some finding aids focus on specific topics, such as Johnson's *Guide to American Indian Documents in the Congressional Serial Set, 1817–1899* (1977).[12]

Ross praised the publication of the *CIS US Serial Set Index, 1789–1969* published between 1975 and 1998.[13] This large multivolume work is divided into twelve chronological parts, covering both the *American State Papers* and the *CSS*. There is also a subject index, an index of names and organizations, an index by bill numbers, and a carto-bibliography of maps. When researchers find relevant entries after using these finding aids, they must still locate the documents in the *CSS* volumes. Contemporary researchers shudder at this two-step process. They are accustomed to access being a click beyond discovery. For researchers and the general public who may not have easy access to an institution holding the physical *CSS* volumes, getting their hands on an actual document presents a challenge.

Several commercial publishers have digitized the *CSS* or are in the process of doing so. For scholars affiliated with organizations able to pay for access to these databases, the discoverability and access issues have been solved. However, for the average citizen and researchers at smaller organizations, discoverability and access, particularly for titles published before digitization was common, are still nearly as difficult as they were prior to the Internet.

There have been efforts to address this difficulty. There are some files of scanned content pages of the documents issued during selected Congresses available on the web, but as the older ones lack optical character recognition and are thus not machine searchable, one must still visually peruse each one to choose titles of interest.[14] The same is true of the pre-1923 finding aids mentioned above, most of which have been digitized and are available as full text in Google Books (books.google.com) or the HathiTrust Digital Library (www.hathitrust.org).

Some non-digital individual titles have been digitized, mostly those that are lengthier or more important than others. For example, the 1912 Titanic disaster hearings total 1,163 pages.[15] Although this document is included in the *CSS*, there are also several individual records for it in

OCLC's WorldCat (worldcat.org). The document has been scanned and is available on the web through Google Books and HathiTrust, findable by searching title keywords. Pocket Books issued a reprint in 1998.[16] This edition is accompanied by a four-cassette dramatization of abridged survivor eyewitness accounts gleaned from this government publication and read by "stars of stage and screen."[17] While the high level of public interest in this topic motivated the multiple ways in which this particular report is readily available, the vast majority of *CSS* titles have not received this treatment.

Searching Google Books or HathiTrust reveals a handful of full-text *CSS* documents individually scanned and discoverable through the words in their titles. These sites include other instances of *CSS* records, but most of these are for volumes scanned in their entirety, some of them containing over two hundred separate documents per volume. The documents are not arranged in any kind of subject order. For instance, a 1905 report on "Methods and costs of gravel and placer mining in Alaska" follows "Experiments on steel-concrete pipes on a working scale"; at least these two House reports were issued by the same agency. Finding known titles may be easier if they appear as separate records rather than as one of many in an entire scanned *CSS* volume. Individual records in WorldCat also improve discoverability, but here, too, titles are lacking for many individual *CSS* documents from the more distant past. For example, during the project described below, library staff found that nearly every *CSS* document issued in the 1890s with the word "Kansas" in the title was represented in a WorldCat record, apparently the result of an earlier cataloging effort in that state, but very few other titles from this decade already had individual bibliographic entries. Until now, there has been no consistent, reliable effort to make the wealth of information in these documents easily available in a digital format for both researchers and the general public.

Purdue University Libraries and the Google Government Documents Project

In 2011, the Purdue University Libraries joined a consortial effort to supply material to Google for the Google Books digitization project. Specifically, Purdue entered the part of the project that supplied US federal documents for digitization. These documents were supplied for destructive scanning, meaning that to facilitate the highly efficient sheet-fed digitization at the Google scanning center, the documents were removed from their bindings and run through a high-speed scanner. Any government documents sent to Google took a one-way trip. A number of other libraries in the consortium, the Committee on Institutional Cooperation (CIC; www.cic.net), were already participating in the government documents scanning project.

Purdue sent Google an extract from the local catalog containing US government documents. Google staff selected the titles that they wanted from Purdue and created a pick list of the locally held government documents. Purdue librarians reviewed the pick list to remove titles that Purdue was unwilling to send for destructive scanning, in particular documents from agencies that Purdue had promised to keep as part of a statewide government documents light archives agreement. The Purdue University Libraries were willing to send their *Congressional Serial Set* volumes for destructive scanning, something that other consortial partners had declined to do. Purdue's holdings for print *CSS* volumes began with the Twenty-Second Congress (1831–33).

As local planning for the overall government documents project continued, Purdue librarians realized that they had a unique opportunity to contribute to scholarship by preparing the *CSS* volumes for scanning not as entire volumes but as individual documents. By doing so, individual records for each individual *CSS* document could be created rather than single records for each multidocument volume. Discoverability would increase exponentially with document-level cataloging coupled with the online access as the scanned documents entered Google Books and, shortly thereafter, HathiTrust. This decision involved barcoding every single document inside a volume and providing a brief bibliographic record for each of those documents. The document-level bibliographic record would follow each document through scanning and into Google Books and HathiTrust. Those records, identifying the individual titles and the unique *CSS* document numbers for each, would also be added to OCLC's WorldCat to provide another point of discoverability.

The *CSS* volumes had previously been boxed and moved to one of Purdue's storage facilities. The staff who would be handling the cataloging portion of the project asked that a sample box be sent to their office. The box that arrived contained volumes from the Fifty-Second Congress (1891–93). Purdue's catalog librarians discovered almost immediately that "providing a brief bibliographic record" meant creating a brief bibliographic record for almost every document, since there were few existing individual records for these documents in OCLC's WorldCat.

Cataloging Workflow

In May 2011, Purdue University Libraries cataloging staff acknowledged that most of the records for the 1890s *CSS* documents would require original cataloging. They discussed possible workflows for preparing these records for the Google government document project. Full-scale cataloging for thousands of documents would not be possible. The catalogers looked at the controlled vocabulary for the various series and at corporate entities involved. Their initial

idea was that preparing separate templates with controlled vocabulary terms already correctly formatted would reduce the need for redundant data entry and for checking authority files.

This plan might have worked if there had been more time and resources to hire and train catalogers, but the Google government documents project deadlines had been set before Purdue agreed to the destructive scanning of the *CSS* volumes. Cataloging more than one hundred years of *CSS* documents could not possibly be completed within the main project timeframe. Purdue staff resources for cataloging/metadata included one professional cataloger and three staff catalogers. With processing new materials being the top priority for the unit, there was no guarantee that sufficient staff time could be consistently devoted to the *CSS* project. The best option for making the project operational quickly was to hire student assistants. Even this solution was a daunting task because procedures needed to be established and documented before students could be hired.

As the catalogers tested the workflow, it became clear that the process was complex. There were too many controlled vocabulary terms in too many different combinations, resulting in too many templates with complicated instructions for choosing the best one for each *CSS* document. Trained catalogers could have relied upon their background knowledge and experience to make informed choices, but it would be impractical to train student workers to this level.

The cataloging supervisor abandoned the original cataloging templates for a master template that was flexible enough to encompass many alternatives. The intention was to provide a basic transcription of each document title in a brief MARC record. It should also be possible to identify the controlled vocabulary needed to enhance each record, should the opportunity present itself. By June 2011, the template was established; catalogers worked through a few samples, developed basic instructions, and hired the project's first student worker. The supervisor hired a second student in July; procedures and documentation had been firmed up, and subsequent hires experienced a more traditional training process that focused on entering data as consistently as possible while including significant elements such as the names, dates, and numbers associated with each document.

Before data entry began, each document was barcoded and its first page marked with a small sticky note so that it could be quickly located within the volume. Staff searched OCLC for each document; if an existing record was found, it was imported and the OCLC number written on the sticky note. Staff corrected any obvious errors in existing records, but did no other editing. Documents that were already cataloged skipped the data entry step. If there was no OCLC record, student workers accessed the template and edited it as needed or copied an existing record and edited it to match the document in hand (see appendix 1). After data entry, staff performed a quality check to ensure that barcodes were correctly linked with corresponding records and that the data entry was accurate. Staff scanned barcodes into a spreadsheet for record keeping and statistical purposes, as required by the overall Google project procedures.

Some *CSS* volumes contained hundreds of individual documents, others just one or two, so the time needed to complete a volume varied. There was a lot of excitement as the first completed volumes began to accumulate on a book truck, but it was September 2011 before that first book truck was full and taken to the centralized area where volumes were prepared for shipment to Google. By then the *CSS* cataloging project was running smoothly.

Purdue's participation in the Google government documents project ended in October 2011 with a final shipment. Cataloging staff had time to complete only a few dozen *CSS* volumes. The project manager began conversations with Google staff about the possibility of sending occasional smaller shipments of *CSS* volumes for digitization.

Appendix 2 provides a sample record of a *CSS* document with full cataloging; it was created by another OCLC member library and provides all the details expected for detailed records. Appendix 3 shows an example of a brief record created by a Purdue cataloger for the *CSS* project. These were developed to provide essential information about each document and to facilitate moving the project forward quickly by creating many short records rather than a few detailed ones. The brief records were added to OCLC without enhancements.

The University of Iowa Library as a Cataloging Partner

As work neared completion on the Fifty-Second Congress, it was clear that the project was far too large for a single institution to complete in a reasonable timeframe while working on a part-time basis. Purdue librarians realized that other libraries might not be willing to barcode their *CSS* volumes or to send them for destructive scanning. A possible solution was to interest partners in the descriptive portion of the project. Working from local volumes of the *CSS*, staff at a partner library could describe the documents and share the records with Purdue. Purdue staff could then barcode their own corresponding volumes while matching them to the partner's records.

The librarian who managed the Purdue Google government document project described the *CSS* project to colleagues on the CIC Technical Services Directors group and asked if any of the other libraries would be willing to pilot the concept of collaborative cataloging for the *CSS* project. Librarians from the University of Iowa agreed to catalog one Congress. Since the Purdue staff were working forward in time from the Fifty-Second Congress, Iowa was asked to catalog the Fifty-First Congress (1889–91). This agreement

was followed by several conference calls between key staff at both institutions to share documentation, work out details, and answer questions.

The University of Iowa Libraries have participated in the Federal Depository Library Program since 1884 and were awarded regional depository status in 1963. Because of long affiliation with the depository program, the libraries maintain a comprehensive collection of the paper volumes of the *CSS*. Responsibility for the bibliographic control of the depository collection has resided with the libraries' Cataloging-Metadata Department (C-MD) since 2004.

The Cataloging-Metadata Department at the University of Iowa Libraries consists of six cataloging librarians and twelve library assistants. The government documents library assistant within the department has primary responsibility for the bibliographic control of newly acquired United States federal documents and serves as gatekeeper for the libraries' ongoing effort to convert an estimated 250,000 paper records to machine-readable form. The government documents retrospective cataloging project, an often-postponed effort with a history of fits and starts, became a priority in 2009 when additional staff time was devoted to the effort.

Within the C-MD, the serials cataloging workgroup—one librarian and five library assistants—has had the responsibility for the retrospective cataloging of federal documents added to its charge. Once exclusively responsible for creating and maintaining bibliographic, holdings, and item records for the libraries' serials collection, the group has assumed new duties as batch-loaded MARC records for electronic journals have become the norm. Most of the group members are comfortable working with monographic records, and some have proofread crowd-sourced data or edited images for digitization projects. The workgroup's familiarity with federal documents, its flexibility, and its comfort with both monographic and serials records made it the logical choice for participation in the *CSS* pilot.

The head of the Cataloging-Metadata Department made the decision to participate in the *CSS* cataloging pilot after consultation with the libraries' federal documents coordinator and the associate university librarian for information technology (the Cataloging-Metadata Department is part of the libraries' information technology operation). A number of considerations were taken into account. Perhaps the biggest obstacle to the libraries' participation in the project was its existing access to the full-text resource through a commercial vendor. The creation of MARC catalog records would have little immediate impact on the ability of the university community to access the resource since the full text of the *CSS* was already available through the discovery layer interface. A second negative consideration involved the scale of the project as a whole, a reality that forced the question of whether a successful pilot would lead to a feasible project. A positive was the realization that a completed project would expose the *CSS* through WorldCat to researchers who previously could not access the costly version offered by commercial vendors. The irony inherent of charges for access to the digital version of a hard copy resource freely available within the depository library system was not lost on participants in the discussion. The greater availability of the information to the general public was in line with the libraries' role as a federal depository and the leadership responsibilities implicit in its regional status. Participation in the pilot would also add to the resources made available to the CIC component of Google Book Project and, by extension, to the HathiTrust Digital Library.

The decision was simplified by the existence of the ongoing federal documents retrospective conversion project. Although there was no plan to create analytical records for the *CSS*, the process of repurposing conversion project staff was expected to be relatively straightforward. No change in project leadership or staffing would be required, training would be minimal, and the impact of the pilot on the workgroup's other responsibilities would also be minimal since those hours were already committed to work with federal documents. Save for some additional hours spent in workflow design and some unanticipated experimentation with a handheld scanner, the assumption of an easy transition proved accurate.

