Library Resources & Technical Services

ISSN 2159-9610
April 2020
Volume 64, No. 2

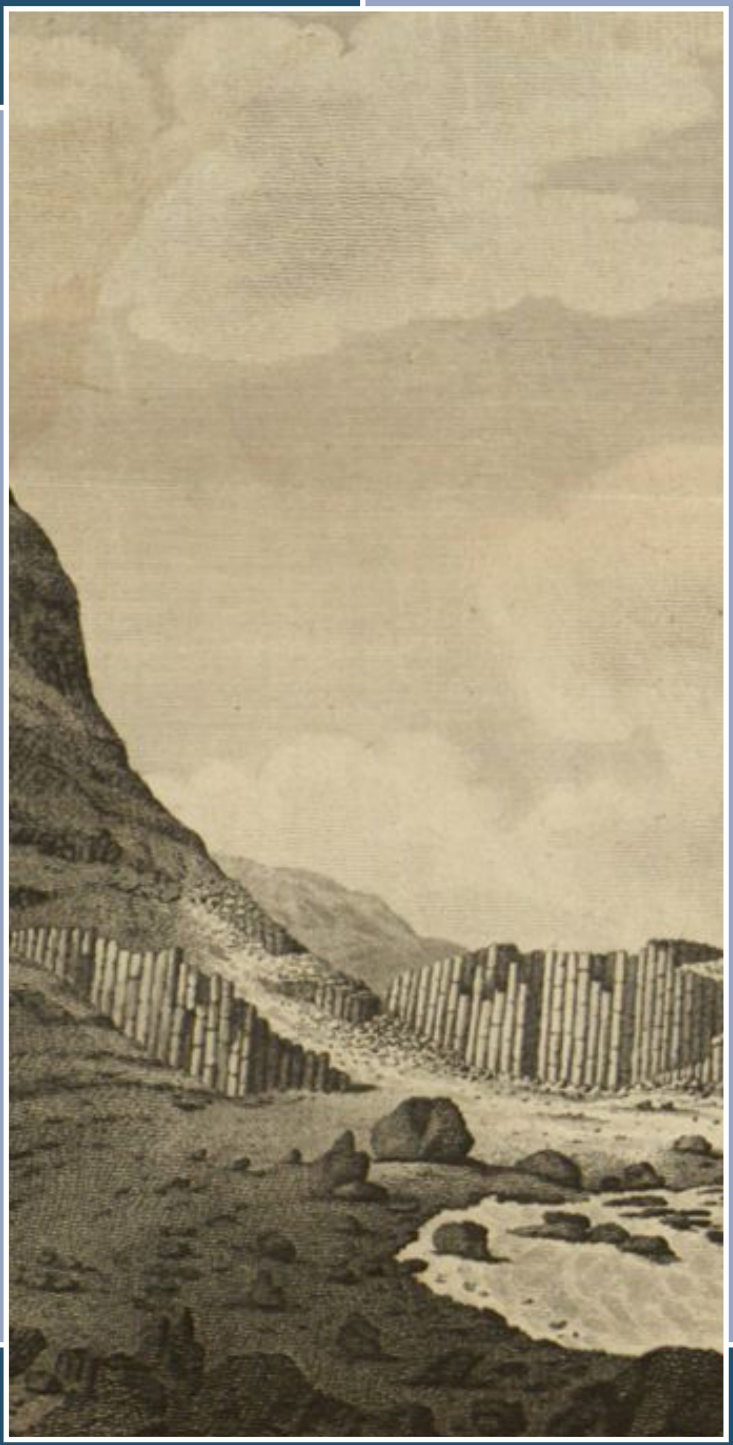
Genre/Form Access in Library Catalogs: A Survey on the Current State of LCGFT Usage
Colin Bitter and Yuji Tosaka

Comparison of Key Entities Within Bibliographic Conceptual Models and Implementations: Their Definitions, Evolution and Relationships
Michele Seikel and Thomas Steele

NOTES ON OPERATIONS

Making a Case for User Experience Research to Drive Technical Services Priorities
Emma Cross and Shelley Gullikson

Database Discovery: From a Migration Project to a Content Strategy
Sandra Wong



ALCTS
Association for Library Collections & Technical Services

OJS Is the New Host of *LRTS*

http://journals.ala.org/lrts

Library Resources & Technical Services (*LRTS*), which went completely online in January 2015, is now available at http://journals.ala.org/lrts on the Open Journal Systems (OJS) platform hosted by the American Library Association (ALA) and is updated and maintained internally by in-house production staff. Content is no longer available on the Metapress site.

ACCESSING YOUR CONTENT

Every *LRTS* user (members and subscribers are both considered *LRTS* users) can log in to journals.ala.org/lrts using the same credentials used for other ALA websites, including www.ala.org, ALA conference registration, and ALA Connect.

Be sure to visit http://journals.ala.org to enjoy other ALA digital journals and newsletters, including the *Journal of Intellectual Freedom and Privacy*, *Library Technology Reports*, *Reference & User Services Quarterly*, and the *Smart Libraries Newsletter*.

For Technical Questions and Support

Please contact journals@ala.org.

Membership or Subscription Questions

To receive free access to *LRTS*, join ALA and ALCTS by visiting www.ala.org/membership/joinala or call ALA's Member and Customer Service (MACS) department at 1-800-545-2433 and press 5. Contact MACS with membership questions, too.

To subscribe to *LRTS* or to ask questions about your existing subscription, email subscriptions@ala.org or call ALA's MACS department at 1-800-545-2433 and press 5.

If you have any general questions about *LRTS*, please contact Brooke Morris-Chott (bmorris@ala.org) in the ALCTS Office.

Library Resources & Technical Services, https://journals.ala.org/lrts (ISSN 2159-9610) is published quarterly by the American Library Association, 50 E. Huron St., Chicago, IL 60611. It is the official publication of the Association for Library Collections & Technical Services, a division of the American Library Association, and provided as a benefit to members. Subscription price to nonmembers is $100. Individual articles can be purchased for $15. Business Manager: Kerry Ward, Interim Executive Director, Association for Library Collections & Technical Services, a division of the American Library Association. Submit manuscripts using the online system at https://journals.ala.org/index.php/lrts/login. Mary Beth Weber, Editor, *Library Resources & Technical Services*; mbfecko@rulmail.rutgers.edu. Advertising: ALCTS, 50 E. Huron St., Chicago, IL 60611; 312-280-5038; fax: 312-280-5033; alcts@ala.org. ALA Production Services: Tim Clifford, Chris Keech, and Lauren Ehle. Members may update contact information online by logging in to the ALA website (http://www.ala.org) or by contacting the ALA Member and Customer Services Department—*Library Resources & Technical Services*, 50 E. Huron St., Chicago, IL 60611; 1-800-545-2433. Nonmember subscribers: Subscriptions, orders, changes of address, and inquiries should be sent to *Library Resources & Technical Services*, Subscription Department, American Library Association, 50 E. Huron St., Chicago, IL 60611; 1-800-545-2433; fax: 312-944-2641; subscriptions@ala.org.

Library Resources & Technical Services is indexed in Library Literature, Library & Information Science Abstracts, Current Index to Journals in Education, Science Citation Index, and Information Science Abstracts. Contents are listed in CALL (Current American—Library Literature). Its reviews are included in Book Review Digest, Book Review Index, and Review of Reviews.

Instructions for authors appear on the *Library Resources & Technical Services* webpage at http://www.ala.org/alcts/resources/lrts. Copies of books for review should be addressed to Elyssa M. Gould, University of Tennessee Libraries, 1015 Volunteer Boulevard, Knoxville, TN 37996-1000; lrtsbookreviews@lists.ala.org.

© 2020 American Library Association

All materials in this journal are subject to copyright by the American Library Association and may be photocopied for the noncommercial purpose of scientific or educational advancement granted by Sections 107 and 108 of the Copyright Revision Act of 1976. For other reprinting, photocopying, or translating, address requests to the ALA Office of Rights and Permissions, 50 E. Huron St., Chicago, IL 60611.

Publication in *Library Resources & Technical Services* does not imply official endorsement by the Association for Library Collections & Technical Services nor by ALA, and the assumption of editorial responsibility is not to be construed as endorsement of the opinions expressed by the editor or individual contributors.

LRTS was available in print (ISSN 0024-2527) from 1957 through 2014. Single print issues from volume 38 through volume 58 can be purchased for $30 each. Contact alcts@ala.org with purchase requests.

Visit *LRTS* online at https://journals.ala.org/lrts.

For current news and reports on ALCTS activities, see the *ALCTS News* at http://www.ala.org/alctsnews.

Library Resources & Technical Services

ISSN 2159-9610 **April 2020** **Volume 64, No. 2**

Editorial **42**
Mary Beth Weber

FEATURES

Genre/Form Access in Library Catalogs **44**
A Survey on the Current State of LCGFT Usage
Colin Bitter and Yuji Tosaka

Comparison of Key Entities Within Bibliographic Conceptual Models and Implementations **62**
Their Definitions, Evolution and Relationships
Michele Seikel and Thomas Steele

NOTES ON OPERATIONS

Database Discovery **72**
From a Migration Project to a Content Strategy
Sandra Wong

Making a Case for User Experience Research to Drive Technical Services Priorities **89**
Emma Cross and Shelley Gullikson

Book Review **99**
Elyssa M. Gould

Cover image: Giants' Causeway (Northern Ireland), Digital Library@Villnova University, 2014.

EDITORIAL BOARD

Editor and Chair
Mary Beth Weber, *Rutgers University*

Members

Brenna Campbell, *Princeton University*

Jeehyun Davis, *Villanova University*

Christine Korytnyk Dulaney, *Library of Congress*

George E. Gottschalk, *University of Illinois, Urbana-Champaign*

Tina Gross, *St. Cloud State University*

Gretchen L. Hoffman, *Texas Woman's University*

Violeta Ilik, *Stony Brook University*

Jennifer A. Maddox Abbot, *University of Illinois at Urbana-Champaign*

Margaret Mering, *University of Nebraska–Lincoln*

Jane Monson, *University of Northern Colorado*

Heylicken (Hayley) Moreno, *OCLC*

Valentine K. Muyumba, *Indiana State University*

Kavita Mundle, *University of Illinois at Chicago*

L. Angie Ohler, *University of Maryland, College Park*

Thomas Teper, *University of Illinois at Urbana-Champaign*

Jennifer B. Young, *Northwestern University Libraries*

Ex-Officio Members

Elyssa M. Gould, *University of Tennessee, Knoxville*
LRTS Book Review Editor

Chelcie Rowell, *Tufts University*
Editor, *ALCTS News*

Kerry Ward, Interim Executive Director, ALCTS

Brooke Morris-Chott, Program Officer, Communications, ALCTS

Julie Reese, Deputy Director, ALCTS

Kalan Knudson Davis, Intern, University of Minnesota

Editorial

I have two important pieces of news to share. The first is that my term as the *Library Resources and Technical Services* (*LRTS*) Editor ends next year. I will chair my last *LRTS* Editorial Board meeting at the American Library Association Annual Conference in Chicago in June 2021. A search committee will be formed and will look for the next *LRTS* Editor. My term officially ends in December 2021 so that there will be overlap between the new editor and me. This will enable a smooth transition between editors, and I will mentor the new editor. If you are interested in serving as the *LRTS* Editor, please apply. Or if you know someone who is interested, nominate that person (I was nominated). It is a rewarding experience and I have worked with many amazing people during my years as the *LRTS* Editor. I am grateful to have been given the opportunity. I am considering my next steps after my term has concluded.

The other item of business that I am excited to share is that ALCTS is partnering with LITA and LLAMA to organize the Exchange, a three-day virtual conference. You may remember that ALCTS first organized the Exchange in 2017. The 2020 Exchange draws on the combined strengths of the three divisions, and the theme is "Building the Future Together." The Exchange will take place May 4, 6, and 8, 2020, with Emily Drabinski and Rebekkah Smith Aldrich serving as keynote speakers. The conference program will focus on leadership, change management, continuity, sustainability, and collaboration, and will include presentations, virtual posters sessions, and lightning rounds. Those who register will have access to live presentations, and the content from the conference will be available to them for a year. Visit https://exchange2020.learningtimesevents.org/ for more information. The Exchange also has a blog (https://exchange2020.learningtimesevents.org/exchange-2020-blog-posts/), which includes an interview with the presidents of ALCTS, LITA, and LLAMA and an excellent post about the virtual poster sessions. The Exchange is an outstanding conference that you will not want to miss.