After the decision to participate was made, the supervisor of the preexisting retrospective conversion effort was appointed project manager. An introductory conference call with staff at Purdue confirmed that neither the repurposing of existing C-MD staff nor the department's wish to use the Connexion Client (OCLC's software for cataloging) for the task were barriers to participation. The project was expected to last approximately four months. The C-MD would target the Fifty-First Congress and, except for required Superintendent of Documents (SuDoc) numbers, the bibliographic records created would be at the minimal level. The department would deliver a spreadsheet with a list of OCLC numbers for the records. The respective project managers would handle further communication between sites. Except for meeting these minimal requirements, the Cataloging-Metadata Department was free to conduct the project as it saw fit. It was an ideal situation for a pilot participant—one that encouraged experimentation and allowed for local autonomy.

The print volumes of the *CSS* were retrieved from storage. Staff at Iowa used a preexisting retrospective conversion workflow, utilizing OCLC's Connexion client for copy editing and creating new records and then exporting the results to its integrated library system (ILS). Save for minor differences in template style, the end result was the same as with the Purdue model—a quick, minimal level record suitable for the Google government documents project. Unlike Purdue, the University of Iowa retained its volumes of the

CSS, a situation which forced consideration of the thousands of brief analytical records created for the project. There was no question that they would be retained and available in the ILS, but much consideration was given to the advisability of creating holdings and item records for them. The project manager decided to attach a volume-level holdings record to each analytic but to forego the effort involved in linking each analytic to its base volume. There seemed little reason to create item records.

Iowa's part in the collaboration was straightforward. As a result of Purdue's work to eliminate the snags involved in developing the process, it was also very efficient. Once underway, procedures were straightforward and there was little need for more than occasional communication between the two institutions. The only glitch in the operation occurred when Iowa staff, not realizing that the information would be unavailable to Purdue, used the OCLC local call number field (099) to record SuDoc numbers. Since only about one hundred records had been created before this problem was discovered, the situation was easily remedied.

Project Outcome

The University of Iowa cataloging staff completed record creation for *CSS* documents from the Fifty-First Congress by March 2012 as anticipated. Since they did their editing and record creation using the OCLC Connexion client, it was easy for them to send Purdue staff a list of OCLC numbers for the records they handled. Purdue staff pulled their corresponding *CSS* volumes from storage, barcoded each document, and imported the Iowa-created OCLC records. The volumes went to Google for destructive scanning in the next shipment. Staff at both institutions agreed that the process worked well and that a collaborative cataloging project on this scale was feasible. See appendix 4 for an example of one of the records from this project in HathiTrust. Project statistics can be found in appendix 5.

Despite the positive outcome of the collaborative cataloging pilot project, no other CIC library volunteered to contribute the resources necessary to participate in expanding the pilot into full production. Iowa was unable to commit the resources to continue the project as the sole collaborating partner. The librarian who managed the Google Books government document project for Purdue felt that providing brief document-level cataloging records for the scholarly community at large was an important contribution towards making interesting documents about our country's past discoverable through WorldCat. In the first half of 2012, Purdue staff continued to work forward from the Fifty-Second Congress, creating brief document-level records and preparing *CSS* volumes for the Google government documents project. However, the library administration decided that other projects, such as the implementation of a discovery layer and the transition to a new integrated library system, took priority for the cataloging staff's attention. With no additional consortial support, the Purdue University Libraries could not handle the entire project alone. The staff completed barcoding and creating brief records for all the *CSS* volumes for the decade of the 1890s (Fifty-First through Fifty-Fifth Congresses), sent them to Google for scanning, and uploaded the records to WorldCat.

While it is disappointing that other priorities prevented the project from continuing, an important outcome from the effort is proof that collaborative retrospective cataloging on a large scale is feasible, given sufficient interest and resources. If one institution is willing to lead the effort by testing workflow, preparing instructions, and generally coordinating the work, participation by others can be easy. The authors hope that the wealth of information contained in the thousands of individual documents in the *Congressional Serial Set* will eventually be readily discoverable and available to students and researchers through WorldCat.

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Appendix 1. Purdue University's Cataloging Template for Brief Records

Type	a	ELvl	K	Srce	d	Audn		Ctrl		Lang	eng
BLvl	m	Form		Conf	0	Biog		MRec		Ctry	dcu
		Cont		GPub	f	LitF	0	Indx	0		
Desc	a	Ills		Fest	0	DtSt	s	Dates	189X ,		

245 0 0 [Main title, omit initial articles] : ‡ b [subtitle – transcribe from title page].

246 1 ‡ i At head of title: ‡ a

260 [Washington, D.C. : ‡ b Government Printing Office, ‡ c 189X].

300 X p.

500 [5Xnd] Congress. [1st] Session. [House of Representatives / Senate]. Doc. No. [XXX].

Appendix 2. Example of Full-level Bibliographic Record for a Congressional Serial Set Document

LDR 01965cam^^22004211a^4500

001 99139314720001081

005 20130826105137.0

008 130506s1912^^^^dcuabf^^^^^^^f001^0^eng^^

010 __ |a ^^^12029061^

019 __ |a 10737440

029 1_ |a AU@ |b 000024072910

035 __ |a (OCoLC)63193775 |z (OCoLC)10737440

035 __ |a (OCoLC)ocm63193775^

040 __ |a DLC |b eng |c DGW |d DLC |d OCLCQ |d OCLCG |d KRTAS |d MUM |d OCLCA

043 __ |a n-us-dc

050 00 |a F204.H8 |b U5

086 0_ |a Y 1.1/2:SERIAL 5849

110 1_ |a United States. |b Congress. |b House. |b Commission on Construction of House Office Building.

245 10 |a Report of the Commission to Direct and Supervise the Construction of the House Office Building.

260 __ |a Washington : |b G.P.O., |c 1912.

300 __ |a vi, 265 p., [85] p. of plates : |b ill., map ; |c 41 cm.

490 1_ |a House report / 61st Congress, 3d session ; |v no. 2291

500 __ |a Spine title: History House Office Building; running title: Report of the House Office Building Commission.

500 __ |a A commission appointed under the Sundry civil appropriations act approved March 3, 1903.

500 __ |a Commission members: Joseph Gurney Cannon, William Peters Hepburn, James Daniel Richardson.

500 __ |a Includes index.

610 20 |a Cannon House Office Building (Washington, D.C.)

650 _0 |a Public buildings |z Washington (D.C.)

700 1_ |a Cannon, Joseph Gurney, |d 1836-1926.

700 1_ |a Hepburn, |c Mr. |q (William Peters), |d 1833-1916.

700 1_ |a Richardson, James D. |q (James Daniel), |d 1843-1914.

740 0_ |a Report of the House Office Building Commission.

810 1_ |a United States. |b Congress. |b House. |t Report ; |v 61st Congress, no. 2291.

830 _0 |a United States congressional serial set ; |v serial no. 5849.

Appendix 3. Example of Brief Record with Minimal Cataloging for a Document from the Congressional Serial Set (Purdue University).

LDR 00908cam a2200133K 4500

001 99141994450001081

005 20130819084354.0

008 130506s1892 dcu f000 0 eng d

035 __ |a (InLP)2826847-wlafdb-Voyager

245 00 |a Letter from the Acting Secretary of the Treasury : |b transmitting a copy of a letter from the Second Comptroller recommending the insertion in the sundry civil bill for the fiscal year ending June 30, 1893, of a proviso in connection with the appropriation for the construction of buildings at, and the enlargement of, such military posts as, in the judgement of the Secretary of War, may be necessary. January 28, 1892 - referred to the Committee on Appropriations and ordered to be printed.

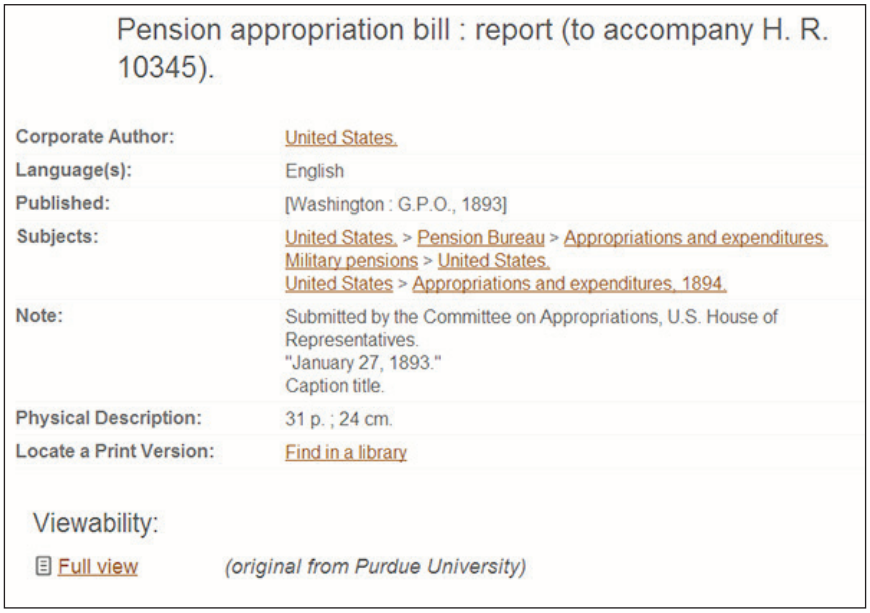
246 1_ |i At head of title: |a Buildings at Military Posts

260 __ |a [Washington, D.C. : |b Government Printing Office, |c 1892]

300 __ |a 2 p.

500 __ |a 52d Congress, 1st Session. Ex. Doc. No. 105.

Appendix 4. Example of a Record for a Document from the Project as It Appears in HathiTrust



Appendix 5. Project Statistics

- The project covered the period of June 2011–August 2012 (fourteen months).
- Purdue staff processed 110 physical volumes of the *Congressional Serial Set*.
- The volumes contained 30,410 individual documents for an average of 276 documents per volume (actual document count per volume varied widely).
- Staff found 10,284 records (about 33 percent) for individual documents already in WorldCat; most of these were records created by the staff at the University of Iowa as their contribution to the project.
- Purdue staff created 20,126 new brief records.
- Purdue library employees spent a grand total of about 2,450 hours on the project.
- The Purdue cataloging supervisor estimates that she spent 150 hours setting up the workflow and handling supervisory tasks; other staff contributed a total of almost 500 hours.
- About 1,800 student hours (30 hours a week) were spent on the project; most of the student time was devoted to record creation.
- The cataloging supervisor estimates that students averaged 3.5 minutes to create each record.
- Even with 650 hours of staff time included, Purdue employees spent less than five minutes per record/document processed.

Notes on Operations

Combining Citation Studies and Usage Statistics to Build a Stronger Collection

Stephanie H. Wical and R. Todd Vandenbark

Citation studies and analyses of usage statistics are two approaches academic librarians take to determine if their journal collections support the needs of research faculty. Librarians at a small, regional liberal arts university compiled a list of faculty journal publications covering a thirteen-year span from four academic departments—nursing, chemistry, biology, and mathematics—and, from these publications, generated a list of the journals that were cited. As expected, this university's faculty members publish in many of the same journals that they cite. However, faculty members cite a wide range of sources. Wiley journal usage statistics were examined from 2011 and 2012 to determine if the number of PDF downloads of articles in the published in and cited Wiley journals were higher than the average numbers of PDF downloads of Wiley journals. Combining an analysis of usage statistics with citation analysis provides a more strategic way to look at a Big Deal package. This information is of interest to the departments represented and other stakeholders, and the implications for collection development purposes are addressed.

Academic librarians managing electronic resources have used different approaches to evaluate journal collections to better serve the research needs of their parent institutions. Citation studies and analyses of usage statistics are two different approaches for assessing the value of journal collections and are well-established in the professional literature. Individually, each method cannot fully address questions about the potential value of the collection. Looking at citations in conjunction with usage statistics may provide better insight into how well a library supports faculty research interests. This study represents an effort to combine the two approaches in a meaningful way in an attempt to answer the following questions:

- In what journals are faculty publishing?
- What journals are faculty citing?
- Does the library subscribe to these journals?
- What level of access to each journal is currently provided?

The current study is a "proof of concept" that can be applied to large journal collections.

Stephanie H. Wical (wicalsh@uwec.edu) is Assistant Professor, Periodicals and Electronic Resources Librarian in the McIntyre Library, University of Wisconsin-Eau Claire. **R. Todd Vandenbark** (vandernt@uwec.edu) is Assistant Professor, Research and Instruction Librarian in the McIntyre Library, University of Wisconsin-Eau Claire.

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Literature Review

Citation studies provide a way for researchers to observe trends and patterns in research output. Garfield is known for his pioneering work in early citation studies. He first mentioned the idea of an impact factor in "Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas" in Science in 1955.[1] An experimental *Genetics Citation Index* was published and this evolved into the Science Citation Index in 1961.[2] Since this time, many studies have examined what could be considered core journal collections to discern what researchers need to add to the growing body of knowledge in their fields. Echezona, Okafor, and Ukwoma found that the journal cited most often by library and information science postgraduates at the University of Nigeria Nsukka was *College & Research Libraries*. They attributed this to the fact that *College & Research Libraries* was available in the university's library, highlighting a critical shortcoming of citation analysis: journal use is influenced by availability. A lack of research in some subjects may be due, in part, to a lack of resources in those areas. To be beneficial, citation studies should be combined with other methods.[3]

In contrast, reliable electronic journals usage statistics have only been available since the implementation of Project Counting Online Usage of NeTworked Electronic Resources' (COUNTER) original goals in 2003. Project COUNTER (www.projectcounter.org) is an international initiative to bring consistency and reliability to the measures used to evaluate library electronic resources that includes librarians, publishers, and aggregators. Usage statistics have undergone further refinements since the first release of the COUNTER Code of Practice in 2002. Prior to COUNTER, usage statistics would not allow for easy comparisons across platforms, and some librarians today would contend that cross-platform comparisons are not advisable because of interface issues that elevate counts for some platforms.[4] A method that combines citation studies and usage analysis is needed to provide additional information, which could help inform subscription decisions.

For over two decades, academic libraries have been in transition from print journals to electronic access. As Xu observed, the tools and methods that were developed in the 20th century for collection analysis were not created with evaluating modern serials collections in mind, evaluating collections in subsets focused on subject areas or as a whole, or across formats such as serials, monographs, etc.[5] In studying the relationship between print and electronic journal (e-journal) use and e-journal discovery, McDonald found that both print use and e-journal use were significant predictors of local citation rates, with print use predicting local citation rates with a two-year delay.[6] De Groote et al. found a high correlation between vendor data and link-resolver data, demonstrating that vendor usage statistics provide a statistically valid substitute for this local access measure.[7] Additionally, usage statistics from either source can predict local citation rates for journals. In regard to measuring access use, counting full-text downloads may seem reliable, but publishers are still working to perfect how to measure this activity. Moreover, publishers have economic incentives to "over-report" such statistics.[8]

Studying usage based on link server reports is a twenty-first-century approach. Bollen and Van de Sompel examined how usage patterns obtained from the link resolver SFX (www.exlibrisgroup.com/category/SFXOverview) at nine major institutions in the California State University system in 2004 correlated with the Institute for Scientific Information Institute Impact Factor (ISI IF), obtained from the 2004 Journal Citation Reports (JCR). They studied full-text download requests for articles from 2002 and 2003 and observed a "negative correlation between the CSU UIF [California State University Usage Impact Factor] and the ISI IF" over a period of eight years, ranging from -0.159 to -0.207.[9] This finding contradicts previous studies that showed a positive correlation between the ISI IF and either journal downloads and citations or article downloads and citations.[10] Their findings suggest that librarians might attach too much importance to something like impact factor, when local needs dictate otherwise, which is consistent with Duy and Vaughan's findings.[11] In their three-month study of the usage of 3,465 journals indexed by MEDLINE, Gallagher et al. found that usage data captured by link servers represents less than 10 percent of e-journal usage when compared to vendor usage data.[12] Consequently, while there is a correlation between usage derived from link resolvers and that provided by vendors, link resolver statistics may not provide enough information for local decisions.

Because of shrinking budgets and the ongoing task of managing collections, evaluation of electronic resources could not wait for the tools to mature, and librarians are applying different methodologies. To assist in critical decision making with regard to journal subscriptions, some libraries are developing their own charts or checklists of data.[13] As part of a cleanup project designed to eliminate encumbrances that were never expended, Smulewitz broke down large journal packages by title, applying a fund code and subject identifier to each. Adding usage statistics to calculate cost per use, Smulewitz was able to look at cost and use per title across packages and years, allowing for better-informed decisions on renewals and cancellations.[14] Usage statistics are often consulted in reaction to a crisis, such as dealing with a budget cut or shortfall.[15] To evaluate large journal collection package purchases as a whole and by title, Blecic and colleagues created metrics that combined Successful Full-Text Article Request (SFTAR) data for three years, subscription status for each journal, and cost. Though this approach is a

step above single-measure comparison while remaining less complex than other methods, Blecic et al. caution that an electronic resources librarian must use thoughtful consideration to ensure fair and even access to journals across subject areas needed by the library's stakeholders.[16]

One way to compile a list of core journals in a given subject area is to focus on the citations in several leading journals and determine which journals are cited most often.[17] Tsay studied all scholarly articles published from 1998 to 2008 in the *Journal of the American Society for Information Science & Technology*, *Information Processing & Management*, the *Journal of Information Science*, and the *Journal of Documentation*. Analyzing a total of 2,913 research articles, Tsay found that these four journals cited 105,063 references, with journal literature topping the list. The four journals accounted for 50.3 percent of the citations. The top thirty most cited journals accounted for nearly 50 percent of all journal citations, but interestingly half of the cited journals were cited only once.[18] Kimball et al. used a traditional citation study to indicate "that the collection development practices for that portion of the collection are effective."[19] Yet, if half of the journals were cited only once, perhaps a new, big picture approach is warranted.

Another approach to define the core journals in a given collection is to apply the 80/20 rule, also known as the Pareto Principle. Simply put, this principle states that for most occurrences in any given area, about 80 percent of the events were triggered by 20 percent of the causes. For example, a likely scenario would be that 80 percent of journal use is attributable to 20 percent of the journals being accessed by users. According to Nisonger, the "basic 80/20 pattern provides a valid approach to operationalizing the core journal concept and is applicable to collection management decision making."[20] Gallagher et al. found that "20 percent of print titles accounted for 77.8 percent of print use, while 20 percent of e-journals accounted for 73.8 percent of use" at Yale University's Cushing/Whitney Medical Library.[21] In examining the University of Illinois at Chicago's (UIC) COUNTER data, De Groote and colleagues found that 80 percent of successful full-text requests were concentrated in 24 percent of the titles.[22] Although Nisonger admits that the percentages do not exactly match the 80/20 rule, ideally the majority of an academic library's journals budget should be allocated for resources that get the majority of use.

Taking a different approach, Ke used Elsevier's SCOPUS database (www.elsevier.com/online-tools/scopus) to analyze the citations in papers published by the University of Houston's psychology faculty to determine if the library was meeting their needs and to gauge how psychology faculty use information beyond their stated uses. Questions asked included what journals were cited and how often? Does the library subscribe to the journals that researchers cite? Ke found that her library subscribed to 100 percent of the journals that were cited more than one hundred times and 92 percent of the journals that were cited twenty-one times or more. She sought to show if there was a connection between the number of times a journal was cited in 2012 to the number of times it was downloaded during that year. The *Journal of Applied Psychology* was downloaded nearly six thousand times in 2012 and was cited more than fifty times in 2012 journal publications indexed in Scopus. Ke concluded that citation analysis can be used to demonstrate that the library effectively supports campus research in the area of psychology.[23] Similarly, Whiting and Orr sought to determine how well their library's collection supported the research needs of doctorate of nursing practice students at the University of Southern Indiana. They found that Rice Library could have provided at least 71 percent of the total items cited in student papers and 81 percent of the journal articles cited.[24] These approaches are attainable ways to demonstrate the library's effectiveness in supporting faculty and student research.

Return on investment (ROI) is one way to demonstrate the library's role in teaching and research to high-level administrators. Determining an ROI is a challenge because there are often costs, such as consortia fees, that are not apparent to people outside the library. These costs may be detected by an experienced electronic resources librarian who would know where to look for them. Local collections are specialized, and electronic resources librarians must know their collections and their respective histories. For that reason, calculating overall electronic product expenditures requires knowledge of current and previous subscriptions and the ability to work with the available tools. How items are counted or what counts as a use is a vital question to ask. As Hulbert, Roach, and Julian noted, "Decisions must be made locally as to how to count usage and costs."[25] Cost per use is their libraries' indicator of the value of a title to the collection. When determining cost per use, Hulbert Roach, and Julian recommend the following: "keep it simple; be consistent, and document decisions," which is sound advice for any library.[26]

Even with standards that were created to simplify and streamline the process of collecting electronic resource usage statistics, this data is not as clear and easy to delineate as one would hope.[27] To illustrate this, Davis and Price gathered COUNTER JR1 reports (the number of successful full-text article requests by month and journal) for Cornell University journal subscriptions with six publishers in 2004. From a possible 1,590 titles, 818 remained for analysis after eliminating titles that provided only one version of the full text. They also looked at Embo Journal because it was hosted on both the Nature and Highwire Press platforms, and thirty-two research institutions had access to it on both platforms. Looking at the number of full-text downloads, Davis and Price found that ratios of PDF-to-HTML downloads,

while consistent for a given publisher, vary significantly across publishers, even when controlling for content.[28] Some publishers' interfaces inflate their journal usage statistics by requiring users to access HTML versions of articles before accessing the PDF versions.[29] Such findings "refute the notion that all COUNTER-compliant publishers are reporting comparable numbers."[30]

University administrators need a solid understanding of usage data and an awareness of the limitations of relying solely on quantitative data. Price and Fleming-May noted, "Administrators' thorough understanding of use is essential in measuring and evaluating the library's effectiveness in the campus community."[31] It is important to demonstrate to administrators how deep budget cuts will adversely impact teaching and research at their academic institutions. While teaching faculty are creative and can find ways to work around limited access to resources, Bradley and Soldo note that "limiting access to the scholarly record puts students at a disadvantage by restraining what their instructors can freely expose them to via accessible course readings due to both cost and copyright restrictions."[32]

Often administrators see the large price tag of a Big Deal journal package and question whether the library needs to have a bundled collection. But this type of approach does not take into consideration how faculty are using titles that are part of a Big Deal. De Groote et al. concluded that "citation data as a subset may tell the library which journals are most used for research by faculty, while vendor or publisher statistics and link-resolver data reflect all types of use, including educational and clinical."[33] Both citation data and usage data can be used to inform decisions related to the retention of expensive journal collections. For Gallagher et al., "Analyzing e-journal statistics by vendor and package will provide libraries with useful information to better determine the true value of each package deal."[34] Additionally, considering how well a particular collection meets the needs of academic department only enhances the analysis of a journal packages value to the institution as a whole. Interest in how faculty research citation and publication data are reflected in vendor-provided full-text downloads statistics provided the impetus for this research.

Method

The University of Wisconsin– Eau Claire (UWEC) is a small, regional liberal arts university with a student full-time equivalent (FTE) of 9,857 located in western Wisconsin, approximately ninety minutes east of the Twin Cities of Minneapolis and St. Paul. To find a new and meaningful way to determine the level of coverage provided by current journal subscriptions, this research sought answers to the following questions:

1. In what journals are faculty publishing?
2. What journals are faculty citing?
3. Does the library subscribe to these journals?
4. What level of access to each journal is currently provided?

Publications from four academic departments at UWEC were examined: nursing, chemistry, biology, and mathematics. Faculty in these areas who were on the university's official list for the 2011–12 academic year were included, across all levels of academic rank: nursing, twenty-two faculty; chemistry, nineteen faculty; biology, nineteen faculty; mathematics, thirty-three faculty.

The university's Office of Research and Sponsored Programs (ORSP) tracks scholarly publications, faculty/student collaborations, creative achievements, and external grant awards for faculty and academic staff and publishes this information in an annual report. Historically, these reports covered the academic year from 1987–88 through 2008–9. ORSP switched to a calendar year interval beginning in 2010. At the time data was being collected, only reports from 1998–99 through 2010 were available in a digital format (PDF). These reports served as additional resources for locating faculty publications to be included in the first lists. Author searches were performed for each faculty member in databases appropriate to a given discipline:

- CINAHL: Nursing
- Web of Science: Chemistry and Biology
- MathSciNet: Mathematics

Each publication found in the search results was added to the appropriate departmental the list.

Four lists of publications were created, one for each discipline. Since the focus was on journal articles published by department, articles with two or more faculty authors were counted as follows:

- If they worked primarily in the same department, the article was included once.
- If they were from different departments, the article was included once for each department involved.

Nursing faculty published in forty-four journals, chemistry in sixty-two journals, biology in fifty-eight journals, and mathematics in thirty-nine journals. These faculty publication lists were used to determine which journals faculty cited in their research. A total of 408 articles were published by UWEC faculty from the four departments examined. For each published article, bibliographic citations would be used if available within an electronic, full-text version of the article itself, or in a database appropriate for each discipline, such as those mentioned previously.

Once created, the publication lists were used to discover which journals the faculty cited in their publications. The resulting citations lists were grouped by academic discipline (nursing, chemistry, etc.), each in a separate spreadsheet, with 589 items for nursing, 782 for chemistry, 855 for biology, and 354 for mathematics. Both sets of lists, the publication lists and the citation lists, were verified using the appropriate databases previously mentioned.

The lists were sorted alphabetically by publication title. To determine whether the library provided access to journals on these lists, the authors (both librarians) reviewed each list separately and checked each publication title using the library's SFX knowledgebase, eliminating titles that were not journals (books, book chapters, monograph series, etc.). Title searching was made easier since both print and online holdings show up in UWEC's SFX searches. For journal title changes, splits, and mergers, the citation with the most recent version was retained in the list and others were treated as duplicates and eliminated. Duplicate titles and items that could not be verified as journals were also removed, resulting in 441 journal citations for nursing, 584 journal citations for chemistry, 623 for biology, and 269 for mathematics.

Each of the 1,917 items was then coded to indicate access to the journal:

- "Current access" meant that the collection offered print or electronic access to the most recent content of the journal without an embargo period.
- "Some access" covered various types of access ranging from three-month embargo barriers for titles in full-text databases to shorter runs or limited access due to a subscription cancellation.
- "None" or "No Access" meant that the library did not have access to any version of the journal and that UWEC faculty would have had to obtain the content through ILL.

The authors compared lists and, where discrepancies were found, conducted verification searches using SFX, WorldCat, ResearchGate (www.researchgate.net), and Google. A journal was defined as something that had an International Standard Serial Number (ISSN), and publications with both an ISSN and an Switch to International Standard Book Number (ISBN) were deemed to be books and removed from the lists.