I close with an overview of the contents of this issue of *LRTS*:

- "Genre/Form Access in Library Catalogs: a Survey on the Current State of LCGFT Usage," by Colin Bitter and Yuji Tosaka, details the analysis of a survey on the current state of usage and policies regarding Library of Congress Genre and Form Terms.
- In their paper "Comparison of Key Entities Within Bibliographic Conceptual Models and Implementations: Their Definitions, Evolution and Relationships," Michele Seikel and Thomas Steele discuss FRBR, FRAD, FRSAD, LRM (IFLA Library Reference Model) plus the RDA Toolkit and BIBFRAME. They compare the models and descriptive standards, and examine and analyze the differences among the entities, their definitions, and properties.
- Sandra Wong's paper "Database Discovery: From a Migration Project to a Content Strategy" discusses the CUFTS ERM developed at Simon Fraser University and decisions the library made with an impending migration to Ex Libris' Alma and Primo for its integrated library system and discovery layer.

- "User Experience for Technical Services (UXTS)," describes an observational study conducted by Emma Cross and Shelley Gullikson. They provide a technical services perspective on user experience (UX) research into student searching behaviors.
- Book reviews courtesy of my colleague Elyssa Gould, *LRTS* Book Review Editor.

Genre/Form Access in Library Catalogs

A Survey on the Current State of LCGFT Usage

Colin Bitter and Yuji Tosaka

This study provides analysis of a large online survey that was distributed to the cataloging community in 2018. The survey aimed to answer a number of important research questions to gain a general sense of the current state of Library of Congress Genre/Form Terms (LCGFT) usage. Findings include an overall broad acceptance of LCGFT, suggesting that the LCGFT project has been successfully embraced as a new controlled vocabulary; however, the adoption of the vocabulary remains uneven, especially between different types of institutions and different areas of the LCGFT vocabulary. Additionally, training points to a much-needed area for improvement as the survey found that the vast majority of non-users of LCGFT had never received vocabulary training. Survey results also suggest that retrospective LCGFT application, particularly using automated means, presents forthcoming challenges for librarians and library IT staff. Despite these limitations and challenges, survey results make it clear that LCGFT has become a widely accepted part of the bibliographic universe that helps to make genre and form information explicitly accessible to library users.

In 2007, the Library of Congress (LC) embarked on a multi-year effort to develop the Library of Congress Genre/Form Terms for Library and Archival Materials (LCGFT). The project's principal aim was to generate a unified vocabulary of terms for the purpose of describing what a resource is rather than what it is about. During the first year of LCGFT, the only available terms were for moving image genre/forms; since then, the project has expanded significantly to include a variety of vocabulary areas, including artistic and visual works, cartographic materials, "general" materials, law materials, literature, music, nonmusical sound recordings, and religious materials.[1] As of this writing, there are over 2,000 authorized LCGFT headings.

Approximately one decade after the project's inception, in 2018, there were 7.02 million LCGFT headings recorded in MARC field 655 in WorldCat.[2] In light of the significant number of LCGFT headings found in the OCLC database, it is not unreasonable to suggest that the project has been widely accepted within the cataloging community, at least among OCLC member libraries. Indeed, the closest English language competitors were the Art & Architecture Thesaurus, at 2.43 million, and the Guidelines on Subject Access to Individual Works of Fiction, Drama, Etc., at 1.88 million, both thesauri conceived long before LCGFT.[3] Although the seven million LCGFT headings in MARC field 655 suggest high use within WorldCat, many questions remain as to the state of LCGFT within the cataloging community some ten years after the first set of terms became

Colin Bitter (bitterc1@tcnj.edu) is Head of Cataloging and Metadata at The College of New Jersey. **Yuji Tosaka** (tosaka@tcnj.edu) is a Cataloging/Metadata Librarian at The College of New Jersey.

Manuscript submitted January 10, 2020; returned to authors for minor revisions February 19, 2020; revised manuscript submitted February 21, 2020; accepted for publication February 23, 2020.

available. What is the current state of LCGFT implementation across the library community? What are the reasons for libraries using or not using LCGFT in their local catalogs? What are the prevailing perceptions of the relationships between LCGFT and LCSH, and what challenges have libraries faced when it comes to retrospective application?

The purpose of this paper is to provide analysis of an online survey developed by the authors with an eye toward identifying the current state of the field with regard to LCGFT. In the first study of its kind, the current paper makes significant contributions to the field, not least by providing relevant findings for a number of constituent groups within the library community. For catalogers and other technical services librarians, the study presents a broad overview of current practices and perceptions of LCGFT across peer institutions or other types of libraries. For those closely involved in setting cataloging policies, the study provides much-needed national data as to the perceived strengths and weaknesses of LCGFT plus its distribution and usage patterns. Lastly, for library administrators, the study illustrates areas of potential programming, staff support, and professional development that might be needed to allow the library community to better harness the potential of genre/form terms for improved resource discovery.

Historical Background and the Current State of the Literature

While LCSH has been traditionally assigned to describe the content of the work (aboutness), bringing out form and genre aspects of the work has been an important part of traditional cataloging practice for generations.[4] Even within LCSH, some types of resources, including compilations and music materials, had genre and form terms assigned either as main headings or subdivisions. More recently, this practice was formally identified separately as form subdivisions in LCSH in 1999, coded in MARC field 650 subfield $v.[5] Additionally, LC had announced its intention to develop separate genre/form headings in the mid-1990s. It was not until 2007, however, that LC initiated a comprehensive effort to fulfill this promise and start to develop the current LCGFT thesaurus.[6] Ostrove had noted years earlier that a project of this potential magnitude and impact across multiple disciplines would need to be coordinated between LC and the library community at large.[7] Indeed, since the LCGFT project has been broad and multi-disciplinary in scope, collaboration has become the rule rather than the exception in the development of the vocabulary, as policy specialists in LC formally collaborated with other outside organizations like the American Library Association (ALA), the American Association of Law Libraries, and the Music Library Association.[8]

Beyond cataloging practice, genre/form access has been addressed sporadically in the cataloging literature, although the topic has seen some increasing attention over time, as reflected in the development of a separate LCGFT thesaurus. This literature is expertly documented by Lee and Zhang's 2013 article in *Cataloging & Classification Quarterly*—arguably the most important recent paper on the topic. The authors provided a comprehensive overview of the historical use of genre and form terms in multiple Anglo-American cataloging codes, emphasizing the disparity of treatment between earlier codes (e.g., Panizzi's 91 Rules) and later ones (e.g., RDA). Tracing the existing literature on the evolution of genre-related rules, they delineated the cataloging community's inability to adequately differentiate between the terms "genre" and "form." Lee and Zhang also found that the community had historically not given suitable attention to genre, despite the "expanding role [that] genre plays in the current as well as future environments."[9] Issues pertaining to improving genre and form access in specific subject areas and specialist communities, such as audiovisual cataloging, have been addressed by Yee and other authors.[10]

Writings focusing on the LCGFT thesaurus have been notably sparse in the cataloging literature—a rather surprising omission now that more than ten years have passed since LC started a project to develop a separate body of genre and form terms at the behest of the library community. Young and Mandelstam have discussed the development of the LCGFT thesaurus in general, including its potential benefits and applications.[11] LCGFT development and application in specialist communities, such as music cataloging, have been addressed by Iseminger and others.[12] Recently, Mullin has explored automated techniques for assigning LCGFT terms retrospectively by using LCSH terms in existing bibliographic records for music resources.[13] While these works do help to place the utility and value of the LCGFT thesaurus in some context, what has been woefully lacking in the literature is empirical research exploring actual LCGFT implementation and usage in detail. Such evidence-based studies are critically needed to fill this knowledge deficit and add to the profession's understanding of the use of LCGFT in ways that will help inform future conversations and decisions about promoting genre and form access for our users.

Research Method and Data

To collect data for exploring the study questions outlined in the introduction, the authors turned to the Qualtrics platform, a leading subscription software for conducting online surveys, to develop and distribute a national survey to the cataloging community in 2018. The survey instrument

designed for this study had a total of forty-five questions, although the number of questions actually displayed for each survey participant was much smaller and variable according to responses given for certain questions. Most of the questions used in the current survey were multiple-choice and Likert-scale questions, although it also included a few open-ended questions designed to ask for more in-depth free text responses where appropriate. In many multiple-choice questions, respondents were asked to select all choices that applied, rather than select one exclusively for each question.

After Institutional Review Board approval was obtained for the current study, the authors disseminated invitation messages and reminders to the following six electronic discussion lists: 1) AUTOCAT, 2) MOUG-L (Music OCLC Users Group electronic discussion list), 3) OCLC-CAT, 4) OLAC-List (Online Audiovisual Catalogers electronic discussion list), 5) PCCLIST (Program for Cooperative Cataloging electronic discussion list), and 6) RDA-L. These lists were chosen for survey participant recruitment due to their fit with the authors' research purpose and questions. Because they were all major mailing lists targeted at cataloging and metadata librarians, they were expected to provide access to the online pool of potential respondents who would be qualified to provide valid and useful professional responses relating to the use of the LCGFT vocabulary in library catalogs.

The survey remained open from May 25 to July 6, 2018. During the approximately five-week period, 576 people volunteered to start answering survey questions. Out of this initial pool of respondents, 441 people (76.6 percent) completed the survey all the way through to the last question. Since the questionnaire included a long list of often complicated questions, the low drop-off rate recorded in this survey seemed to illustrate the timeliness and relevance of the survey at a time when the cataloging community is still developing best practices for applying the LCGFT vocabulary in a fast-paced production environment.[14]

Respondents' Profiles

Analysis of the survey data showed that a broad cross-section of the cataloging community was represented among respondents. With regard to their professional positions, the authors found that most respondents were currently involved in cataloging and metadata areas. Cataloging librarians were the largest group, amounting to 42.1 percent of the survey participants. Nearly 20 percent of our respondents (19.9 percent) reported themselves as cataloging department heads/managers. Those identifying themselves as metadata librarians accounted for 11.7 percent of the respondent population. The other smaller respondent groups were cataloging support staff (8.5 percent), library administrators, including technical services heads (7.2 percent), metadata department heads/managers (5.5 percent), and metadata support staff (1.0 percent). In general, while respondents self-selected themselves into the online survey sample, it was evident that their professional profiles clearly ensured that the data collected was valid and usable for the purpose of the current study.

Data about respondents' institutional backgrounds are presented in figure 1. Those working in academic libraries accounted for slightly more than half of the respondents (53.9 percent). Approximately a quarter of the respondents—the second largest subgroup—were from public libraries (26.5 percent). The survey data also included smaller numbers of responses from those working in archives, museums, and special collections (5.3 percent), from government libraries, including national libraries (4.6 percent), from special/corporate libraries (3.0 percent), and from school libraries (1.6 percent). The distribution of survey participants across library types was significantly skewed toward academic libraries, which currently account for approximately 17 percent of the total librarian population in the United States.[15] These results were hardly surprising to the authors. Because new initiatives in cataloging and metadata services have been often spearheaded in academic libraries, as has been the case recently with RDA and BIBFRAME testing, the over-representation of academic librarians in the respondent population appeared in most parts to be a logical outcome, suggesting that they have been much more active in keeping abreast of the development of new controlled vocabularies and were thus more interested in participating in the authors' survey on LCGFT usage in library catalogs.[16]

The survey also asked the respondents about participation in any PCC (Program for Cooperative Cataloging) programs: BIBCO (Monographic Bibliographic Record Cooperative Program), CONSER (Cooperative Online Serials Program), NACO (Name Authority Cooperative Program), and SACO (Subject Authority Cooperative Program). The PCC is an international cooperative effort aimed at providing high-quality shared cataloging and leading the cataloging and metadata community through specialized training and mentoring for its participants and non-members. The question about PCC activities was consequently included in the survey with an eye toward examining if participation in international cataloging initiatives influenced how different types of institutions have implemented the LCGFT vocabulary in their library catalogs (see discussion below). The survey data showed that respondents were split almost equally between PCC program participants and non-members (46.6 percent versus 53.4 percent). Among the PCC participants, nearly half (46.9 percent—21.8 percent of the respondents) were involved in a single program only, while the remainder (53.1 percent—24.7 percent of