Determining the correct title for a publication based on abbreviations provided proved to be a challenge. The following is an example of how much citations can vary depending on the database source:

- ISR J MATH Volume: 7 Pages: 325-349 DOI: 10.1007/BF02788865 Published: 1969
- Israel J. Math. 8, 273–303 (1970). MR0271721 (42 #6602)
- ISRAEL JOURNAL OF MATHEMATICS Volume: 22 Issue: 2 Pages: 138-147 DOI: 10.1007/BF02760162 Published: 1975

While these are different citations, the journal title, *Israel Journal of Mathematics*, may not be obvious when it appears as "ISR J MATH." Searches using OCLC's WorldCat and Google helped to confirm that these abbreviated titles were in fact journals. Truncated searches in WorldCat required at least three letters per search term. Sometimes, but not always, searching Google for the abbreviated title led to the official journal site, allowing for easy verification. Contending with varying citation styles was a challenge that was often alleviated by the inclusion of a Digital Object Identifier (DOI) in the citation. When a DOI existed for a vague or confusing abbreviation, using it allowed for searches to find the preferred version of the title in the SFX knowledgebase.

Another issue to contend with was journal title changes, for example

Old:

HOSPITAL AND COMMUNITY PSYCHIATRY Volume: 41 Issue: 5 Pages: 549–551 Published: MAY 1990

New:

PSYCHIATRIC SERVICES Volume: 57 Issue: 8 Pages: 1153–1161 DOI: 10.1176/appi.ps.57.8.1153 Published: AUG 2006

Rather than coding each version of the journal as a separate title, the most recent or current title was used because that is what most of the content providers use when they provide usage statistics reports. Progeny of a parent journal were counted as individual journals, while the parent (with a superseded version of the title) was treated as a duplicate. After coding the titles on the shorter lists of faculty publication and on the longer lists of articles that faculty cited, the authors compiled the results to study trends. This entire process is diagrammed in the flowchart in figure 1 for easy replication.

Since statistics in COUNTER journal reports are not consistent across platforms, a single vendor platform needed to be selected. Initially, statistics for the EBSCO databases were considered because EBSCO is a major provider of the library's content, but the lack of specificity in the "Some Access" category would be problematic. Because the "Some Access" category was not granular enough to provide data that could be compared across titles, the authors chose to focus on "Current Access" titles available from Wiley. While creating the publications and citations lists, the Wiley journal package repeatedly provided current access

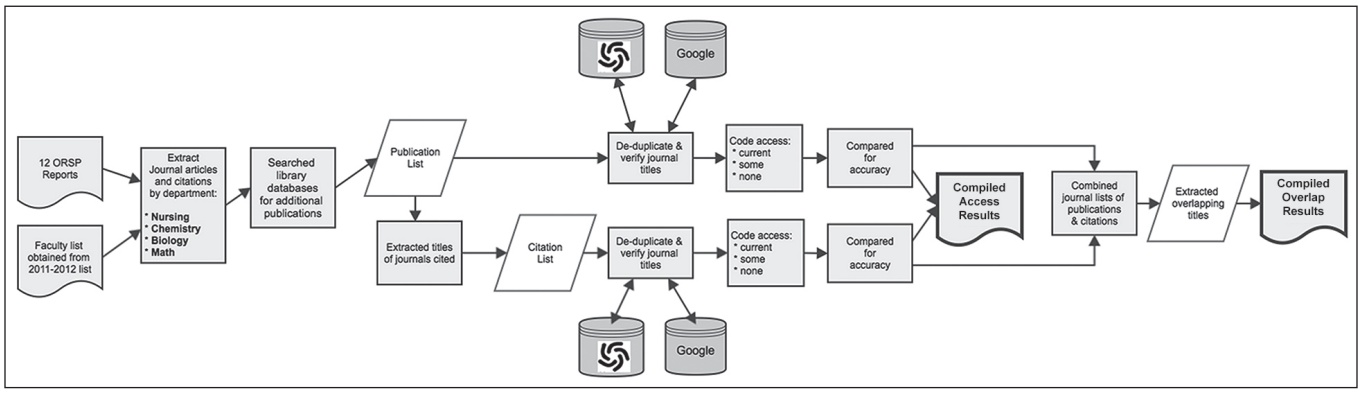

Figure 1. Citation Study Process Flowchart

Table 1. Journal Access by Department

	Nursing	Chemistry	Biology	Mathematics
Journals Published In				
Current	75% (33)	45% (28)	39.655% (23)	38.46% (15)
Some	11% (5)	23% (14)	39.655% (23)	23.08% (9)
None	14% (6)	32% (20)	20.690% (12)	38.46% (15)
Total	44	62	58	39
Journals Cited				
Current	51% (224)	31% (183)	34% (212)	31% (84)
Some	25% (112)	27% (155)	23% (143)	25% (67)
None	24% (105)	42% (246)	43% (268)	44% (118)
Total	441	584	623	269

to titles in both lists that were embargoed or unavailable through UWEC's other databases. This package provides COUNTER reports for the 1,218 Wiley e-journals to which UWEC subscribed in 2011 and the 1,224 Wiley e-journals to which UWEC subscribed in 2012. These reports include data on the average number of PDF downloads by journal title and for the entire Wiley package. All four departments in this study published in, as well as cited, Wiley journals. Wiley 2011 and 2012 COUNTER JR1 PDF downloads were pulled, and the numbers of PDF downloads were examined for the journals that UWEC faculty published in and cited. Titles published in, or cited by, nursing faculty were grouped together, and the average number of PDF downloads calculated. This was repeated for the other three academic disciplines.

Results

A total of 408 journal articles published by the university faculty across the four disciplines were included in this study, which together cited 1,785 different journals. Looking first at access to the journals where faculty had published their papers, the library provides current or some access to 60 percent or more of the titles in the publications list titles, with nursing having the best access at 86 percent. Table 1 provides a comparison of access levels by discipline. When gauging access to journals cited in faculty articles, the library offers current or some access to over 50 percent of the citation list titles, again with nursing holding the top spot at 76 percent.

From the group of journals that faculty in each department both cite and publish in—the overlap of the two publication lists—the library provides current access to nearly three-quarters of the nursing journals, while access for the other departments is at less than half (see table 2). From the group of journals that faculty in each department both cite and publish in—the overlap of the two publication lists—the library provides current access to nearly

Table 2. Overlap Coverage by Department

Access	Nursing	Chemistry	Biology	Mathematics
Current	30	28	20	13
Some	5	12	22	7
None	6	20	11	10
Totals	41	60	53	30

Table 3. Maximum Repeated Citations From, or Publications in, the Same Journal

	Academic Department			
	Nursing	Chemistry	Biology	Mathematics
Citations	6	6	4	4
Publications	2	1	1	1

Table 4. Wiley Usage Statistics by Department: Average Number of PDF Downloads

	2011	2012
Entire Wiley package	6.79	9.16
Journals Cited		
Nursing	49.65	39.78
Chemistry	12.18	16.56
Biology	7.07	11.02
Mathematics	3.90	8.70
Published In		
Nursing	60.17	61.67
Chemistry	68.50	75.50
Biology	20.20	24.10
Mathematics	7.00	21.75

three-quarters of the nursing journals, while access for the other departments is at less than half (see table 2). Additionally, only member of the chemistry department cited from all twenty-eight of the journal in which they also publish. Nursing faculty published in three journals they did not cite (*Journal of Obstetric, Gynecologic and Neonatal Nursing*; *Luso-Brazilian Review*; and *Nursing Education Perspectives*), biology faculty published in three journals they did not cite (*American Biology Teacher*, *Journal of Animal Breeding and Genetics*, and *Journal of Nematology*), while mathematics faculty published in only two that were not cited (*Chemistry and Biodiversity* and *Electronic Journal of Combinatorics*). No single journal was cited more than six times. Faculty in chemistry, biology and mathematics published twice in exactly one journal per each discipline whereas faculty in nursing published more than one time in two different journals (see table 3).

Wiley Usage Statistics

UWEC subscribed to 1,218 Wiley e-journals in 2011 and 1,224 Wiley e-journals in 2012. According to 2011 and 2012 COUNTER reports, the average number of Wiley full-text PDF downloads per title each year was 6.79 and 9.16, respectively. The average number of PDF downloads for journals in the Wiley package cited by nursing faculty was 49.65 in 2011 and 39.78 in 2012, exceeding the overall package average by a factor of seven and four, respectively. For the Wiley journals in which the nursing faculty published, the average number of PDF downloads was 60.17 in 2011 and 61.67 in 2012, again substantially exceeding the package averages of 6.79 and 9.16, respectively (see table 4).

Regarding journals cited by chemistry faculty, the average number of PDF downloads was 12.18 in 2011 and 16.56 in 2012, surpassing the overall Wiley package averages as noted above. For Wiley journals in which the chemistry faculty published, the average number of PDF downloads was 68.50 in 2011 and 75.50 in 2012. Journals cited by biology faculty from the Wiley package averaged 7.07 PDF downloads in 2011 and 11.02 in 2012, noticeably closer to the Wiley package average as a whole. The average number of PDF downloads was 20.20 in 2011 and 24.10 in 2012 for those Wiley journals where biology faculty published. The average number of PDF downloads was only 3.90 in 2011 and 8.70 in 2012 for those Wiley journals cited by mathematics faculty. These faculty averaged 7.00 PDF downloads in 2011 and 21.75 in 2012 for the journals where they published.

For the average number of downloads in journals cited, all academic disciplines had a higher per-journal average than the collection as a whole, with nursing holding the top spot. An examination of this analysis by academic discipline shows that for Wiley journals in which university faculty published, three out of four subjects matched or exceeded this average, with chemistry faculty averaging four to seven times the amount.

Discussion

This research is important because faculty often view the library as a purchasing agent.[35] While an academic library cannot offer current access to all journals cited by faculty, focusing on titles that appear in both the publications and citations lists can serve as an indicator of how well the library supports core areas of faculty research. Faculty in the four

departments examined in this study published in and cited a range of publications, including journals outside their traditional discipline's areas. Moreover, citations were not as concentrated as in the findings of Maharana and colleagues.[36] All four departments had current or partial access to more than half of the journals published in and cited, with nursing having the highest levels of coverage (86 and 76 percent, respectively). Narrowing the focus to titles overlapping these lists, this study highlighted that while a majority of nursing journal titles offer current access, all other departments have current access to less than half of the titles on their lists. A higher level of such coverage can serve to demonstrate the library's successful support of research, while lower levels can provide an additional incentive to negotiate for and acquire current access to additional titles as part of journal package purchases.

Because publishers typically group journal and database subscriptions in packages, and renewal statements for journal packages are received at different times (even when a subscription agent is used), this approach offers a more comprehensive picture of the merits of a particular journal package or database subscription. The findings of this proof-of-concept study provided enough data to support the decision to renew the Wiley journal package, which provides considerable current access to titles that are otherwise subject to an embargo in full-text databases. Within any given package, comparing one title's usage against the average use of journals as a group does not take into consideration the complex constellation of how academic libraries are billed for database and journal subscriptions. Much attention has focused on cost per use, but if a highly downloaded title does not make it into the literature, or if local faculty choose to publish in other titles, stakeholders will not get a complete picture unless they look at where faculty publish, which titles they cite, and what is downloaded. Experienced electronic resources librarians and subject liaisons know that certain journal packages serve various departments better than others, and this method provides a way to measure and confirm this knowledge.

Whereas some of the usage can be attributed to students and faculty outside these four departments, it is not unreasonable to assume that students are utilizing resources that their professors also use. This approach allows academic librarians to see whether a journal package or full-text database subscription serves a department as a whole. Sharing this information could possibly prevent a situation where an administrator may cut a library budget, thinking that a big-ticket journal package is unnecessary. Comparing the publication and citation rate averages of a department to the overall average for a journal package provides a measure that can be taken to departmental faculty to get their support for a particular course of action.

Combining usage data and citation data, this study's findings do not show that usage and citation fall into an 80/20 distribution as might be expected. This will make deselection more difficult. It also makes it necessary to collect more data to determine a core list of journals for the four departments at this university. Moreover, the initial findings may not be true for other departments at UWEC, like music and theater arts, where the departmental evaluation plan for faculty states explicitly which journals are examples of acceptable peer-reviewed journals for promotion and tenure. Other departmental evaluation plans leave the selection of journals in which to publish more open, giving faculty a broader array of options.[37]

After examining citations and publications that spanned a dozen years, the authors suggest that future research may focus on specific departments over a shorter time span, perhaps three years. This would be less cumbersome, allowing more time to perform analysis of multiple platforms, journal collections, and databases. This approach could be more useful to the research faculty who want to know how a package compares to other packages in their discipline. However, this information needs to be put in its context. Departmental research needs often change with personnel changes, and it will be interesting to see how average uses, citation, and publication rates change over time. Measuring publication, citation, and usage rates provides compelling information on how a collection is used. The authors' experience is that faculty members believe that the library can cancel certain journals when they are bundled even when they are explicitly told that bundled titles are not cancellable. It is important to resist assigning a value to an individual title, unless the cost of the package did not depend on the individual title. A better solution is to provide the cost of the entire bundle or package, including any additional costs or fees that are required to provide access to the full package and recent full-text download counts.

Considering PDF downloads rather than the total for full-text (HTML and PDF) downloads in COUNTER reports eliminates the usage inflation issue that different interfaces bring to usage measures. Since this study was limited to Wiley, the next step is to apply this method to other journal packages, including Oxford, Sage, and Elsevier and full-text databases from EBSCO and other providers. This approach will be used with other departments' publications, including psychology and women's studies, to see how well the library's collections meet the faculty's research needs. Lastly, another step is to share this information with other stakeholders, if appropriate, to gain their support.

Although this small-scale study yielded some practical information, the research was limited by available usage data and the need to manage the complexity of holdings information. Straightforward comparisons between database usage and vendor-supplied usage statistics could not be made in any meaningful way. The poor quality of available citations

was also a challenge. Moreover, the process of gathering and checking the citations was extremely time consuming. Further research is needed to expose how limiting the sample to article citations on hand, either electronically or in print, could skew results. However, examining the results of this part of the study allowed the authors to gauge how well their journal collections in general, and Wiley journals in particular, support UWEC faculty research. This is important because UWEC's McIntyre Library spends a considerable amount of money on journals relative to the overall budget. Plans include examining other journal and database packages as they related to the nursing department and considering journals and databases in relation to the women's studies program and the psychology department, which has a strong research component.

Conclusion

Usage statistics and citation analysis can be combined in a meaningful way. This study provided an approach that is a more targeted and possibly strategic examination of usage statistics by filtering those statistics through the lenses of journals that are important to academic departments. The described approach allows for evaluation of usage statistics in a meaningful way—meaningful both to faculty outside the library and those within the library. This approach encourages stakeholders to think differently about evaluating usage statistics. Cost per use means nothing without the proper context and perspective. Using this approach is labor intensive but perhaps justifiable when the amount of money academic libraries spend on electronic journal and database subscriptions is taken into consideration. In conclusion, combining measures of citations and publications in conjunction with usage data provides a better view of the relative merits of an electronic resource package.

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Notes on Operations

Visual Representation of Academic Communities through Viewshare

Violeta Ilik

This paper discusses how the Viewshare web application was used to generate and customize unique, dynamic views of data about faculty members in a large public university, specifically their areas of research and other data such as PhD granting institutions, location of the PhD granting institutions, Virtual International Authority File (VIAF) authority records, and gender. Viewshare, as a visualization platform, enabled the author to discover the departments' strengths and consider how the results could be used to benefit the library, students, and specific departments. Viewshare also enabled the author to show patterns and trends with graphics instead of volumes of text.

The library's mission is closely intertwined with the university's mission, and librarians need to respond to the challenges that the research landscape is facing. Borgman states that the role of libraries in research institutions is evolving from a focus on reader services to a focus on author services.[1] Luce suggests that libraries are becoming part of new hybrid organizations, which will emerge as a result of tackling new support paradigms in the university system. Further, Luce advises that in the emerging paradigm of collaborative partnerships, libraries should emphasize proactive outreach and engagement by taking a role as conveners among the different stakeholders.[2] In a similar argument, Lougee explains that libraries must be able to constantly adapt to the changing landscape of scholarship and technology, especially as these two aspects of research interact.[3] While the library's role has traditionally been to build collections supporting faculty research activities, it is now apparent that libraries need to adapt to the new ways of conceptualizing research, specifically shaping and disseminating that research. Libraries need to position themselves in terms of a larger strategic process, becoming proactive and innovative rather than reactive.

Within this context, this paper describes how Texas A&M University (TAMU) Libraries moved towards action and innovation by testing a free, open-source visualization platform, Viewshare (http://viewshare.org), together with linked data principles, to visualize university research strengths, research outputs, collaborative relationships, and other characteristics of the campus research environment based on publicly available data about TAMU faculty. This project started as an experiment and a learning experience on the author's own time. It looks towards the future adaptation of library systems to the changes in academia:

Violeta Ilik (violeta.ilik@northwestern.edu) is Digital Innovations Librarian, Galter Health Science Library, Feinberg School of Medicine, Northwestern University Clinical and Translational Sciences Institute, Chicago.

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it highlights authors and researchers, encourages and directs collaborative partnerships, and provides a source of interaction and innovation for library outreach and engagement. Subject selectors can use this tool for collection development as it presents the research focus of the faculty members in an interactive and dynamic way.

Literature Review

This paper discusses linked data, the challenges of adopting linked data in libraries, visualization as a way to interactively display data, and open source platforms based on linked-data principles. Few authors have discussed similar projects at other institutions. None of the existing projects mentioned below have utilized the Viewshare platform used in this project.

When Tim Berners-Lee introduced the Semantic Web, he coined the term "linked data." He claimed that the Semantic Web implies more than putting documents on the web; instead, it is about making links to enable a person or a machine to expand data and knowledge.[4] This is a departure from the original web, which has conceptually been document-centric and static. According to Allemang and Hendler, the main concept behind linked data is to support a distributed web at the level of the data rather than at the level of presentation (e.g., documents).[5] Instead of having one web page point to another, one data item can point to another, using global references called Uniform Resource Identifiers (URIs). Miller and Westfall noted that linked data is not about stopping the current development of databases or database systems, but that this technology aims to leave data where it resides to provide the opportunity to connect in new ways and integrate data to solve a particular problem.[6] They further note that linked data is beyond the current capabilities of the World Wide Web.

Adopting Linked Data in Libraries

Alemu et al. state that the road towards adoption of linked data in libraries is not without challenges.[7] MARC format has been extensively used and understood as the basis for both current library management systems and legacy metadata. It has a document-centric metadata structure; the data cannot survive in an environment where an actionable data-centric format is needed. The author notes that while libraries are aware of MARC's limitations, alternative formats, such as XML, have not been acceptable replacements.

A second challenge is the terminological disparity that exists between library and web-based standards.[8] Alemu et al. cite Wallis, who recommends that the library and the linked data community work in concert to bridge such differences to facilitate the reusability and extensibility of library data by outside users.[9] Wallis also argues that initiatives to develop library standards, such as Resource Description and Access (RDA) and the Functional Requirements for Bibliographic Records (FRBR), should cater to simplicity while exploiting the metadata richness that is possible through the use of linked data.

Alemu et al. note that a third and important challenge is the complexity of linked data technologies.[10] The authors state that it is imperative that linked data technologies be made relatively easy to learn and use and comparable in simplicity to creating HTML pages during the early days of the web. As things currently stand, linked-data technologies are generally too complicated for people outside the linked data community to use. For a wider adoption to occur, anyone with the basic skills of website design should be able to create a page based on linked data standards.

Visualization provides a way to explore data in an interactive way regardless of the platform or tool used. Tools and platforms that are not built on linked-data principles also have the capability to present data interactively. The difference is that the data is not linked to other sources of data that might provide further insight into the subject. Heer and Shneiderman state that although the increasing scale and availability of digital data provides an extraordinary resource of information, users must be able to make sense of it to pursue questions, uncover patterns of interest, and identify (and potentially correct) errors.[11] As the authors note, multiple linked visualizations often provide clearer insights into multidimensional data than do isolated views.

Researchers at the University of Colorado-Boulder conducted a project in 2012 that demonstrates the use of Semantic Web technologies in a library. Lindquist et al. found, in working with an online heritage collection, that semantically enriched metadata and intelligent user services expose the complex, often nonlinear relationships, among topics, people, and places that are buried within the sources. This particularly occurs when data and services draw on ontologies and other specialized vocabularies that impart meaning to these concepts and the relationships among them in any given historical domain. They further note that linked data encourages the development of intelligent applications that are easy to use because they present the user with a range of options for analyzing and visualizing the data. The authors conclude that through linking related concepts by using a specialized vocabulary and enabling semantically rich services, they hope to empower users to find and use online primary sources efficiently and effectively.[12]

Schreur points out that "linked data has the potential to change most aspects of the universe of information creation and exchange. As a primary purveyor of information, the academy will be at the nexus of this revolution."[13] He further reiterates a call to libraries for reform and adaption: "True

beginnings do not happen often and revolutions can be swift and unexpected. Libraries must be leaders in this revolution. Information creation and exchange is the raison d'être of the academy. The time has come for a pivotal change in the entire information ecosystem and libraries cannot afford to let history simply repeat itself."[14]

Research Community Tools and Applications

This paper explores the use of a visualization tool for displaying publicly available information about academic communities. To develop an initial proof of concept for a linked-data project, the author chose Viewshare (http://viewshare.org), an open source platform based on linked data principles that enables users to upload their data in various formats, share it with the community, and reuse other users' data. Viewshare has not previously been used for visualization of academic communities." Although some of the tools discussed below also use linked data to present directory information, the author chose Viewshare for an initial project because the data resides on the web.There was no need to request access to TAMU Libraries' server space, and the work would incur no expenses other than the author's time.

Heer and Sinderman noted that Viewshare enables a meaningful analysis in which users develop insights about significant relationships, domain-specific contextual influences, and causal patterns.[15] As Algee et al. suggest, there is an emerging consensus that tools that support this kind of exploratory process are valuable to a range of disciplinary perspectives.[16] They note that Viewshare has the ability to iteratively explore, compare data trends, and engender the accidental wisdom that comes from visualizing collections in new ways.

Perhaps the most significant linked-data directory project is VIVO (www.vivoweb.org), which creates a virtual life-science community to aid faculty, researchers, and students to discover common interests and make connections. This community organizes and presents information on people, research, and educational activities using an entity-relationship ontology model. VIVO has made possible the visualization of academic communities through open source applications. As stated on the VIVO home page (http://vivoweb.org), after initial installation, the developer populates the tool with researcher interests, activities, and accomplishments, and VIVO enables the discovery of research and scholarship across disciplines at that institution. VIVO supports browsing and a faceted search function for rapid retrieval of desired information, both encouraging natural discovery and allowing specific research. VIVO's developers are exploring the possibility of providing access not only to the Virtual International Authority File (VIAF) (http://viaf.org) but to other controlled vocabularies that exist as linked data sets. Devare et al. noted that a virtual community such as VIVO could serve as a model to explore synergies with peer institutions, museums, foundations, and research consortia to provide access to academic information on a national scale.[17]

Wolski et al. and Krafft et al. describe how the VIVO platform collects appropriate metadata from research collections within the university through customized feeds from the various university content management and corporate systems.[18] The system exposes this data to library discovery tools and other research information federations.[19]

Harvard Catalyst (http://catalyst.harvard.edu) is an open source tool for research networking that connects people by combining basic directory information with expertise keywords.[20] OpenScholar (http://theopenscholar.org) and BibApp (http://bibapp.org) provide for interactive research communities. In addition, all major commercial providers of scholarly content are involved in developing or are already running visualization tools (Elsevier's product, SciVal; ProQuest's product, Pivot; Symplectic Elements, to name a few).

Background

TAMU has, 3,800 faculty, researchers, and advisors. It is home to more than 50,000 students and is the sixth largest university in the United States. It currently ranks among the top twenty universities nationally, with its research valued at more than $705 million annually.[21] TAMU Libraries is a Name Authority Cooperative Program (NACO) participant, and this project began as part of an effort to create name authority records for faculty members to contribute to the Library of Congress (LC) Name Authority File (NAF) and the TAMU Libraries' local name authority file. It gradually expanded into a visualization project when the author wanted to experiment with creating a dynamic and interactive view of data about TAMU faculty members to create various views with the available data. While the intention is to eventually include all faculty, the decision was made to start with a single department, TAMU's Department of Mathematics, one of the university's largest departments, with seventy-five tenure track and tenured professors, twenty-five visiting faculty, and twenty-nine lecturers. The goal was to create views of the department, its research areas, and faculty members' PhD granting institutions while also determining how many name authority records were needed.

Data Collection

Data about all tenured and tenure track faculty were included in the project. The data is publicly available and presented no privacy, copyright, or other compliance issues. It was entered manually into a spreadsheet with data types varying

from static to linked data vocabularies. This step required sixteen hours of labor. Although the data was publicly available, it was not in formats that allowed automatic harvesting.

At the beginning of the project, only static textual data was collected, such as the names of faculty members, their research areas, PhD granting institutions, the date the PhD was granted, and date of hire. This data is available from the faculty directory website and was easy to collect. As the project expanded, and in consultation with members of the Department of Mathematics, the author decided to include additional data to enrich the data set: master's granting institution, bachelor's granting institution, PhD location that contains the latitude and longitude for the geographic place, links to their Department of Mathematics web page, personal web pages, a link to the Mathematics Genealogy Project, and a link to VIAF.

The OCLC Authority Record Number (ARN), which represents the LC NAF, was later included for verification purposes. Use of the LC NAF and the VIAF was considered and accepted, as it is best practice to reuse existing semantic vocabularies, even though they both offer limited coverage of names in the specific domain of mathematics (as mathematicians more often write scholarly articles than monographs). Inclusion of the Open Researcher and Contributor Identifier (ORCID) was considered. A careful examination of the number of faculty members with ORCID ids found that an insignificant number of individuals were registered, and the author decided that this data type was unnecessary for the prototype. Latitude and longitude data were collected from the GeoNames geographical database based on the corporate name for the PhD granting institution. The remaining data was collected from other sources such as the department page and personal faculty web pages. Some of the data (e.g., date of hire) came from the publicly available faculty directory.