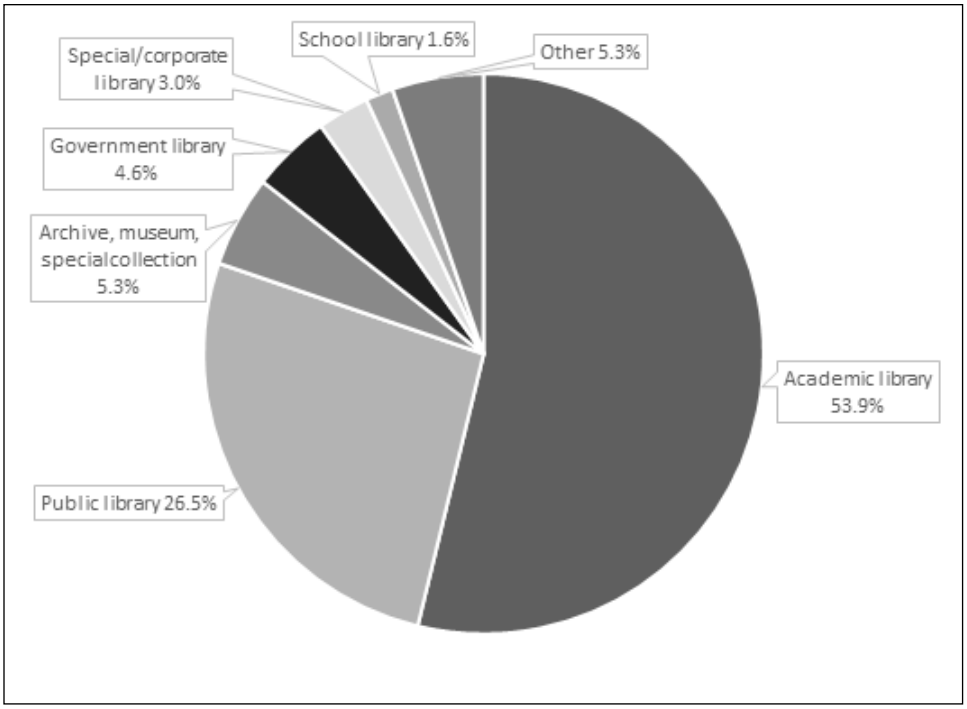


Figure 1. Respondents' institutional background (N = 570). Numbers do not add up to 100% due to rounding.

the respondents) participated in multiple PCC programs. A total of 13.2 percent of the PCC participants (6.1 percent of respondents) worked with three PCC programs, while nearly a quarter of the PCC participants (22.9 percent—10.6 percent of respondents) participated in all four PCC programs. As was the case with the previously noted overrepresentation of academic librarians, the survey population was obviously skewed toward PCC program participants in light of the selective nature of these cooperative cataloging programs. This result was also almost anticipated, however, because it would be hardly surprising that the principle of following the latest PCC standards makes PCC participants much more attuned to incorporating new standard thesauri in their cataloging work and likewise much more willing to contribute to an online survey on a topic of likely interest to them.[17]

Findings and Analysis

Cataloging Practices

Following the preliminary questions regarding the respondents' profiles, one principal section of the survey was designed to examine treatment and application of LCGFT terms in copy cataloging records. As the survey was conducted approximately ten years after LCGFT's initial launch, it is almost certain that respondents involved in cataloging would have encountered the LCGFT vocabulary in their everyday work. An initial area of inquiry—treatment of preexisting LCGFT terms—was of interest to the authors as it provides a basic framework on the current attitudes toward and perceptions of LCGFT. That is, since copy cataloging records that contain LCGFT terms do not require intensive cataloging effort (barring record errors), whether the respondents choose to retain them might provide basic information as to the perceived usefulness of the vocabulary. Of the 534 respondents, the survey found that only 7.5 percent deleted LCGFT headings in local catalogs, 5.6 percent retained LCGFT headings but suppressed them from display, and 86.9 percent kept LCGFT headings and displayed them in local catalogs (see figure 2).

While figure 2 shows a surface-level broad acceptance of the LCGFT vocabulary, cross-examining this question against the respondent profile provides a more nuanced view of the data. Dividing the respondents into three broad institutional groups brings out the greatest preference for LCGFT use in public libraries, academic libraries as a close second, and the least preference from a combined group of archives, museums, special collections, and special/corporate libraries (see figure 3).

The preference for LCGFT in public libraries seems to make sense given the type of materials collected and their historical application of subject and genre headings. For example, in Subject Heading Manual H 1790, there are "special provisions for increased subject access to fiction" covering the application of appropriate GSAFD form and genre heading(s) from the *Guideline on Subject Access to Individual Works of Fiction, Drama, Etc.*, some of which are aimed at enhancing the ability of the "average public library user" to select recreational reading.[18] Given the vast amounts of fiction and literature that public libraries hold (to say nothing of motion pictures and sound recordings), it seems perfectly reasonable to find increased rates of LCGFT retention reported by the public library respondents. Another possible interpretation of the data may be that this result was a reflection of public libraries being more limited in staff and cataloging knowledge/training and

thus unable and/or unprepared to make any modifications to incoming copy records in their local catalogs.[19]

Of course, rates on the retention and display of the LCGFT vocabulary for copy records only paint part of the picture; obtaining the reasons behind the respondents' answers was equally, if not more, critical. Of the 441 respondents answering this question, 84.6 percent indicated that their institutions displayed LCGFT terms in local catalogs because they described the "non-topical attributes" of resources, which seemed to illustrate the usefulness of the vocabulary in describing "is-ness," as opposed to "aboutness," that is not brought out by LCSH. A majority of the respondents also selected answers indicating LCGFT's potential for filtering of search results and faceted searching (56.7 percent and 59.4 percent, respectively). Roughly one-third of the respondents' institutions displayed LCGFT because LC will be implementing the thesaurus and because peer institutions have adopted LCGFT (32.4 percent and 30.2 percent, respectively).

In addition to the pre-constructed choices reported in Table 1, there was an option for "other," prompting free text response. Though many of the free text responses provided alternate wordings or augmentations of the choices contained in table 1, there were also some unexpected themes. For example, many respondents pointed to time constraints, as seen below:

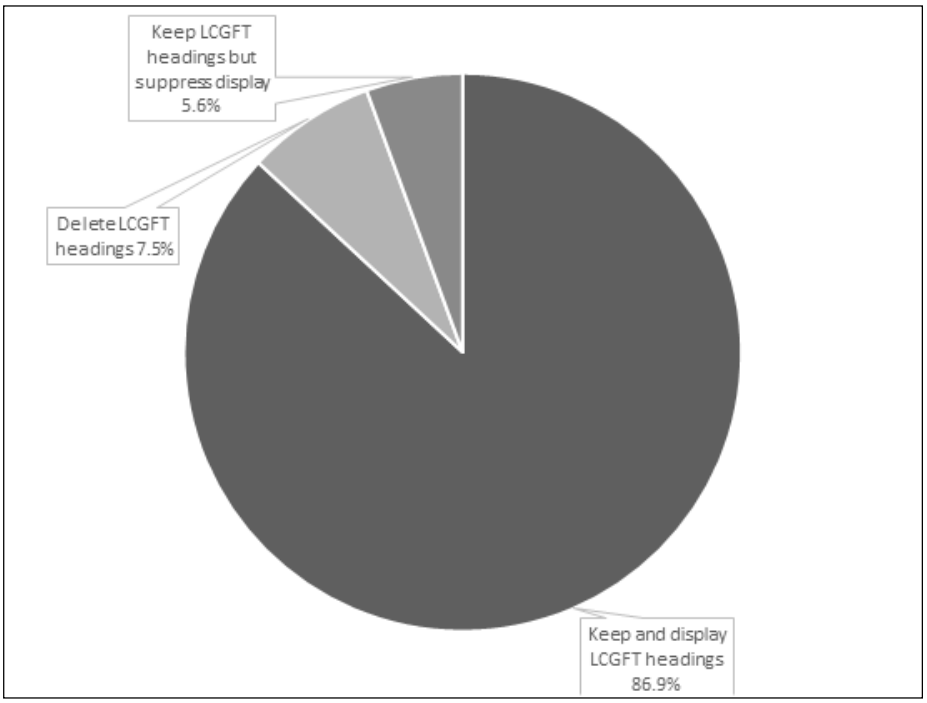


Figure 2. Treatment of Pre-Existing LCGFT Terms in Copy Records (N = 534)

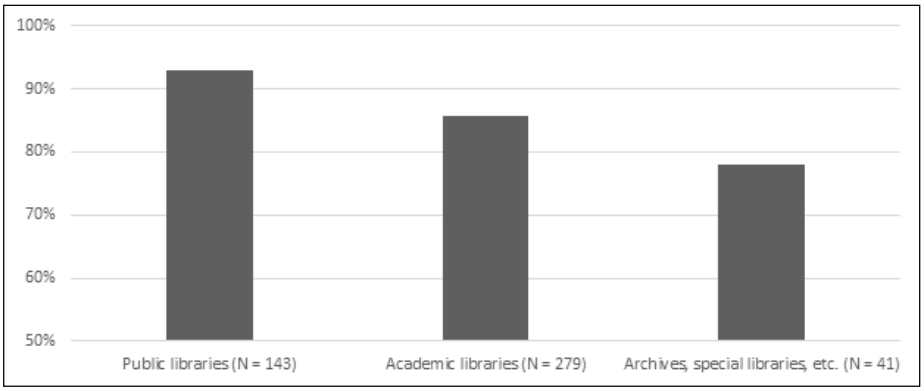


Figure 3. Institutions Retaining and Displaying LCGFT Headings in Local Catalogs, by Library Type

- "The less we have to modify the record, the better (time-wise)."
- "Lack of staff available to review and change records. Locally, records are more and more just accepted as is."
- "LCGFT headings are helpful and it takes less time to keep than to delete."

These responses highlight the fact that the LCGFT vocabulary likely will be integrated at many institutions via acclimation rather than conscious decision, as suggested above for public libraries. Copy catalogers simply do not have the time or have not undergone the requisite training to take appropriate action when it comes to genre/form headings. Alternatively, they are instructed to take no action, as other respondents revealed following the local protocol as the reason for retaining LCGFT headings:

- "Honestly, I do not know. It's in the manual, so I follow it."
- "I haven't been told to delete them."
- "It is consortium policy not to delete any headings when bringing in a record."

Table 1. Reasons for Displaying LCGFT Headings for Copy Records in Local Catalogs (*N* = 441)

Response	Percent
LCGFT headings describe non-topical attributes of resources	84.6
LCGFT headings support faceted searching	59.4
LCGFT headings support filtering results	56.7
LC will be implementing LCGFT thesaurus	32.4
Peer institutions have adopted LCGFT thesaurus	30.2
Other	15.9

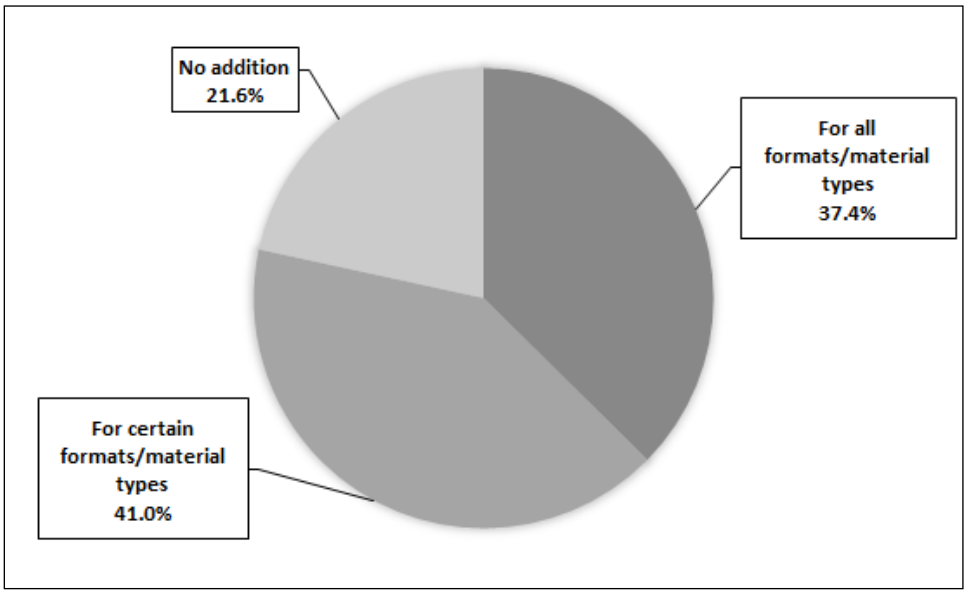


Figure 3. Institutions Retaining and Displaying LCGFT Headings in Local Catalogs, by Library Type

In contrast to the treatment of existing genre/form terms, addition of LCGFT headings in copy records is a far more proactive task, requiring extended effort on the part of catalogers. With regard to this question, the survey showed that 78.4 percent of the respondents added LCGFT headings to all or some copy records (37.4 percent and 41.0 percent, respectively), as seen in figure 4.

The respondents whose institutions only added LCGFT headings for certain types of materials were further asked to specify the type of material in a follow-up question. The responses shed light onto varied practice regarding format/material type. As illustrated in Table 2, survey participants reported applying headings more often to motion pictures (64.9 percent), television programs (52.3 percent), literature (47.1 percent), sound recordings (46.6 percent), music (40.8 percent), and artistic/visual works (34.5 percent). Less preference was given to cartographic materials (23.0 percent), law materials (10.3 percent), and religious materials (4.6 percent). Additionally, 46.6 percent of the respondents applied LCGFT in copy records in one or more of the "general" areas of LCGFT (commemorative works, derivative works, discursive works, ephemera, illustrated works, informational works, instructional and educational works, recreational works, and tactile works).

In examining the non-use of LCGFT terms in copy cataloging (13.1 percent of respondents), the adequacy of other vocabularies (e.g., LCSH) was selected as a top reason (60.0 percent), followed by indexing and display issues (35.4 percent and 27.7 percent, respectively), as seen in table 3. Dissatisfaction with the LCGFT vocabulary was also reported as a reason for locally deleting or suppressing LCGFT headings for display by a small number of the respondents (7.7 percent).

For these non-users, the survey posed questions regarding implementation plans for the LCGFT vocabulary. Survey responses revealed that 5.9 percent had no implementation plan, while 12.5 percent planned to adopt the vocabulary locally in the future, with the remaining 51.6 percent still unsure. Those non-users who either replied "yes" or "unsure" about future LCGFT implementation (i.e., non-user potential adopters) were also asked to report when they planned to adopt the vocabulary; here the majority had no firm, fully worked out plan as 75.6 percent replied "not sure." Of the remaining 24.4 percent who had a definite implementation schedule, most stated they will implement LCGFT when LC formally adopts the vocabulary (17.1 percent), while few specified a "later date" (7.3 percent). The reasons behind the implementation delay, as demonstrated in table 4, showed higher response levels for LCSH's adequacy (40.5 percent), potential duplication with LCSH (35.1 percent), and indexing problems (29.7 percent). Other reasons for not implementing LCGFT included lack of time/funding for training (24.3 percent), lack of genre/form search mechanism (24.3 percent), no demonstrated benefit for LCGFT implementation (21.6 percent), potential conflicts with LCSH (21.6 percent), unsure of vocabulary stability (18.9 percent), display issues (18.9 percent), and dissatisfaction with LCGFT (10.8 percent).

For those few respondents without plans to adopt LCGFT (definite non-adopters) for copy cataloging, perhaps the most notable finding is that adequacy of LCSH (52.5 percent) was overtaken by "no demonstrated benefit to implementing the vocabulary" (69.6 percent) as their reason for no implementation, as seen in table 5. The disparity between the greatest and least responses ("no demonstrated benefit" and "not satisfied with LCGFT vocabulary," respectively) can perhaps be explained by unfamiliarity with the vocabulary. That is, these respondents might have seen examples of the LCGFT vocabulary used within bibliographic records and public displays, but did not necessarily have comprehensive knowledge of the vocabulary's goals and intended benefits and/or its terms and structure. This analysis is supported by data from a subsequent question asking the respondents whether they had received any formal LCGFT training; almost all definite non-adopters (95.7 percent) had not received any formal LCGFT training.

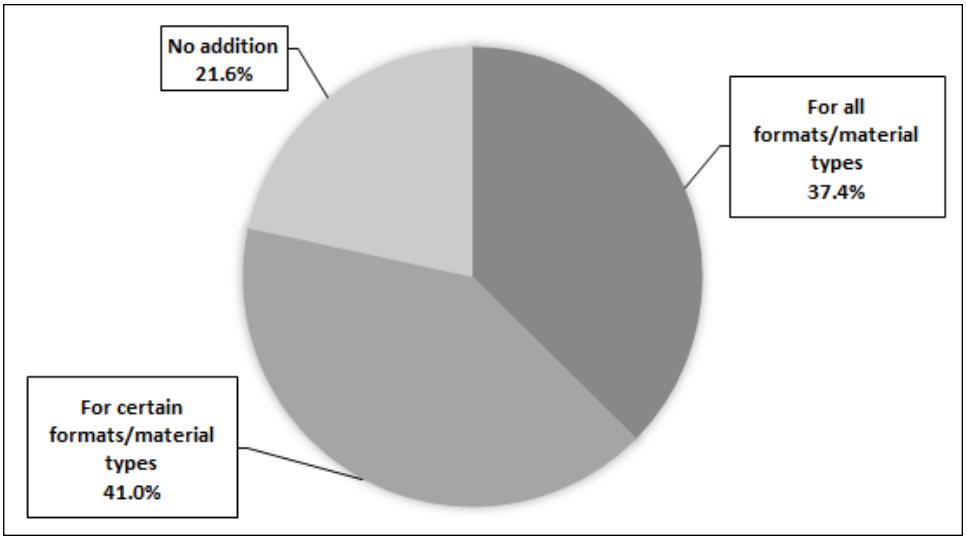


Figure 4. Addition of LCGFT Headings in Copy Cataloging (N = 439)

Table 2. Type of Materials for Adding LCGFT Headings in Copy Records (N = 174)

LCGFT Category	Percent
Artistic and visual works	34.5
Cartographic materials	23.0
Law materials	10.3
Literature	47.1
Motion pictures	64.9
Music	40.8
Religious materials	4.6
Sound recordings	46.6
Television programs	52.3
"General" materials	46.6
Commemorative works	2.9
Derivative works	5.7
Discursive works	5.7
Ephemera	17.8
Illustrated works	21.8
Informational works	10.9
Instructional and educational works	16.1
Recreational works	17.2
Tactile works	10.3

In contrast to the definite non-adopters, the survey also found a small group of "total adopters" (8.3 percent). These respondents either deleted or suppressed LCSH and instead displayed LCGFT alone when copy cataloging, abandoning the former vocabulary. Though few, the total adopters preferred LCGFT especially for motion pictures (60.0 percent), sound recordings (60.0 percent), music (54.2 percent), television programs (51.4 percent), and literature (51.4 percent). While this represents a very small minority of the respondents, it may be important to note that the group does signal professional anticipation of resultant vocabulary usage. For example, future use of LCGFT, and its compatibility with LCSH, are addressed in a 2017 white paper by a subcommittee of the ALCTS/CaMMS Subject Analysis Committee:

> The role of form subdivisions, especially when they duplicate a genre/form term (in meaning if

not in exact verbiage), is called into question. Even more significant are the entire areas of music and literature. For resources that are works of music or literature (not works about them), the preponderance of LCSH headings applied are not "subject" headings at all but rather headings that convey only form/genre, medium of performance, creator/contributor, audience, geographic, language and/or chronological characteristics. After these headings have been satisfactorily mapped to faceted terms and encoded in their proper designations, they ought to be removed entirely from bibliographic records. Moreover, in certain cases the corresponding LCSH authority records ought to be cancelled.[20]

Although the total adopters seem to have embraced these ideas early on, it is not surprising that their numbers were small in the authors' survey data as LC still assigns LCSH in tandem with LCGFT.[21]

The survey also included a number of similar questions on the adoption of the LCGFT vocabulary in original cataloging to see if any significant differences could be found in LCGFT usage patterns between copy and original cataloging practice. The data are not reported in this paper because the responses showed much of the same patterns as those for copy cataloging. One notable exception that deserves highlighting here, however, was related to the question on reasons for implementation delay in original cataloging among the current non-users, as presented in table 6. Here, a far greater proportion of the respondents (56.3 percent) reported "lack of time/funds for training." This result may suggest that insufficient training with the newer LCGFT thesaurus makes LCGFT application in original cataloging records more difficult for many catalogers than in handling copy cataloging records. With more than half of the respondents mentioning the training problem in original cataloging, this data clearly points to an important area for improvement within the cataloging community.

Table 3. Reasons for Deleting or Suppressing LCGFT Headings for Display in Local Catalogs (N = 65)

Response	Percent
Alternate controlled vocabularies (e.g., LCSH) are adequate for our catalogs	60.0
LCGH terms are not indexed in our catalogs	35.4
Display issues	27.7
Not satisfied with LCGFT thesaurus	7.7

Table 4. Reasons for Not Implementing LCGFT for Copy Records (N = 37)

Response	Percent
LCSH is adequate for our catalogs	40.5
Potential duplication with LCSH	35.1
LCGFT is not indexed in our catalogs	29.7
Lack of time/funding for training	24.3
Lack of search mechanism by genre/form	24.3
No demonstrated benefit for LCGFT implementation	21.6
Potential conflicts with LCSH	21.6
Unsure of the stability of LCGFT thesaurus	18.9
Display issues	18.9
Not satisfied with LCGFT thesaurus	10.8

Table 5. Reasons for Not Planning LCGFT Implementation for Copy Records (N = 23)

Response	Percent
No demonstrated benefit for LCGFT implementation	69.6
LCSH is adequate for our catalogs	52.5
LCGFT is not indexed in our catalogs	39.1
Potential duplication with LCSH	34.8
Potential conflicts with LCSH	34.8
Lack of time/funding for training	21.7
Lack of search mechanism by genre/form	21.7
Display issues	21.7
Unsure of the stability of LCGFT thesaurus	17.4
Not satisfied with LCGFT thesaurus	4.3

Retrospective LCGFT Application

Although deployment of a new vocabulary may indicate a certain level of change in cataloging practices, the true effectiveness of the said vocabulary cannot be fully realized until it is applied retrospectively to existing records within databases to avoid a "split file" situation (i.e., when the vocabulary is applied to new records while being omitted from eligible legacy records). To explore this question, the survey included questions regarding vendor-automated retrospective application of LCGFT headings

in addition to manual application. The main finding is that manual application (enhancing individual records by applying LCGFT terms manually) was practiced more than automation (enhancing individual records using macros or updating groups of records in batch). It is clear that the calls for automated treatment have either not been developed or adopted by the majority of the cataloging community.[22] Indeed, the only documented non-vendor system of automation is the OCLC Music Toolkit, a tool designed to assist music catalogers in applying LCGFT retrospectively using macros within OCLC Connexion Client.[23]

Table 6. Reasons for Delaying LCGFT Implementation for Original Cataloging (N = 64)

Response	Percent
Lack of time/funding for training	56.3%
LCSH is adequate for our catalogs	42.2%
Legacy data issues (split file due to lack of LCGFT headings in past records)	32.8%
Potential conflicts with LCSH	23.4%
No demonstrated benefit for LCGFT implementation	20.3%
Unsure of the stability of LCGFT thesaurus	18.8%
LCGFT is not indexed in our catalogs	15.6%
Lack of search mechanism by genre/form	14.1%
Display issues	10.9%
Not satisfied with LCGFT thesaurus	3.1%

Table 7. Automated Treatment of LCSH Terms (N= 45, Multiple Responses)

Response	Percent
Matching 6XX $a terms are removed and replaced by LCGFT terms	53.3%
6XX $v terms are retained and matching LCGFT terms are added	46.7%
Matching 6XX $a terms are retained and LCGFT terms are added	26.7%
6XX $v terms are removed and matching LCGFT terms are added	17.8%
Other [free text response]	15.6%

Regarding manual application of LCGFT in local catalogs, nearly half of the respondents (46.4 percent) have applied the LCGFT thesaurus in this fashion. Questioned about each vocabulary area, the respondents showed greatest preference for manual application for motion pictures (33.0 percent), television programs (29.5 percent), literature (28.8 percent), sound recordings (27.9 percent), and music (24.6 percent). Respondent profile was also significant here as public libraries adopted manual conversion workflows at greater rates (59.5 percent) than academic libraries (38.8 percent) and the combined group of archives, museums, and special/corporate libraries (37.0 percent), a result that paralleled the findings about types of institutions retaining and displaying LCGFT headings in local catalogs as reported earlier (see figure 3).