Data Normalization and Standardization

Once collected, the author developed standards for recording data in the spreadsheet. The name column was populated by entering last name, first name; department name was entered as Mathematics, and the college name was entered as established in the LC NAF; research areas were entered as found in the Library of Congress Subject Headings (LCSH); corporate names of bachelor's, master's and PhD granting institutions were entered as established in the LC NAF; PhD date and date of hire were entered in a "YYYY" format which is an ISO 8601 standard; PhD location was entered as a decimal value for latitude and longitude; department page, home page, image, and the link to the VIAF were entered as URLs (see figure 1).

Because normalizing and standardizing the data would help to show patterns, cleaning the data was an essential step before importing it into Viewshare. For example, if "algebra" was entered as a research area, algebra with a lower case "a" and also with an upper case "A" would be counted as two separate entries, although it is clearly the same entry. Additionally, there were entries with misspellings or numerical data entry errors. To address these issues, the author utilized OpenRefine (formerly known as Google Refine) (http://openrefine.org) to clean up the data used for this experimental project. OpenRefine (http://openrefine.org) is a free tool for working with messy data and transforming it from one format to another. This tool enabled a fast and efficient cleanup of the data.

College	College of Science
Department	Mathematics
Additional appointment	
Name	Aguiar, Marcelo
Research area	Algebra
Department page	http://www.math.tamu.edu/~maguiar/
Home page	http://www.math.tamu.edu/~maguiar/
VIAF	http://viaf.org/viaf/54453604
ARN	4552762
PhD granting institution	Cornell University
Master granting institution	
Bachelor granting institution	Universidad de Uruguay
Mathematics Genealogy Project	http://genealogy.math.ndsu.nodak.edu/id.php?id=25171
image	http://www.math.tamu.edu/directory/photos/aguiar_m.jpg
PhD date	1997
PhD location	42.4406, -76.4969
gender	male
Hire date	2001

Figure 1. Sample Data Properties

Data Ingestion into Viewshare

Data ingestion into Viewshare is a simple process. One can import data in different formats, such as spreadsheets in XSL format, XML, Dublin Core (DC) data from an Open Archives Initiative (OAI) end point, and some instances of ContentDM (Version 4 only).[22] Viewshare transforms the data from rows and columns to Resource Description Framework (RDF), the data model that underlies linked data. After ingestion, data can be quickly and easily visualized in various ways. Data was manually entered into the spreadsheet in the XSL format and ingested. Immediately after ingestion, Viewshare enables users to visualize data

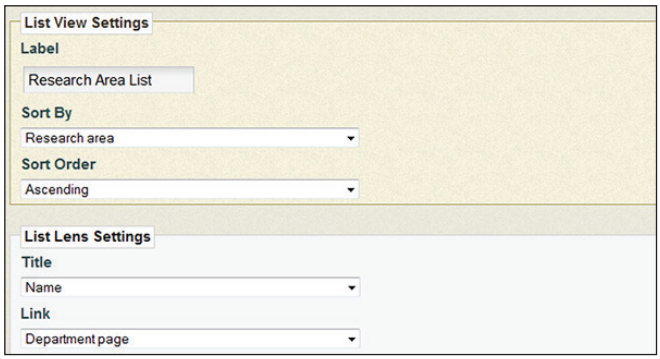

Figure 2. List View Settings Options

using a drag-and-drop view-building workspace. Viewshare's open data principles allow multiple users to create different views of the same collection dataset.

Viewing Data with Viewshare

After importing the collected data, the author utilized and explored options to choose layout, preview, add facets and views, and pick which features to display in the interface. Considering the number of options, creating the views required a negligible amount of time (less than two hours).

Viewshare allows the insertion of widgets, such as tag clouds based on research area data, lists of research areas, lists of faculty names, and a search window where one can search the data. There are also widgets that enable users to add a logo, slider, range, or text to enhance the visualization of the data set. See the Viewshare site for the TAMU Math Department at http://viewshare.org/share/1a848a62-d6fa-11e2-8aa1-4040e007d488/ for more information.

The default view provides a list of person records sorted by research area. See figure 2 for the options for list view. In the List View Settings, the label was set to Research area with the data displayed alphabetically in ascending order. In the List Lens Settings, the Title field was set to display the name of the faculty member, linked to his/her Department of Mathematics page. The person record shows all the collected data (or properties) for an individual with the exception of the Authority Record Number (ARN) from OCLC.

A second list view for PhD year was created. In this view, the Title field displays the faculty member's name, linked in this instance to the Mathematics Genealogy Project, a database that shows a mathematician's PhD thesis title, advisor, and affiliated graduate students tracing relationships among researchers through history. Some faculty members at TAMU are descendants of famous mathematicians such as Gauss, Euler, and his advisor Bernoulli, and others trace their academic genealogy to the 14th century. As with the default view by Research area, the author decided to display all collected data except the Authority Record Number (ARN) from OCLC in the list by PhD year.

The next constructed view displays the PhD-granting institutions in a map with "PhD granting institution" as the label. In this view, Latitude/Longitude is the location of the PhD institution (see figure 3). The Zoom Level is set to "auto" to provide a full world map. Colored balloons help to visually distinguish multiple institutions that are close to each other on the map. In the Map Lens settings, "Title" is the faculty member's name, and the link is to the faculty member's home page.

It should be noted that initially the augment feature was used to generate the coordinates needed to display the location of the PhD granting institution. As stated on Viewshare's User's Guide site, Viewshare can augment or transform some types and forms of information into the proper format. Viewshare does not change existing data in the file during the augmentation process; it adds columns of new data to the file. Data can be augmented when loading or editing the data in the Viewshare tool and before creating views.[23] Out of seventy five PhD granting institutions, sixty-one had their values augmented through the Viewshare platform. It was then decided to collect the latitude and longitude value from the GeoNames geographical database. This decision made it possible to have all the values included in the data set which provides for complete map of PhD granting institutions.

The Timeline view (see figure 4) visualizes the length of time between when the individual's PhD was granted to when he or she was hired by TAMU. Each line is labeled with a person's name and links to the person record. There are two bands for time units with the top band set to year and the bottom band set to decade. Again, colors are used to distinguish the various institutions. In the Timeline Lens setting, the Title set to the faculty member's name and includes a link to the faculty member's home page.

The PhD Gallery view is sorted alphabetically by PhD granting institution. The List Lens Settings include the property image; the image comes from the Department of Mathematics' website. The name below the image links to the faculty member's VIAF record if available; if not, the link defaults to the default view list of person records sorted by research area. The link to VIAF links directly into WorldCat Identities, the LC NAF, and the International Standard Name Identifier (ISNI). In addition, the VIAF record for each faculty member may be viewed as an RDF record. As stated on the OCLC website, WorldCat Identities has a summary page for every name in WorldCat (currently there are about 30 million names), including named persons, organizations, and fictitious characters. The WorldCat Identities page "include[s] a list of most widely held by libraries, works by and about the identity, a list of variant forms of name the identity has been known by, a FAST tag cloud of places,

topics, etc. closely related to works by and about the person, links to co-authors, and more."[24]

The LC NAF "provides authoritative data for names of persons, organizations, events, places, and titles. Its purpose is the identification of these entities and, through the use of controlled vocabulary, to provide uniform access to bibliographic resources."[25]

ISNI (www.isni.org) is an International Standards Organization (ISO) standard (ISO 27729) that identifies the public identities of parties and serves as a tool for disambiguating public identities. While ORCID was the preferred choice for this data set, lack of use by study participants made inclusion unnecessary. However, future experiments using this data set will, most likely, include ORCID data because of TAMU's plans to actively promote ORCID. Additionally, a TAMU Libraries team (including the author) was awarded a grant from ORCID to assign identifiers to all TAMU faculty members.

A gallery called Research Area was created to sort faculty members alphabetically by research area. The title is set to the faculty member's name with a link to his or her departmental home page, which lists his or her publications. Many of the publication links go to the preprint versions of papers or to information on arXiv.org, a well-known archive that provides an e-print service for mathematics, physics, computer science, quantitative biology, quantitative finance, and statistics.

Exploring the Views

The visualization of this data brought to light interesting relations and connections, enabling the author to fully realize new interpretations of data. Simple keyword searching reduces data to only the keyword being entered into the search box. For example, if one enters the term "group" in the search widget, all available views will reduce to display data containing the keyword entered. In this case, the result shows four faculty members, three of whom have "Combinatorial Group Theory" as their research area and one faculty member with research area "Group Representations" (see figure 5). When "Combinatorial Group Theory" is selected from the Research Area widget list, all the widgets and the selected view display data in relation to the research area selected (see figure 6).

When the "Combinatorial Group Theory" research area is selected, one can examine the various views and explore the data about each faculty member associated with the selected research area. Figure 7 demonstrates how the PhD granting institution map displays data associated with the three faculty members whose research area is "Combinatorial Group Theory."

A user may examine all the views and check the data about a specific faculty member. The PhD granting

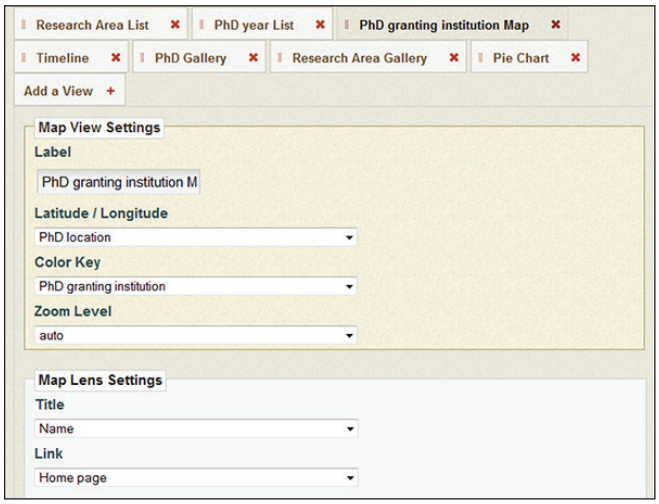

Figure 3. Map Settings

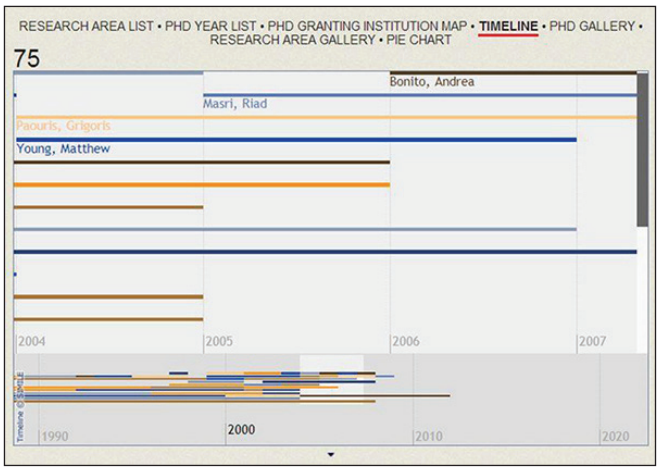

Figure 4. Timeline View: The Length of Time from When the Individual's PhD was Granted to When He/She was Hired by TAMU

institution map takes users directly to the location of the granting institution for that faculty member. If the user clicks on the pin located on the map, he can see all data about the selected faculty member displayed on that specific view. Similarly, by clicking on the timeline view, the user can see the year a specific faculty member received his PhD and the year he was hired by TAMU. The timeline view enabled the author to see differences in past and more recent hiring practices. Beginning in the year 2000, more faculty members were hired each year than in any year before. That trend continued until 2009, when the university faced budget cuts. No faculty members were hired during 2010–2011, and only one new faculty member was hired in 2012.

The pie chart view, when displaying the research area, provides a breakdown of all research areas in percentages

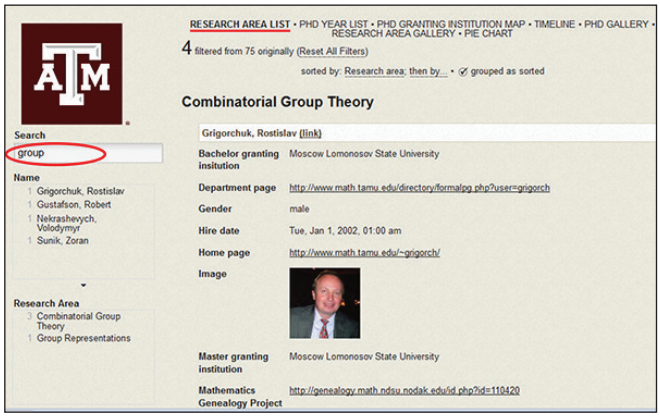

Figure 5. Keyword Searching

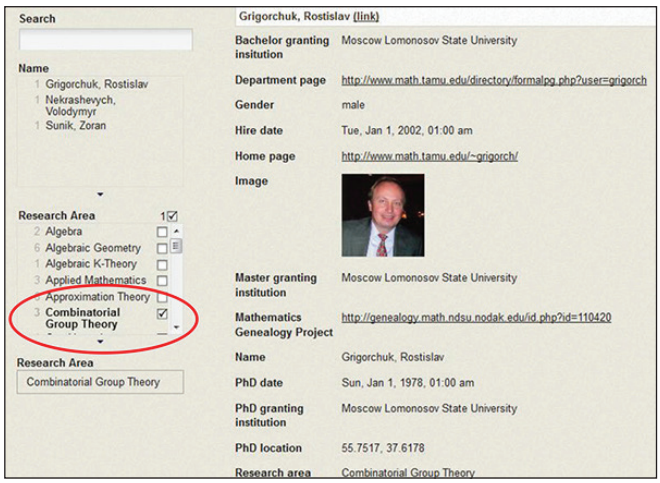

Figure 6. Selecting Research Area from othe Widget List

and number of faculty. From the pie chart view, the author discovered that the most represented research area in the Department of Mathematics at TAMU is Partial Differential Equations. Faculty members in charge of the design and content of the Department of Mathematics website were surprised to learn that Operator Theory is no longer the most prevalent area of research. This has immediate implications when recruiting graduate students and promoting the department's strengths, especially as the Viewshare tool is available for public use. Future incarnations of the Viewshare tool can be embedded in the LibGuides created by TAMU Libraries subject selectors for their liaison departments. Subject selectors noted the importance of this project for collection development as they perceive it as a useful tool in determining the research focus of academic departments.