As for automated retrospective LCGFT application, the survey data found that only 10.2 percent of the respondents have instituted automated authority treatment to flip or retrospectively convert LCSH terms to LCGFT headings in their catalogs. This small group was also asked about how the automated processes were executed, as seen in table 7. The most common responses were "matching 6XX $a terms removed and replaced by LCGFT terms" (53.3 percent) and "6XX $v terms are retained and matching LCGFT terms are added" (46.7 percent), followed by "matching 6XX $a terms are retained and LCGFT terms are added" (26.7 percent) and "6XX $v terms are removed and matching LCGFT terms are added" (17.8 percent).

Some additional practices were reported in the free text responses, such as having GSAFD terms only—but not LCSH terms—converted for LCGFT additions, or using MarcEdit, a leading MARC data editing tool, to convert LCSH terms to LCGFT headings during batch record downloading—implying that their global update actions are at least partially homegrown.

Respondents were asked if they encountered difficulties with automated processes. More than one-third of the respondents (35.6 percent) reported that they had encountered problems. In a free text follow-up question, the vast majority of them expressed dismay with incorrect flipping of LCSH or GSAFD terms to LCGFT headings by vendors, in any number of ways. For example, multiple respondents reported that their vendor had incorrectly flipped certain LCSH headings on the mistaken assumption that they would eventually be transitioned to identical LCGFT terms. In another case, the vendor switched LCSH to LCGFT although the LCSH heading was correct as it was meant to be a topical heading in many records. Other respondents described syntax errors, especially regarding MARC fields, indicators, and subfield $2 values. One respondent noted: "Sometimes it [vendor conversion] flips the wrong things. Sometimes it deletes headings. Its [*sic*] just the usual thing when you have an automated system do large scale work like this." While this is true, the prevalence of haphazard LCGFT application identified in the survey data might have been minimized if more cooperative efforts been established between vendors and libraries to test the

conversion process and address potential conversion issues. Most importantly, these various inconsistencies revealed by vendor processes likely have resulted in additional institutional cleanup projects, which might discourage future retrospective application efforts, particularly for those institutions lacking the expertise or devices to execute such tasks in house.

Training

Identifying the degree to which training has influenced cataloger application of LCGFT was another goal of the survey. Training was an important area to include in the survey as various types of training represent the greatest level of educational participation on the part of both the trainer and trainee.[24] That is, generally the trainer has to spend a great deal of time developing the session, while the trainee has to put forth effort to attend the session. Formal training can require additional effort on the part of the participant in locating monies needed to fund travel and the event itself (whether it is in the form of conference or workshop fees). Even the asynchronous webinar, which may certainly require less effort than attending a conference, can require a fair amount of time commitment by the participant. Further, evaluating the responses from this area of the survey gives a unified picture as to the effectiveness of professional distribution of communications regarding the new thesaurus. Here the survey data found that only 19.1 percent of respondents had received some type of formal training either at their institution or via an external event. Of those respondents who had received training, 33.3 percent had received funding from their institution.

Training appeared to influence local use and treatment of the LCGFT thesaurus. For example, nearly all respondents who had received some type of training kept and displayed LCGFT headings locally when doing copy cataloging (98.9 percent), while almost none had LCGFT headings suppressed from display in their local catalogs (1.1 percent). In contrast, the survey data showed that those respondents who had not received training were far more likely to suppress or delete LCGFT headings when copy cataloging (6.0 percent and 8.7 percent, respectively).

Lack of LCGFT training among these survey respondents reveals other consistent attitudes regarding nonadoption of LCGFT in both copy and original cataloging practices. These respondents showed preference for LCSH over LCGFT (50.0 percent in copy cataloging, 37.0 percent in original cataloging) in addition to stating that there was no benefit to implementing the vocabulary (72.7 percent in copy cataloging, 55.6 percent in original cataloging). Both of these responses were top choices among these "nontrainees" in questions regarding reasons for not implementing the LCGFT thesaurus in their cataloging workflows.

Perceptions on End User Effectiveness

As the overwhelming majority of respondents were employed in a cataloging-related capacity, it would have been difficult to gauge the effectiveness of LCGFT for end users. This being said, the survey was an opportunity to collect data regarding catalogers' perceptions on end use. Because a new controlled vocabulary is developed to improve resource discovery and access for library users, its application by working catalogers should be directed largely by their professional judgment about its effectiveness for end users, rather than being dictated externally by new cataloging rules.

The survey attempted to measure perceived vocabulary effectiveness by querying the respondents about two primary constituencies: public services staff and end users. Here the survey data revealed a common trend between their perceptions with respect to both groups. First, the respondents were optimistic overall toward the effectiveness of the vocabulary. They reported that LCGFT would be very helpful (42.8 percent) or somewhat helpful (38.1 percent) to public services staff. The numbers were similar for perceptions about end users, with 45.4 percent reporting "very helpful," and 40.0 percent reporting "somewhat helpful." Secondly, follow-up questions queried the respondents about the direct feedback they had received from the two groups. It is notable that the actual feedback reported was mostly neutral from public services staff and end users (52.1 percent and 57.2 percent, respectively).

The respondents were then invited to describe feedback using free text response. The responses given seemed to highlight a few end-user issues for LCGFT usage in library catalogs. For example, several respondents commented on the importance of providing training for public services staff. At one institution, training sessions were held to demonstrate how to recognize and use the vocabulary. According to the respondent, this was received positively, and they noted that "[reference librarians and graduate student reference assistants] are enthusiastic about the genre headings in particular, such as graphic novels, fantasy literature, etc. But they also are really happy about being able to filter by form too." Such training should not be limited to isolated professional interactions, however. Otherwise, one respondent noted, even if LCGFT demonstrations were well attended, "virtually everyone outside of cataloging" would be unable to keep them in mind and take advantage of the index a couple of years later.

Some respondents noted that public services staff had commented on issues created by split files. That is, newer records contain LCGFT headings, but older similar records do not. One respondent stated that, "[Public services staff] desire . . . that we can develop a way to retrospectively add useful LCGFT headings to our legacy database." Another noted that, "We've decided not to make the genre index available at this time . . . as most of our 8 million records do

not have genre terms, thus skewing search results." These responses highlight a need for retrospective application of LCGFT to legacy cataloging data to better assist both public and technical services staff, as noted in a previous section.

Feedback from end users as reported in the free text responses was similar to that of public services staff, though some departures are worth noting. For example, some respondents reported end users' confusion or dissatisfaction with the vocabulary. One specific example cited was the LCGFT heading Academic theses. "A small number of dissertation authors have asked why we use that term, which they think denigrates their work," one respondent wrote. Particularly in light of the reported difference above between LCGFT's perceived effectiveness and the actual feedback from public services staff and end users, these responses seemed to illustrate the need for further user education on genre/form headings, as well as more attention to exploring how to take full advantage of said headings within modern-day discovery systems. When better trained, end users may develop greater satisfaction with the catalog. Along this line, one respondent noted: "After I show them (on the Reference desk) how to search by subject (actually genre) 'Film adaptations' they are impressed."

Discovery

As suggested above, while much has been done to create the proper infrastructure for LCGFT application by cataloging professionals, questions remain as to whether present-day discovery systems take full advantage of the vocabulary. The survey presented an opportunity to gauge the issues the respondents experienced with their local discovery systems regarding the LCGFT thesaurus. The authors found that indexing was of primary concern as LCGFT likely has limited usefulness unless a separate index is created for it, or, at minimum, unless it is incorporated with a pre-existing genre index. Approximately two-thirds of respondents (66.9 percent) reported that their discovery systems indexed LCGFT headings, while 15.3 percent noted that the thesaurus was not indexed in their local systems. Filtering this data based on institution type presented another significant data point; most notably, public library discovery systems appeared to lead the way when it came to indexing LCGFT (79.4 percent as opposed to 61.9 percent for the rest). The survey confirmed that indexability of LCGFT appeared to have an effect on whether the institution decided to apply and/or display the vocabulary. For those institutions deleting or suppressing LCGFT headings from copy records, only 18.2 percent had LCGFT indexed locally, while 73.8 percent of institutions that retained and displayed LCGFT headings in copy records also indexed the vocabulary.

Besides indexing issues, the respondents were also questioned about display in their local systems. The majority of the respondents (83.6 percent) used an OPAC or discovery system that displayed LCGFT headings. Simultaneously, a small portion of these respondents (8.4 percent) reported that they had experienced display problems with LCGFT. These respondents were invited to describe their display issue(s) using free text response. Common responses included the conflation of LCGFT with LCSH under the display label "subjects," duplication of LCGFT and LCSH form subdivisions, inability to suppress sources of terms in subfield $2, and issues with creating links between bibliographic records to and from LCGFT headings. Regarding these issues, multiple respondents also highlighted the need for ongoing communications with vendors: "We need to educate the vendors more in the use, display and differences between LCGFT and LCSH."

The ability to search by LCGFT terms and use them as facets was also an important question that the authors wanted to examine as these are two common ways to navigate bibliographic record data using genre/form headings. The survey showed that searching of LCGFT headings is a more widely available functionality than faceting, as more than half of the respondents (51.6 percent) reported this capability in their local systems. However, the authors found that many respondents (27.8 percent) were unsure as to whether their discovery systems enabled users to search based on LCGFT terms. Somewhat surprisingly, faceting was still not an available function at many institutions (35.6 percent) for LCGFT.

Conclusion

The purpose of the study was to provide analysis of an online survey developed by the authors and distributed to the cataloging community in 2018. The survey aimed to answer a number of important research questions to gain a general sense of the current state of LCGFT usage. The survey data helped to bring forth a series of findings that are relevant to catalogers, technical services staff, and the library community in general. As noted above in the section *Cataloging Practices*, the survey found an overall broad acceptance of the LCGFT vocabulary as the overwhelming majority of the respondents retained LCGFT headings in copy records loaded into their local catalogs. This finding suggests that the LCGFT project has been successfully embraced as a new controlled vocabulary for describing non-topical attributes of resources. As describing what a resource is rather than what it is about was an important initial goal of the project, the survey provides affirmation of LC's efforts to develop a genre/form thesaurus separate from LCSH.[25]

While these findings are important in evaluating the thesaurus more than a decade after its inception, the overall

adoption of the vocabulary remains uneven. As for institutional types, public libraries led in adopting the vocabulary. Regarding formats, clear preference was found for certain areas of LCGFT (e.g., literature, motion pictures, music, sound recordings, and television programs), a finding that appeared to indicate a need for further education and communication about less represented areas of LCGFT within the cataloging community. Training itself points to a much needed area for improvement as the survey found that the vast majority of non-adopters had never received training in LCGFT.

Furthermore, the survey results suggest that retrospective LCGFT application, particularly using automated means, also presents forthcoming challenges for librarians and library IT staff. Indeed, given the vast amount of legacy bibliographic data at present, one of the main sources of delay for institutions in presenting the vocabulary to the public was found to be the fear of the "split file." Although the survey data highlighted the prevalence of manual treatment as the most common form of retrospective application, continuation of the existing practice seems untenable in light of the very legitimate concern about the impact of the "split file" issue on user discovery. That is, automation will need to supplant manual application as the split file is likely one of the most critical barriers to wider LCGFT usage. Additionally, the library community will need to continue to demand more of vendors involved in authority control as past automated retrospective application processes have often resulted in copious errors.

Another key survey finding is that interdepartmental communication within libraries will need to play a greater role in the forthcoming years with regard to end use of the LCGFT vocabulary. If the small number of "total adopters" presents the most logical path forward (i.e., abandoning LCSH in favor of LCGFT for describing certain types of resources), then public services librarians will face a large challenge in educating (or perhaps "recalibrating") end users. Technical services librarians can spark the effort by collaborating with their colleagues in public services more effectively. Conversely, public services librarians can provide valuable advice to those in technical services regarding how to best present this new data and enable end users to make the most of the LCGFT vocabulary in modern discovery systems. The survey data also highlights the need for library administrators' support for ongoing training, collaboration, and user education to allow both technical and public services librarians to facilitate genre/form access for improved end-user resource discovery.