Viewshare's pie chart view includes properties such as gender, PhD date, PhD granting institution, research area, master's granting institution, and bachelor's granting institution. When organized by gender, the pie chart shows that roughly one tenth of the faculty members are female. There are just eight female faculty members in a total of seventy-five faculty. The pie chart view clearly shows that Partial Differential Equations is the most represented research area in the TAMU Department of Mathematics.

Exporting the Data

Data can be exported from Viewshare in various formats—RDF/XML, JSON, or semantic wikitext— for reuse. The views created by this project, which display data about the Department of Mathematics, are publicly available to anyone who uses Viewshare, and any user can download the data in a format suitable to their needs. One can also generate an HTML view. When the list views are exported in HTML, they can be used to create webpages with the information available from the list view in question, stylized to each user's preference. Figure 8 represents a snapshot of the HTML view from the Research Area list view. The HTML page was generated in Adobe Dreamweaver with only minimal customization: an added background image.

Lessons Learned

The directory of faculty members was created relatively quickly by a librarian from the Cataloging Department. Sixteen hours of work was needed to collect all the data for faculty members from the Department of Mathematics. If the same rate was used per faculty member, it would take 600 hours to collect information for all faculty members on campus. If it were possible to populate Viewshare with data from the university's Research Information System office, it would shorten the time needed for this project, perhaps by two thirds. Only VIAF and the coordinates for the PhD granting institution might require particular attention. After examining the websites of multiple departments, the author discovered that not all departments publicly share the same information about their faculty members. Information about PhD granting institution and PhD date is absent in some cases, and not all departments provide individual home pages for their faculty.

Subject selectors suggested that faculty gender should be excluded from future projects as it may be perceived as a privacy issue. This concern was raised in relation to possible transgendered faculty members. Because of this and other possible privacy concerns, future projects will include an opt out/in survey so that faculty members may choose whether to share their information. Visualizing the academic community at TAMU will enable library patrons, students, faculty members, and other stakeholders to find information about the faculty as a whole, for example, insight into the

interdisciplinary work in which members of the Department of Mathematics are involved. It may be possible to visualize dual appointments.

To produce clean, interactive displays of data through the creation of various views, the data must be normalized. Simple removal of white trailing spaces, capitalization issues, and spelling mistakes were completed using OpenRefine. It was also necessary to replace the names of the institutions with the authoritative form as available in the LC NAF, and we intend to continue this practice. These two essential steps of normalizing data and using authoritative forms of names enabled us to see the patterns and trends among the faculty members from TAMU's Department of Mathematics.

As previously mentioned, we discovered that Partial Differential Equations is now the most prevalent primary research area. According to the faculty members that reviewed the Viewshare representation of data about the Department of Mathematics, Operator Theory was previously the most prevalent research area. Analysis of the data reveals that, as new faculty members were hired and others retired, the main research area for the department shifted. However, the reason for this perceived change may be because only the primary research area for each faculty member was collected instead of all research areas. This was a limitation of the project and it will be addressed in the future. A future project will include as many research areas as each faculty member shares through a survey or as many as are provided in the university's Research Information System.

GeoNames will be used from the beginning of the future large-scale project as we discovered that not all values of corporate names for PhD granting institutions are augmented through the Viewshare platform. The margin of error is not significant, as 81 percent of the PhD granting institutions had their location values augmented correctly, but it is desirable to have all the location values in the data set. Faculty members from the Department of Mathematics received their PhD degrees from institutions located either in North America or Europe (see figure 9).

Additionally, we discovered that almost half of the faculty members lacked Name Authority Records (NARs). As a NACO participant, TAMU Libraries has the capacity to create the remaining NARs. For nonmonographic publications, online research IDs will be essential for linking out to faculty publications. One solution is to use ORCID. If members of the Department of Mathematics had registered for ORCIDs, the Viewshare views would have been more complete. It is a goal going forward to establish ORCIDs for all TAMU faculty members.

In this pilot project, only one of the few existing URI-based vocabularies and ontologies was incorporated and used, VIAF. LCSH, Lexvo (URI referenced controlled list of characters, words, terms), DBpedia, and GeoNames

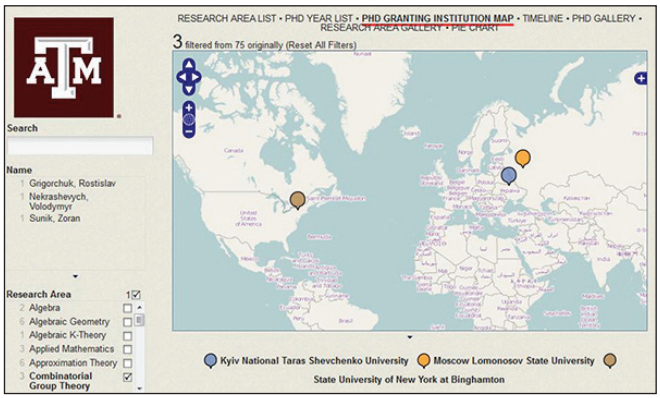

Figure 7. PhD Map View for Faculty Members with Research Area "Combinatorial Group Theory"

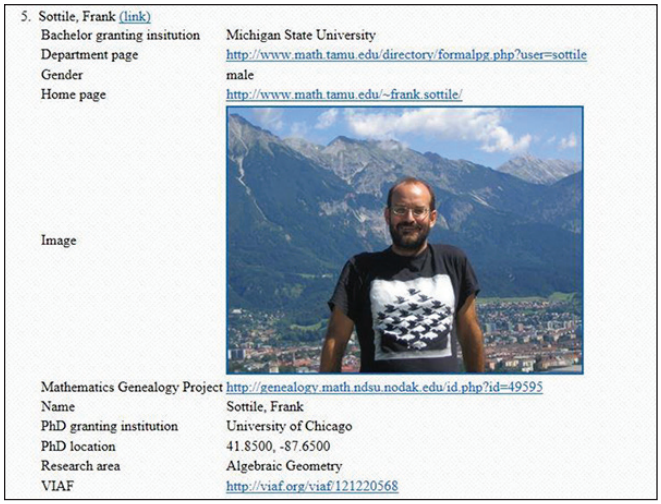

Figure 8. Generated HTML View of Research Area List: Algebraic Geometry (6)

are being considered as potential additions for future development. LCSH was consulted when normalizing the research areas represented within the faculty members of the Department of Mathematics.

Future Large-Scale Project

Creating dynamic, interactive views of data describing Department of Mathematics faculty members was the first step towards a large-scale project that will create data visualizations for all TAMU academic departments. A team was identified to work on the large-scale project. As each department is unique and has its own specialties, we are aware that visual representation will pose new issues and research questions, yet we also anticipate that new departmental strengths will be discovered. The goal of the large-scale

Figure 9. PhD Granting Institutions for Faculty Members from TAMU

project is to expose hidden possible relationships between faculty members from different departments and facilitate collaboration and connection. Enabling researchers to find possible collaborators from different departments will create a stronger institution with increased opportunities for competitive national grants. Having one department represented in the pilot project did not provide an opportunity to see the relationships between departments. The relationships of these faculty members formed through their involvement in various interdisciplinary institutions that exist on TAMU's campus is also not apparent. As Borgman concludes, the boundaries are blurring between the sciences and the humanities. This blurring urgently calls for outreach and organization.[26] At TAMU, the libraries are responding by creating tools and methods to bring various researchers from our institution together, creating possible ground for new research.

The Dean of the TAMU Libraries and his management team have expressed interest in promoting the project to the university, and we expect full support from university administrators to further pursue this project. Installing a visualization platform that will provide for discoverability of faculty research output is our priority. To gain full support of the university administration, the software must be installed on our servers to provide for easy customization since Viewshare's web application does not support full customization. Deciding which platform to use depends on the university administration's support since the plan is to include data from external sources, such as the registrar's office, the Vice President for Research's office (VPR), the Dean of Faculties' office, the Research Information System office, and the human resources office. To provide access to data from those external sources, the project needs a platform with the capability to harvest external data. We are currently experimenting with VIVO on a test server and have previously experimented with BibApp.

In the summer of 2013, this prototype included all TAMU faculty. When this project concludes, we will have contributed to the enhancement of the University's brand profile and impacted the development of research for the University, individual researchers, and research groups. This initiative also provides a rich, internal discovery mechanism for faculty, current and future, plus graduate students and the general public. It will enable researchers, administrators, and students to obtain a meaningful snapshot of a given investigator's productivity and reach. Perhaps most useful, data collected for the Viewshare project can be easily ingested in different open source platforms, such as VIVO, based on linked data principles and reused for purposes not even considered by the author.

Conclusion

This paper describes how all aspects of this experimental project, including the role played by the university's library professionals, could empower users to effectively find and use online primary resources about faculty members. The initial Viewshare project created interest in further development by both library and university administrators, who are now willing to invest computing resources and manpower toward expanding it.

Developing this Semantic Web–based service for collecting research data highlights the importance of reusing and exposing research data that resides in university websites and databases. Visualization of university research strengths, research outputs, collaborative relationships, and other characteristics of the campus research environment were presented. Siloed research content across the university should be discoverable through the aggregation of data from a range of scattered university systems, and the libraries can take the lead in these tasks as experts in constructing controlled vocabularies, personal name authorities, and corporate name authorities. The changing face of the research environment in the university system should not be ignored by libraries; we must respond and adapt to the changing landscape.

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Book Reviews

Elyssa M. Gould

Fundamentals of Collection Development and Management. 3rd ed. By Peggy Johnson. Chicago: ALA, 2014. 472 p. $75 softbound (ISBN: 978-0-8389-1191-4).

Peggy Johnson has updated her comprehensive text, *Fundamentals of Collection Development and Management*, for its 3rd edition. Fundamentals is intended as "a comprehensive introduction to the topic for students, a primer for experienced librarians with new collection development and management responsibilities, and a handy reference resource for practitioners as they go about their day-to day work" (ix). The breadth and depth of information Johnson provided is impressive in its coverage, and any reader in her intended audience will glean something relevant and informative from this text. Comprehensive, yet surprisingly easy to read, Johnson's text is written in a straightforward, informative style and organized into clear chapters and subsections that enable a reader to dip in and out of the text.

The structure of this edition is familiar to readers of earlier versions. It starts with a brief overview of the history and development of collection building as a specialty in the profession, then moves through well-ordered chapters reflecting key elements in collections work, including staffing models, budgets, policies, developing and managing collections, marketing and outreach, collections analysis, cooperative collection building, and scholarly communication. The chapter on scholarly communication has been expanded from the previous edition to acknowledge this ever-shifting environment and the growing roles libraries and librarians serve therein. Each chapter is rounded out with a case study, references, and supplemental reading suggestions. The supplemental reading lists have been comprehensively updated for this new edition and contain no sources published prior to 2008.

In the first edition of her text, published in 2004, Johnson dedicated a chapter to e-resources. Now ten years later, e-resources are of course an integral part of any collection, and Johnson reflects this shift by integrating e-resources throughout her book. This approach certainly makes sense but in some instances results in a level of brevity that doesn't align with the work's comprehensive nature. In particular I found the light treatment of evaluative criteria surrounding e-resource purchasing to be concerning. The author does provide a list of additional criteria to consider in a selection decision such as provider business model or licensing and contractual terms, but I fear this is far too brief to be of value for a novice in this field. Expansion on what these criteria may look like in real life and how to fully consider them in the selection decision process would be a significant enhancement.

As she discusses in the preface to this new edition, collection management is "being reshaped by technology and the ubiquity of the Internet," (ix) and the author states that her aim is to reflect this changing environment with updated and relevant examples, data, and reading lists. While the author certainly exhibits a clear knowledge of current trends and directions, I was disappointed that there was not more discussion of the potential impact of this reshaping. The author describes practices such as patron driven acquisition and macro-level selection, but there is no follow up on how these developments may lead to a questioning of the value of detailed collections work. Examples of libraries that have fully embraced these methods, and the impact they have or have not had on staff roles, would serve to better illustrate the landscape for new collections librarians.