While this paper makes a significant contribution to understanding the current state of LCGFT usage in the library community, the present study is not without limitations. In particular, although the survey was an efficient, convenient mechanism to collect relevant data from a large number of voluntary respondents quickly, reliance on voluntary survey participation potentially leads to underestimation of the issues and concerns that could have been reported by non-respondents, who might have differed in their characteristics and perspectives, among others, from the respondents. To overcome such potential limitations, it will be essential that follow-up studies be conducted to triangulate the present survey findings using other research methods, such as in-person, individual, or focus-group interviews with various subsets of cataloging professionals for more granular, qualitative analysis. Equally important as a logical follow-up to the current project might be a quantitative study regarding actual rates of LCGFT application within a large bibliographic database or several databases, as the present survey only examined self-reported perceptions on various aspects of the vocabulary. Retrospective application is another area that will need further examination in the coming years, particularly as more libraries migrate from traditional integrated library systems to newer library services platforms (LSPs). For example, does the new generation of LSPs, with far more advanced data remediation functionalities, offer new possibilities for more sophisticated treatment of genre-form headings for retrospective application? Studies will need to be conducted to determine best practices for applying LCGFT headings to legacy data in the evolving data environment. Finally, as the faceted vocabularies projects will only be fully realized with the more recent addition of the Library of Congress Medium of Performance Thesaurus (LCMPT) and the Library of Congress Demographic Group Terms (LCDGT), a comprehensive study of the three new LC vocabularies might be a further area ripe for analysis. While these questions represent fruitful ground for potential future studies, the survey results seem to make it abundantly clear that LCGFT has become a widely accepted part of the bibliographic universe that helps to make genre and form information explicitly accessible to library users.

References and Notes

1. Library of Congress, "Introduction to Library of Congress Genre/Form Terms for Library and Archival Materials," www.loc.gov/aba/publications/FreeLCGFT/2019%20LCGFT%20intro.pdf.
2. Roy Tennant, "Ground Truthing [MARC field 655 second indicator 2]," http://roytennant.com/proto/groundtruthing/2018-01-6552.txt.
3. Tennant, "Ground Truthing."

4. David P. Miller, "Out From Under: Form/Genre Access in LCSH," *Cataloging & Classification Quarterly* 29, no. 1–2 (2000): 169–88.
5. Edward T. O'Neill et al., "Form Subdivisions: Their Identification and Use in LCSH," *Library Resources & Technical Services* 45, no. 4 (2001): 187–97.
6. Library of Congress, "Report on the Moving Image Genre/Form Project," www.loc.gov/catdir/cpso/movimgenre.pdf.
7. Geraldine E. Ostrove, "Music Subject Cataloging and Form/Genre Implementation at the Library of Congress," *Cataloging & Classification Quarterly* 32, no. 2 (2001): 91–106.
8. Janis L. Young and Yael Mandelstam, "It Takes a Village: Developing Library of Congress Genre/Form Terms," *Cataloging & Classification Quarterly*, 51, no. 1–3 (2013): 6–24.
9. Hur-Li Lee and Lei Zhang, "Tracing the Conceptions and Treatment of Genre in Anglo-American Cataloging," *Cataloging & Classification Quarterly* 51, no. 8 (2013): 891–912.
10. Martha M. Yee, "Two Genre and Form Lists for Moving Image and Broadcast Materials: A Comparison," *Cataloging & Classification Quarterly* 31, no. 3–4 (2001): 237–95; Faye R. Leibowitz, "Form and Genre Headings in Serials Cataloging," *Cataloging & Classification Quarterly* 20, no. 3 (1995): 19–41; Mary Dabney Wilson et al., "The Relationship between Subject Headings for Works of Fiction and Circulation in an Academic Library," *Library Collections, Aquisitions, & Technical Services* 24 (2000): 459–65; Carrie Newsom et al., "Genre Terms for Chemistry and Engineering: Not Just for Literature Anymore," *Cataloging & Classification Quarterly* 46, no. 4 (2008): 412–24.
11. Young and Mandelstam, "It Takes a Village."
12. Beth Iseminger et al., "Faceted Vocabularies for Music: A New Era in Resource Discovery," *Notes* 73, no. 3 (2017): 409–31; Mark McKnight, "Are We There Yet? Toward a Workable Controlled Vocabulary for Music," *Fontes Artis Musicae* 59, no. 3 (2012): 286–92.
13. Casey A. Mullin, "An Amicable Divorce: Programmatic Derivation of Faceted Data from Library of Congress Subject Headings for Music," *Cataloging & Classification Quarterly* 56, no. 7 (2018): 607–27.
14. Thomas A. Archer, "Response Rates to Expect from Web-Based Surveys and What to Do About It," *Journal of Extension* 46, no. 3 (2008), www.joe.org/joe/2008june/rb3.php; Mirta Galesic, "Dropout on the Web: Effects of Interest and Burden Experienced during an Online Survey," *Journal of Official Statistics* 22, no. 2 (2006): 313–28.
15. OCLC, "Global Library Statistics," 2015, www.oclc.org/global-library-statistics.en.html.
16. Library of Congress, "Testing Resource Description and Access (RDA) Archives," www.loc.gov/aba/rda/rda_test_archives.html; Robert M. Groves et al., "The Role of Topic Interest in Survey Participation Decisions on JSTOR," *Public Opinion Quarterly* 68, no. 1 (2004): 2–31.
17. Groves et al., "The Role of Topic Interest in Survey Participation Decisions on JSTOR."
18. Library of Congress, "Literature: Fiction H 1790," *Subject Headings Manual*, 2015, www.loc.gov/aba/publications/FreeSHM/H1790.pdf.
19. See, for example, Shawn D. Miska, "A Survey of Local Library Cataloging Tool and Resource Utilization," *Journal of Education for Library & Information Science* 49, no. 2 (2008): 128–46.
20. Casey Mullin et al., "'A Brave New (Faceted) World': Towards Full Implementation of Library of Congress Faceted Vocabularies," 2017, www.loc.gov/aba/pcc/documents/PoCo-2017/BraveNewFacetedWorld-170713.pdf.
21. Library of Congress, "Assigning Genre/Form Terms," 2016, www.loc.gov/aba/publications/FreeLCGFT/J110.pdf.
22. Mullin et al., "'A Brave New (Faceted) World.'"
23. Mullin, "An Amicable Divorce."
24. Yuji Tosaka and Jung-ran Park, "Continuing Education in New Standards and Technologies for the Organization of Data and Information: A Report on the Cataloging and Metadata Professional Development Survey," *Library Resources & Technical Services* 62, no. 1 (2018): 4–15.
25. Library of Congress, "Introduction to Library of Congress Genre/Form Terms for Library and Archival Materials," www.loc.gov/aba/publications/FreeLCGFT/2019%20LCGFT%20intro.pdf.

Appendix. LCGFT Survey Questions

Q1 Please indicate the nature of your institution

- Academic library
- Archives (go to Q3)
- Museum (go to Q3)
- Public library (go to Q3)
- School library (go to Q3)
- Special collections (go to Q3)
- Special/corporate library (go to Q3)
- Other (please specify) _____ (go to Q3)

Q2 Please indicate the primary type of your parent institution
- Doctoral/research university
- 4-year college/university (undergraduate focus—with or without master's/professional programs)
- Community college
- Special focus academic institution (a high concentration of degrees in a single field or related fields, such as theology, medicine, art, music, design, law)
- Other (please specify) _____

Q3 Please indicate your job title (check all that apply)
- Library administrator (including technical services head)
- Cataloging department head/manager
- Metadata department head/manager
- Cataloging librarian
- Metadata librarian
- Paraprofessional—cataloging
- Paraprofessional—metadata
- Library student worker—cataloging
- Library student worker—metadata
- Other (please specify) _____

Q4 Please check the PCC (Program for Cooperative Cataloging) programs that your institution participates in (check all that apply)
- BIBCO
- CONSER
- NACO
- SACO
- N/A

Q5 When you (hereafter including your staff/colleagues, or your library if applicable) are copy cataloging and see LCGFT terms in a record, you generally:
- Delete LCGFT headings in local catalogs
- Keep LCGFT headings locally but suppress display
- Keep LCGFT headings and display locally (go to Q11)

Q6 Please provide reasons for locally deleting or suppressing LCGFT headings for display (check all that apply)
- LCGFT terms are not indexed in local catalogs
- Display issues
- Not satisfied with LCGFT vocabulary
- Alternate controlled vocabularies (e.g., LCSH) are adequate for our catalogs
- Other (please specify) _____

Q7 If you currently delete or suppress LCGFT headings in copy records for display, do you plan to adopt the vocabulary locally in the future?
- Yes
- No (go to Q10)
- Not sure

Q8 When do you plan to implement LCGFT for copy records?
- When the Library of Congress formally adopts the vocabulary
- A later date (please specify) _____
- Not sure

Q9 Why has implementation been delayed for copy records at your institution? (check all that apply)
- Lack of time/funds for training (go to Q15)
- Unsure of the stability of the vocabulary (go to Q15)
- Potential duplication with LCSH (go to Q15)
- Potential conflicts with LCSH (go to Q15)
- Lack of search/retrieval mechanisms to help users find materials using genre/form terms (go to Q15)
- Display issues (go to Q15)
- No demonstrated benefit to implementing the vocabulary (go to Q15)
- LCGFT headings are not indexed in local catalogs (go to Q15)
- Not satisfied with LCGFT vocabulary (go to Q15)
- LCSH is adequate for our catalogs (go to Q15)
- Other (please specify) _____ (go to Q15)

Q10 Please describe the reasons for not planning to implement the LCGFT vocabulary for copy records at your institution. (check all that apply)
- Lack of time/funds for training (go to Q15)
- Unsure of the stability of the vocabulary (go to Q15)
- Potential conflicts with LCSH (go to Q15)
- Legacy data issues (e.g., past records lack LCGFT, leading to a split file) (go to Q15)
- Lack of search/retrieval mechanisms to help users find materials using genre/form terms (go to Q15)
- Display issues (go to Q15)
- No demonstrated benefit to implementing the vocabulary (go to Q15)
- LCGFT headings are not indexed in local catalogs (go to Q15)
- Not satisfied with LCGFT vocabulary (go to Q15)
- LCSH is adequate for our catalogs (go to Q15)
- Other (please specify) _____ (go to Q15)

Q11 What are the main reasons for locally displaying LCGFT headings in copy records? (check all that apply)

- LCGFT headings describe non-topical attributes of resources
- Peer institutions have adopted the vocabulary
- LC will be implementing the vocabulary
- LCGFT headings support filtering results
- LCGFT headings support faceted searching
- Other (please specify) _____

Q12 Do you generally add LCGFT headings to copy records in addition to keeping and displaying them in local catalogs?

- Add applicable LCGFT headings regardless of format/material type (go to Q14)
- Add applicable LCGFT headings for certain types of materials
- No, we do not add LGGFT headings to copy records (go to Q14)

Q13 For which materials do you currently add LCGFT headings in copy records? (check all that apply)

- Artistic and visual works
- Cartographic materials
- Law materials
- Literature
- Motion pictures
- Music
- Religious materials
- Television programs
- Sound recordings
- Commemorative works
- Creative nonfiction
- Derivative works
- Discursive works
- Ephemera
- Illustrated works
- Informational works
- Instructional and educational works
- Recreational works
- Tactile works

Q14 Are there certain materials for which you locally display LCGFT headings only in copy records while deleting or suppressing LCSH altogether?

- Artistic and visual works
- Cartographic materials
- Law materials
- Literature
- Television programs
- Motion pictures
- Music
- Religious materials
- Sound recordings
- Commemorative works
- Creative nonfiction
- Derivative works
- Discursive works
- Ephemera
- Illustrated works
- Informational works
- Instructional and educational works
- Recreational works
- Tactile works
- No, we never delete or suppress LCSH in favor of LCGFT

Q15 When you are performing original cataloging, for which materials do you currently apply LCGFT headings?

- Artistic and visual works
- Cartographic materials
- Law materials
- Literature
- Motion pictures
- Music
- Religious materials
- Television programs
- Sound recordings
- Commemorative works
- Creative nonfiction
- Derivative works
- Discursive works
- Ephemera
- Illustrated works
- Informational works
- Instructional and educational works
- Recreational works
- Tactile works
- We do not apply LCGFT headings in any original cataloging (go to Q18)

Q16 At your institution, are there certain materials for which you apply LCGFT headings only for original cataloging while omitting LCSH altogether?

- Artistic and visual works
- Cartographic materials
- Law materials
- Literature
- Motion pictures
- Music
- Religious materials
- Television programs
- Sound recordings

- Commemorative works
- Creative nonfiction
- Derivative works
- Discursive works
- Ephemera
- Illustrated works
- Informational works
- Instructional and educational works
- Recreational works
- Tactile works
- No, there are no specific types of materials for which I apply LCGFT exclusively for original cataloging.

Q17 What are the main reasons you have adopted the LCGFT vocabulary for original cataloging?
- LCGFT headings describe non-topical attributes of resources (go to Q22)
- LCGFT headings are easier to apply than LCSH (go to Q22)
- Peer institutions have adopted the vocabulary (go to Q22)
- LC is adopting the vocabulary (go to Q22)
- LCGFT headings support filtering results (go to Q22)
- LCGFT headings support faceted searching (go to Q22)
- Other (please specify) _____ (go to Q22)

Q18 If you do not currently use LCGFT terms in original cataloging, do you plan to adopt the vocabulary in the future?
- Yes
- No (go to Q21)
- Not sure

Q19 When do you plan to implement LCGFT for original cataloging?
- When the Library of Congress formally adopts the vocabulary
- A later date (please specify) _____
- Not sure

Q20 Why has implementation been delayed for original cataloging at your institution? (check all that apply)
- Lack of time/funds for training (go to Q22)
- Unsure of the stability of the vocabulary (go to Q22)
- Potential conflicts with LCSH (go to Q22)
- Legacy data issues (past records lack LCGFT, leading to a split file) (go to Q22)
- Lack of search/retrieval mechanisms to help users find materials using genre/form terms (go to Q22)
- Display issues (go to Q22)
- No demonstrated benefit to implementing the vocabulary (go to Q22)
- LCGFT headings are not indexed in local catalogs (go to Q22)
- Not satisfied with LCGFT vocabulary (go to Q22)
- LCSH is adequate for our catalogs (go to Q22)
- Other (please specify) _____ (go to Q22)

Q21 If you do not plan on adopting the LCGFT vocabulary for original cataloging, please describe the reasons for not implementing the vocabulary at your institution. (check all that apply)
- Lack of time/funds for training
- Unsure of the stability of the vocabulary
- Potential conflicts with LCSH
- Legacy data issues (e.g., past records lack LCGFT, leading to a split file)
- Lack of search/retrieval mechanisms to help users find materials using genre/form terms
- Display issues
- No demonstrated benefit to implementing the vocabulary
- LCGFT headings are not indexed in local catalogs
- Not satisfied with LCGFT vocabulary
- LCSH is adequate for our catalogs
- Other (please specify) _____

Q22 Please indicate how helpful each of the following resources have been for LCGFT training.
[Very helpful / Somewhat helpful / Neutral / Somewhat unhelpful / Very unhelpful / N/A]
- Materials at lc.gov
- Electronic mailing lists
- "Best practices" documentation (e.g., OLAC, MLA)
- Webinars
- Other (please describe)

Q23 Have you received formal LCGFT training, either locally or externally (at conferences or workshops, for example)?
- Yes
- No (go to Q25)

Q24 Has your institution funded formal LCGFT training, either locally or externally?
- Yes
- No

Q25 Has your institution used automated authority control vendor services to 'flip' or retrospectively convert LCSH terms to LCGFT headings?
- Yes
- No (go to Q29)

Q26 Which of the following best describes automated treatment of LCSH? (check all that apply)
- Matching 6XX $a terms (LCSH) are removed and replaced by LCGFT terms
- Matching 6XX $a terms (LCSH) are retained and LCGFT terms are added
- 6XX $v terms (LCSH) are retained and matching LCGFT terms are added
- 6XX $v terms (LCSH) are removed and matching LCGFT terms are added
- Other (please describe) _____

Q27 Have you encountered any difficulties with the automated processes?
- Yes
- No (go to Q29)

Q28 Please describe the difficulties encountered.

Q29 For which materials have you manually converted or added LCGFT headings in local catalog records?
- Artistic and visual works
- Cartographic materials
- Law materials
- Literature
- Motion pictures
- Music
- Religious materials
- Television programs
- Sound recordings
- Creative nonfiction
- Commemorative works
- Derivative works
- Discursive works
- Ephemera
- Illustrated works
- Informational works
- Instructional and educational works
- Recreational works
- Tactile works
- We have not manually converted or added LCGFT headings in local catalog records

Q30 Rate the degree to which you think LCGFT will help public services staff.
[Very helpful / Somewhat helpful / Neutral / Somewhat unhelpful / Very unhelpful / N/A]

Q31 At your institution, what has the feedback been from public services staff regarding LCGFT headings?
[Very positive / Somewhat positive / Neutral / Somewhat negative / Very negative / N/A]
N/A = (go to Q33)

Q32 Please describe the feedback, if any, you have received from public services staff.

Q33 Rate the degree to which you think LCGFT will help end users.
[Very helpful / Somewhat helpful / Neutral / Somewhat unhelpful / Very unhelpful / N/A]

Q34 At your institution, what has the feedback been from end users regarding LCGFT headings?
[Very positive / Somewhat positive / Neutral / Somewhat negative / Very negative / N/A]
N/A = (go to Q34)

Q35 Please describe the feedback, if any, you have received from end users.

Q36 Do you see the potential for any duplication (or conflicts) between LCSH and LCGFT?
- Yes
- No (go to Q38)
- Not sure (go to Q38)

Q37 Please specify the potential areas you see for duplication or conflicts between LCSH and LCGFT. (check all that apply)
- Conflation of topical and non-topical attributes of resources
- LCSH includes many headings and sub-divisions that are not about topical attributes
- LCSH describes facts about resources that are not subjects
- Misleading to users since many genre and form terms are found in LCSH strings
- LCSH form subdivisions duplicate LCGFT terms
- Other (please specify) _____

Q38 What is your preferred method of finding LCGFT headings when cataloging?
- Classification web
- lc.gov
- Personal lists
- Connexion
- Library of Congress LCGFT manual
- N/A (go to Q40)
- Other (please describe) _____

Q39 Based on your previous answer(s), how easy do you find it to navigate the LCGFT vocabulary using your preferred method of finding an LCGFT heading?

- Very easy
- Somewhat easy
- Neither easy nor difficult
- Somewhat difficult
- Very difficult

Q40 Does your OPAC or discovery system currently index LCGFT headings? (Please limit your answer to the primary product if your institution deploys more than one)

- Yes
- No
- Not sure

Q41 Does your OPAC or discovery system display LCGFT headings in bibliographic records?

- Yes
- No (go to Q44)
- Not sure (go to Q44)

Q42 Have you experienced any display problems with LCGFT headings in your OPAC or discovery system?

- Yes
- No (go to Q44)
- Not sure (go to Q44)

Q43 Please describe any display issues.

Q44 Does your OPAC or discovery system allow users to conduct basic or advanced searches using LCGFT headings?

- Yes
- No
- Not sure

Q45 Does your OPAC or discovery system currently display LCGFT headings via facets for filtering search results?

- Yes
- No
- Not sure

Comparison of Key Entities Within Bibliographic Conceptual Models and Implementations

Definitions, Evolution, and Relationships

Michele Seikel and Thomas Steele

With the introduction of FRBR (Functional Requirements of a Bibliographic Record) in 1998, IFLA (the International Federation of Library Associations and Institutes) introduced a new conceptual entity relationship model. FRBR was soon followed by FRAD (Functional Requirements of Authority Data) and FRSAD (Functional Requirements of Subject Authority Data). With LRM (IFLA Library Reference Model) and two descriptive standards, the RDA Toolkit and BIBFRAME to follow, it helps catalogers to have a greater understanding of the entity relationship models they use for bibliographic description. The authors compare the models and descriptive standards. Differences among the entities, their definitions, and properties are examined and analyzed.

When computers were introduced for the organization of information, Avram's creation of MARC format (machine-readable cataloging) in the late 1960s was an outgrowth of this change. About the same time, the Anglo-American Cataloging Rules were published, and the second edition was published in 1978. Another key standard from this period is the International Federation of Library Associations' (IFLA) International Standard Bibliographic Description for monographic publications (ISBD), published in 1971. These standards dominated cataloging in the US and other countries for several decades. Many technological advances occurred during those decades, resulting in the growth of using computers and shared online databases such as OCLC and RLIN to automate cataloging processes. Additionally, the number and types of resources that required cataloging grew exponentially. This increase in published materials and the necessity for libraries to quickly record their holdings produced the need for an established minimum level of cataloging. For this reason, IFLA decided to adopt new standards of cataloging for both machine processing and humans.[1] This resulted in the publication of FRBR (Functional Requirements for Bibliographic Records), FRAD (Functional Requirements for

Michele Seikel (michele.seikel@okstate.edu) is the cataloger at Edmon Low Library, Oklahoma State University. **Thomas Steele** (thomas.d.steele-1@ou.edu) is the Science and Technology Cataloger, University of Oklahoma Libraries.

Manuscript submitted October 17, 2019; returned to authors for revision January 6, 2020; revised manuscript submitted January 31, 2020; accepted for publication February 14, 2020.

Authority Data), and FRSAD (Functional Requirements for Subject Authority Data).

The original IFLA 1997 study, which resulted in the FRBR model, focused on helping users to fulfill their information needs. As Madison stated, "The study's framework was built on the ways data contained in bibliographic records are used through a variety of user tasks, namely to find, identify, select, and obtain," and the concept of user tasks has remained to the present day, although it has been further developed.[2] The study determined that the best way to identify how a bibliographic record (and later authority data) can fulfill these tasks is to use the entity-relationship model. Chen developed this form of modeling in 1976.[3]

FRBR's entity analysis technique began by isolating the entities that are the key objects of interest to users of bibliographic records. "The study then identifies the characteristics or attributes associated with each entity and the relationships between entities that are most important to users in formulating bibliographic searches, interpreting responses to those searches, and 'navigating' the universe of entities described in bibliographic records."[4] The key set of entities introduced by the FRBR model is known as WEMI (Work, Expression, Manifestation, and Item). These entities remain as part of the LRM model, and in modern implementations such as RDA and BIBFRAME (Bibliographic Framework).

FRBR, FRAD, and FRSAD were replaced by the IFLA LRM (Library Reference Model), which also resulted in the restructuring of the RDA Toolkit. The 2017 final draft of the LRM states in its introduction that "the model considers bibliographic information pertinent to all types of resources generally of interest to libraries; however, the model seeks to reveal the commonalities and underlying structure of bibliographic resources."[5] This statement indicates that LRM defines a broad scope for bibliographic description and is intended to be format agnostic.

The Library of Congress (LC) and its partners are developing and testing BIBFRAME to produce linked data to describe holdings. Of the models examined in this project, BIBFRAME is the most overtly designed for production of linked metadata in RDF (Resource Description Framework). RDF is the framework used to describe resources available via the web and is designed to be read and understood by computers. The process of expressing RDF in a computer language is known as serialization, and XML is the most popular serialization format for RDF. It extends the linking structure of the web to name and link relationships between things (usually referred to as a "triple"). "The first step was to make the many large (LCSH, Name Authority File, etc.) and small (language codes, content and media terms, etc.) controlled lists available for use in a linked data application. These controlled vocabularies and lists used for bibliographic description needed to be transformed from print or web formats into RDF to enable their links to be referenced by URIs, making their descriptions accessible in RDF."[6] LC's Linked Data Service began development in 2007. The intent is to make the links both automatic and enhanced. The Service continued with the BIBFRAME project. Because BIBFRAME was explicitly designed to create RDF triples, its entities and their definitions might be expected to differ somewhat from RDA, which is format agnostic. However, because RDA has been modified for LRM, its entity relationship model is RDF triple friendly. RDF triples are metadata built with the classic "entity-relationship-entity" structure. An example of the structure follows: "Charles Dickens"—"is the author of"—"*Bleak House*," which expresses the relationship of Charles Dickens to his work "Bleak House."