A recurring criticism of the two previous editions was that Johnson focuses on large academic libraries with peripheral coverage of issues relating to collection building in public, special, and school libraries.[1] As a reviewer with a background solely in academic libraries, it is hard for me to fully judge whether these criticisms can be fairly levelled at this edition. The author has packed her book full with examples and references from the literature to provide the reader with avenues for further investigation and learning. These examples and references may inherently lead to a skew in coverage because the literature is heavily weighted in discussion of collection building in academic libraries. The case studies at the end of each chapter, however, cover a range of scenarios in different library environments, and the appendices, which list useful professional development resources, selection aids, and sample collection development policies, all seem to cover the broad spectrum of library types. These added resources indicate that the author is striving to make her text applicable to collections librarians across all library environments.

Overall, I would highly recommend this book to anyone in the author's intended audience. The readers most likely to derive benefit are LIS students, as this book could well serve as an authoritative textbook. The case studies of real-world examples are an excellent resource for collections librarians. The author herself acknowledges that collection development and management "is both an art and a science. It results from a combination of knowledge, experience and

intuition," (138) which means it cannot be learned without hands-on practice. But this text offers a comprehensive introduction to put any new collections librarian on the right path.—*Annette Day (annette.day@unlv.edu), University of Nevada, Las Vegas*

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Are Libraries Obsolete? An Argument for Relevance in the Digital Age. By Mark Y. Herring. Jefferson, NC: McFarland, 2014. 258 p. $25 softcover (ISBN: 978-0-7864-7356-4).

In 2001, a legislator told Mark Herring "everything was on the Internet, so why did our students need a new, big library building?" (7). Herring responded by publishing a brief and highly popular list, "10 Reasons Why the Internet is No Substitute for a Library."[1] Six years later, Herring transformed that list into a book, *Fool's Gold: Why the Internet is No Substitute for a Library* (McFarland 2007). Both the list and book outline in passionate detail Herring's view that the Internet's many flaws make it inferior to the library. "Not everything is on the Internet" writes Herring, and "quality control doesn't exist. . . . The Internet is ubiquitous but books are portable."[2] His latest book, *Are Libraries Obsolete? An Argument for Relevance in the Digital Age*, revisits points made in his earlier works. Thirteen years after Herring's original list was published, has the Internet made the library obsolete? Herring says no.

Are Libraries Obsolete is divided into three parts. The first part returns to Herring's 2001 list, updating each of his ten points. Part two outlines four areas that Herring believes have been made worse by the Internet: reading, literacy, privacy, and piracy. Part three describes the current state of the library and provides two possible scenarios for the future: one positive and one much more dismal.

Most of the book is devoted to part 1, which begins with the chapter "Everything Is Still Not on the Internet." This sets the tone for the rest of the book. Everything is still the way it was in 2001, according to Herring. The Internet is still too large and complicated for the average user to navigate. There is still no quality control. Some information found on the web might be misleading or incorrect. The average user, making their way through this bramble without the help of a librarian, is likely to stumble upon misinformation or distractions. They might sacrifice their right to privacy. Their eyes will hurt from staring at a screen for too long. They might find pornography. Herring paints the Internet as a dangerous place and tries to convince his readers that they would be much safer and more comfortable sticking to the familiar and trusted stacks of their libraries.

This is very much the same argument Herring made in his "10 Reasons" in 2001, a perspective that now appears dated. In part three, he describes what he sees as new challenges to the library. We are faced with staff who are unwilling to change and unable to keep up with technology. Our patrons are moving online, as are our collections, and our spaces and buildings are becoming "less about books and much more about social gathering places" (183). As for funding and politics, Herring writes that "libraries have for too long been the financial black holes at institutions, costing small and large fortunes, but not creating much in the form of a revenue stream" (182). Herring also sees a political climate that is turning against us. Disappointed with our lack of revenue, politicians are eliminating funding for public and academic libraries. For this, he blames librarians themselves. He urges us to "remain politically neutral" (208), so as not to anger our political leaders. "Ideas have consequences," he writes, "and if we carve out a niche that is strongly opposed to ruling parties, we have only ourselves to blame when those parties are in power" (208).

Overall, the book lacks focus and is written with the defensive tone of someone who perhaps worries that he is becoming obsolete. Herring refers to his age so often, and speaks so disparagingly of those younger than he, it becomes a distraction to his main points. He writes, "those who are under thirty will laugh at this and say this is only a function of my age" (27). His statistics are seemingly lifted from thin air, without citation. "In fact," he claims, "*libraries* account for almost 35 percent of all Internet access outside the home" (28). Throughout the book, he fixates on the amount of pornography available on the Internet. "The web," according to Herring, "is rich and deep, but also vulgar and rude" (115). His tone is riddled with sexist microaggression. "*YouTube* videos of young men acting the fool, or worse, young girls imitating what they think might be appealing at some level to someone, crowd the Internet" (49). A bit later he writes, "A founding principle of Americanism is abundance, or so it would seem. If one is good, one hundred is better. We apply this to almost everything: cars, boats, guns, dollars, Starbucks, wine, women . . ." (67).

With public and academic libraries across the country losing funding and often closing their doors, it is important to argue for relevance in the digital age. Herring may not be the right person to fight this fight. It would be more useful to offer a book on the use of technology to improve library services rather than one about a man disappointed with the way the world has changed around him. Issues of concern to librarians, such as net neutrality and its impact on the library, would have been a good addition to this book, but

Herring does not address it. Those who agree with Herring might find his meanderings amusing. Anyone who enjoyed his first book might also find value in *Are Libraries Obsolete*, as it reiterates many of the same points.—*Melissa De Fino (mdefino@rulmail.rutgers.edu), Rutgers University, New Brunswick, New Jersey*

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Floating Collections: A Collection Development Model for Long-Term Success. By Wendy K. Bartlett. Santa Barbara, CA: Libraries Unlimited, 2014. 128 p. $55 paperback (ISBN: 978-1-59884-743-7).

In these uncertain economic times, library administrators are often faced with tough budget decisions. They are encouraged to "think outside the box" for creative strategies to help cut costs while not diminishing services to library patrons. Wendy Bartlett's *Floating Collections: A Collection Development Model for Long-Term Success* offers one such creative and thought-provoking strategy, particularly for public library systems. Bartlett defines a floating collection as "a system-wide collection wherein there is no owning branch designation" (xiii). She explains the history of floating collections and suggests floating as a cost-cutting measure for libraries facing budget challenges. Savings from floating accrue from the lack of expenses to process, ship, and reroute books and media back to their home branch. Moreover, shelving can be done promptly, and patrons are satisfied as material is available more quickly and not perpetually in transit. To help libraries decide whether floating is right for them, Bartlett offers the "Library Float Evaluation" checklist, which a library would complete only after reading about the advantages and disadvantages of floating. Bartlett has experienced these issues; she writes with a clear desire to make it easy for the next group of libraries to make informed decisions whether or not to float their collections.

Rather than a manifesto on the merits of floating, this book is written to illuminate the variables to be considered within a library system and to reinforce the concomitant need for good communications at all levels. Bartlett offers guidance about communicating with staff prior to implementing a floating collection. She encourages visits to library branches so staff understand what a floating collection will mean for their workflows. She discusses new and positive workflows for shelving, weeding, and running library system reports. Bartlett encourages teamwork, communication, and an open mind so that floating produces less surprise and more positive results for patrons and staff alike.

There is plenty in this book to interest collection development librarians. Floating may be easy to do from the library system point of view, but it changes the approach to purchasing for individual branch collections. She encourages collection development librarians to visit their branches and observe library workflows firsthand. Although Bartlett suggests that collection development librarians weed before floating begins to avoid creating imbalances in collection size across branches, a good portion of the book deals with resulting imbalances that may occur from floating.

Floating Collections includes helpful scenarios, charts, and worksheets spread throughout the book and gathered in the appendices. There is also a list of libraries organized by state that have moved to floating, useful for consulting with libraries of comparable type and size.

Bartlett has written the guide on how to float and live to tell the tale. She provides ample guidance for answering staff questions and helping libraries determine whether floating would be a positive initiative financially and for patron service. I recommend this book for large public libraries as well as academic libraries to whom floating appeals.—*Amy Lewontin (a.lewontin@neu.edu), Northeastern University, Boston, Massachusetts*

Rethinking Collection Development and Management. Eds. Becky Albitz, Christine Avery, and Diane Zabel. Santa Barbara, CA: Libraries Unlimited, 2014. 402 p. $60 softcover (ISBN: 978-1-61069-305-9); e-book (ISBN: 978-1-61069-306-6).

Rethinking Collection Development and Management is an anthology of essays authored by professionals active in the field, broadly conceived. The treatment of each topic is highly contemporary and carries with it the distinct perspective of personal experience. This pronounced subjectivity distinguishes this volume from more directly instructive texts such as Peggy Johnson's *Fundamentals of Collection Development and Management*, 3rd ed. (ALA Editions, 2014). Indeed, the publisher recommends the volume as a supplement to its more traditional textbook counterparts.[1] Taken as a whole the volume seeks to situate contemporary collection development and management as a field evolving in many directions at once.

The volume is divided into four parts, beginning with "Selection and Assessment." This section opens with a chapter aptly titled "Forces Shaping Scholarly Publishing," written by Robert Boissy. The chapter serves to position the twin topics of selection and assessment within the dramatically shifting landscape of scholarly publishing. Following is a chapter by Mark Sandler, which problematizes the historical practice of collecting and collection management. Sandler strongly states that large research libraries function, or attempt to function, under the tyranny of an outmoded specter of assessment, which conflate collection size with

depth and comprehensiveness. The book then moves from this long view to drill down to a discussion of process, with chapters covering subscription databases, weeding in academic and public libraries, as well as trends in MLIS course requirements.

Part two, "Acquisitions," explores specific trends in the acquisition of both print and digital material. It surveys the current acquisitions landscape by first describing the tectonic shift of the "big deal" that continues to impact the focus and buying power of academic libraries. In "The Big Deal and the Future of Journal Licensing in Academic Libraries," Jeffrey Carroll provides a lens through which the reader might better understand the direct impact of large-scale decision making on individual processes we take for granted. The following chapter, "Collection Development between Teaching Mission and Resource Management: The Case of Carleton College," serves to reinforce that, in the implementation of the library's mission, scale is everything. Coauthored by Victoria Morse and Kathy Tezla, the chapter discusses the high level of teaching faculty responsibility for materials selection made within this small private institution. Other highlights of part two include James LaRue's examination of the potential role of self-publishing in the public library, as well as chapters on lease services in public and academic libraries by Kathleen Sullivan and Anne Behler, respectively.

Part three, "Access, Cooperative Efforts, Shared Collections," discusses the current innovative ways libraries have sought to maintain access with the competing concerns of space and budget. In the opening chapter, "Cataloging for Collection Management," Linda Musser and Christopher Walker argue for increased awareness and collaboration in metadata creation across library staff, especially as cataloging departments thin and purchase of shelf-ready materials becomes more prominent. This approach becomes particularly relevant when considering a subsequent chapter, "Rethinking Access to Collections in the Discovery Age" by Jody Condit Fagan and Meris Mandernach, which describes the reliance on metadata for discoverability within these increasingly facile systems. This treatment of access through discovery makes way for a discussion of access through consortial agreements, shared print initiatives, and floating collections. Together these chapters illustrate how traditional sharing by branch or interlibrary loan has evolved to effectively increase a library's purchasing power by changing the vision, and practical definition, of "ownership." The chapter by Karen Greever illustrates how an institution might implement multiple strategies at once. "Floating Collections: Perspectives from an Academic Library" describes how Kenyon College and Denison University, members of the Five Colleges of Ohio Consortia as well as OhioLINK, developed a floating collection. Greever details the impact floating has had on collection management between the two schools.

Part four, "Preservation and Special Collections," receives the briefest treatment and seems to focus primarily on academic libraries. The topics, however, are given thoughtful treatment. "Thinking About Collection Development in Special Collections" by Stephen Galbraith is an introductory yet thorough discussion of the unique considerations brought to special collections material. Galbraith focuses on the goal of keeping stand-alone special collections viable as libraries continue to balance print and digital materials. Susanne Kellerman's chapter, "Digitization Projects," takes the reader though the logical steps of a digitization workflow, making straightforward that which the layman might find overwhelming. The volume closes with a discussion on digital and print preservation by Jacob Nadal. Using the FRBR hierarchy as a framework, Nadal asks the reader to consider the ambiguities in defining what we seek to preserve. Nadal argues for complementary roles for print and digital preservation in which adequate access to, and comprehensive preservation of, the work is achieved by strategically maintaining multiple manifestations in a collaborative environment.

Rethinking Collection Development and Management seeks to cover a lot of ground, and the chapters range from editorial to prescriptive in tone. The unifying thread, however, is the described subjective experiences. Indeed, as an anthology this is not unusual, and the stand-alone quality of each chapter lends the text the supplementary facility advertised. While articles of comparable tone and quality are frequently published in the professional literature, this volume juxtaposes the perspective of the public librarian alongside that of the academic and that of one working in a large research university alongside the small liberal arts college. In this way the reader is given the opportunity to rethink, as it were, his or her own experience of collection development and management in the larger context of an evolving field.—*Miriam Nelson (nelsonm1@ohio.edu), Ohio University, Athens, Ohio*

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1. See the description section of the book's page in the ABC-CLIO online store. "Rethinking Collection Development and Management," ABC-CLIO, accessed June 8, 2014, www.abc-clio.com/product.aspx?id=2147554320.

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