Method

To examine how the FRBR, FRAD, and FRSAD conceptual models have evolved and have been implemented since their release, the definitions of several key bibliographic entities that are shared conceptually among FRBR, FRAD, FRSAD, LRM, RDA, and BIBFRAME were compared. Making these comparisons based on the use within each model of the same or similar bibliographic entities was possible; however, in some cases, entities were not part of all models or have been renamed. As shown in tables 1 through 11, some entity definitions have remained the same across the various models and implementations, while others have varied considerably from the original FRBR definitions and its counterparts. Comparing the definitions side-by-side demonstrates how thinking has changed about these entities and the structure of their bibliographic description models. Additionally, relationships between entities within their model structures were examined and compared for evolutionary changes. Because of the number of possible relationships that may be associated with each entity, comparing and presenting each relationship for all of the models was too complex. Instead, an example demonstrating how an "Agent" relationship is expressed is compared between the three models that have "Agent" as an entity.

To construct table 1, entity definitions for FRBR were extracted from Chapter 3.2 Entities in *Functional Requirements for Bibliographic Records: Final Report.*[6] Chapter 3.4 Entity Definitions in *Functional Requirements for Authority Data* supplied the definitions for FRAD.[7] FRSAD's definitions are derived from the *Functional Requirements for Subject Authority Data's* third chapter.[8] Entity definitions used in LRM are from *IFLA-Library Reference Model.*[9] The RDA entity definitions are from the *RDA Toolkit* Beta site, which is available via subscription to the RDA Toolkit.[10] At the time of this writing, the RDA

Table 1. Work.

Entity	FRBR	LRM	RDA	BIBFRAME
Work	A distinct intellectual or artistic creation	The intellectual or artistic content of a distinct creation	A distinct intellectual or artistic creation, that is, the intellectual or artistic content	Resource reflecting a conceptual essence of a cataloging resource

Table 2. Expression

Entity	FRBR	LRM	RDA	BIBFRAME
Expression	The specific intellectual or artistic form that a work takes each time it is realized	A distinct combination of signs conveying intellectual or artistic content	An intellectual or artistic realization of a work in the form of alpha-numeric, musical or choreographic notation, sound, image, object, movement, etc., or any combination of such forms	Work has property expressionOf, Work that the described Work is an expression of

Toolkit is still being restructured, and a final version has not been released. Lastly, the BIBFRAME entity definitions are from the BIBFRAME 2.0 site, in the Vocabulary List View.[11] A discussion of each compared entity follows the corresponding table.

Res and Thema

Before discussing the first shared entity of the models, it should be noted that LRM introduced the entity "*Res*." "*Res*" is much like another word for entity. It covers all entities in LRM, is the top level, and holds the model together. The definition states, "Res is a superclass of all the other entities that are explicitly defined, as well as of any other entities not specifically labelled."[12] FRSAD introduced the concept of "*Thema*" and defined it as "Any entity used as a subject of a work." With LRM, the entity was generalized to include "any entity in the universe of discourse" and renamed "*Res*" ("thing" in Latin).[13] RDA uses the term "universe of human discourse" in its definition for RDA Entity, its superclass of all entities, making it clear that RDA Entity is its equivalent for "*Res*." BIBFRAME has no equivalent for "*Res*" or "*Thema*."

Work

Table 1 shows that for the entity "Work," a major change in LRM from the original FRBR definition is the addition of "content of" in the LRM definition. This wording makes the definition more specific. The "Work" definition now encompasses the content of the creation, not the creation itself. This idea has been carried over in the RDA definition, "a distinct intellectual or artistic creation, that is, the intellectual or artistic content." Both LRM and RDA retain the FRBR idea of "a distinct creation," making it apparent that a "Work" must be unique and distinct from others. FRAD and FRSAD both cite the FRBR definition. The language differs considerably, however, from the BIBFRAME definition. The BIBFRAME phrase "resource reflecting a conceptual essence" combines the concept of "Work" and "Expression." As seen in the online BIBFRAME documentation, the FRBR concept of "Expression" maps to the BIBFRAME concept of "Work," therefore the two are one entity in BIBFRAME. The overview of the model defines a Work more clearly as "the highest level of abstraction, a Work, in the BIBFRAME context, reflects the conceptual essence of the cataloged resource: authors, languages, and what it is about (subjects)."[14] Because BIBFRAME is intended for the transition of MARC21 format to a bibliographic description format grounded in linked data techniques, this combination allows an easier transwition from a format not based on WEMI.[15]

Expression

As shown in table 2, the entity "Expression" has been simplified from the original FRBR definition to its recent LRM definition. While the LRM does not cite the term "Work" in its "Expression" definition, it explains that the entity is "A distinct combination of signs conveying intellectual or artistic content." This part of the definition could read as "signs conveying a 'Work.'" The RDA Toolkit Beta site uses the same phrase, "in the form of alphanumeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms." The RDA definition provides a list of various forms in which the "Expression" can be produced, perhaps to convey the breadth of possible resources that can be described as "Expressions." While the new LRM definition is not as enumerative as the original FRBR definition, it focuses on "any combination of such

Table 3. Manifestation

Entity	FRBR	LRM	RDA	BIBFRAME
Manifestation	The physical embodiment of an expression of a work	A set of all carriers that are assumed to share the same characteristics as to intellectual or artistic content and aspects of physical form. That set is defined by both the overall content and the production plan for its carrier or carriers.	A physical embodiment of an expression of a work	Called Instance, a resource reflecting an individual material embodiment of a work

Table 4. Item

Entity	FRBR	LRM	RDA	BIBFRAME
Item	A single exemplar of a manifestation	An object or objects carrying signs intended to convey intellectual or artistic content	A single exemplar or instance of a manifestation	Single example of an instance

forms." Essentially, the meaning is the same and emphasizes the broadness that an "Expression" can take. As shown in the table, BIBFRAME combined "Work" and "Expression" into one entity. Both FRBR and LRM explain that an "Expression" is a "Work" that has been "realized." BIBFRAME operates under the assumption that all "Works" being cataloged have been realized, thus the "Expression" is not needed in BIBFRAME as a separate entity.

Manifestation

The RDA Steering Committee decided to retain the original FRBR definition of a "Manifestation," the physical embodiment of an "Expression" of a "Work," in the RDA Toolkit. In contrast, the LRM completely reworked the definition to emphasize the carrier concept, as shown in table 3. Rather than calling it a "physical embodiment," the language defines all carriers that share the same characteristics regarding intellectual or artistic content and aspects. A positive aspect of this LRM definition is the reminder to catalogers that a "manifestation" will share characteristics of the content with other manifestations of the same work.

Not only has BIBFRAME reduced the WEMI model to three entities, it has redefined "Manifestation" as an "Instance," "a resource reflecting an individual material embodiment of a Work," as shown in the table above. The BIBFRAME website clarifies information recorded for an instance includes publisher, place and date of publication, and format, for example.[16] It also clarifies the differences in a print and an electronic reproduction. As McCallum explains, "in the MARC environment it was common to try to describe on one record the manifestation and all the different carriers for it. With the BIBFRAME model the expectation is that major differences in carriers, such as print and electronic, would be separate Instances of a Work and characteristics of each can then be clearly recorded in the Instance descriptions."[17]

Item

The RDA Toolkit and BIBFRAME have retained the original FRBR definition, with minor differences, for the entity "Item." as shown in table 4 above. The LRM definition, however, is "a physical object carrying signs resulting from a production process and intended to convey intellectual or artistic content." The scope notes clarify that, "an item exemplifying a manifestation normally reflects all the characteristics that define the manifestation itself." Therefore, the meaning of "Item" has not changed much from FRBR. Both FRBR and LRM explain that an "Item" can be more than one physical object, such as a multi-volume monograph. While they both define an "Item" as a physical object, LRM makes clear in its scope notes for the relationship between a "Manifestation" and an "Agent" distributing it, "items can be made available through the traditional distribution processes for physical items, or by making electronic items available for download, streaming, etc."[18] Referring back to the table, BIBFRAME also defines an "item" as physical or electronic, and "it reflects information such as its location (physical or virtual) shelf mark, and barcode.[19]

Agent

In RDA, an "agent" is a person or group of persons capable of acting as a unit, as shown in table 5. RDA also follows the LRM hierarchy, by defining "Agent" as a super-type, with "Person" and "Collective Agent" being sub-types. BIBFRAME defines an "Agent" as a person or an organization with a role. It also lists Family, Organization, Jurisdiction, and Meeting as subclasses. Therefore, although "Agent"

Table 5. Agent

Entity	FRBR	LRM	RDA	BIBFRAME
Agent	not found in FRBR	An entity capable of deliberate actions, of being granted rights, and of being held accountable for its actions	A person, family, or corporate body	Entity having a role in a resource, such as a person or organization

Table 6. Person

Entity	FRBR	LRM	RDA	BIBFRAME
Person	an individual	An individual human being	An individual human being who lives or is assumed to have lived	Individual or identity established by an individual (either alone or in collaboration with one or more other individuals

Table 7. Collective Agent

Entity	FRBR	LRM	RDA	BIBFRAME
Collective Agent	Not found in FRBR	A gathering or organization of persons bearing a particular name and capable of acting as a unit	A gathering or organization of persons bearing a particular name and capable of acting as a unit. A collective agent includes a corporate body and a family.	Not found in BIBFRAME

did not exist in FRBR/FRAD/FRSAD, it plays the same important role in LRM, RDA, and BIBFRAME. While definitions differ in wording, in all three "Agent" is an entity consisting of all the related subclasses. However, these subclasses differ in all three.

With FRBR, Work, Expression, Manifestation, and Item are called Group 1 entities. Group 2 entities were Person and Corporate Body. Group 3 were "Concept," Object, Event, Place.[20] FRAD added the entity "Family" to the Group 2 entities.[21] FRSAD introduced two new entities, Nomen and Thema.[22] When IFLA consolidated FRBR, FRAD, and FRSAD into one model, this hierarchy was not retained. LRM has three levels, with *Res* at the top level. The second level is comprised of Work, Expression, Manifestation, Item, Agent, Nomen, Place, and Timespan. Group 3 entities are on the same level as Group 1. The Group 2 entities are Person and Collective Agent and are subclasses of "Agent." "Collective Agent" encompasses the former FRAD entities Family and Corporate Body. The "Agent" definition in LRM asserts various properties, such as "capable of deliberate actions, of being granted rights and of being held accountable for its actions."[23]

Person

In FRBR and its authority models, a "Person" is an individual, living or dead, or a persona or identity "established or adopted by two or more individuals." Both FRBR and FRAD cited the pseudonym Ellery Queen as an example of a "person," even though Queen was the pseudonym used by two cousins. However, in LRM and RDA, as shown in table 6, Ellery Queen is now a "Collective Agent" because a "Person" is an individual human being. In BIBFRAME, Queen is a "Person" under its definition, which includes individuals, but also identities established either alone or in collaboration with others. In FRAD, it is explained that fictional characters may be Persons, Families, Places, etc. according to some cataloging rules but are Concepts according to others.[24] The cataloging rules to which FRAD refers are AACR2 (Anglo-American Cataloging Rules, revised). LRM changed this ambiguity, eliminating fictional characters such as Kermit the Frog from its definition. In LRM, a fictional character is only a *Res*, which lists fictional characters in its scope notes. *Res*, as a superclass, covers "any other entities not specifically labelled."[25] RDA, by using the phrase "individual human being who lives or is assumed to have lived," excludes fictional characters and real animals or other non-humans. BIBFRAME enables catalogers to use their own judgement by using the original FRBR definition.

Collective Agent

FRBR originally defined a corporate body as "an organization or group of individuals and/or organizations acting as a

Table 8. Nomen

Entity	FRBR	LRM	RDA	BIBFRAME
Nomen	In FRAD, Name is a character, word, or group of words and/or characters by which an entity is known	An association between an entity and a designation that refers to it	A designation that refers to an RDA entity. A designation includes a name, title, access point, identifier, and subject classification codes and headings.	Not found in BIBFRAME

unit," as shown in table 7. The second subclass of "Agent" in LRM is "Collective Agent." LRM's definition of "Collective Agent" is like the FRBR definition for Corporate Body, but it further defines the entity as "a gathering or organization of persons bearing a particular name," emphasizing the group acting as a unit is a named group. What distinguishes a "Collective Agent" from a gathering of people is that the name "must be a specific name and not just a generic description for the gathering."[26] While families and corporate bodies are no longer LRM entities, the scope notes for "Collective Agent" explains that they are specific types that "may be relevant in a particular bibliographic application."

This explanation is followed by RDA in its use of "Collective Agent." Its definition in the RDA Beta toolkit is similar to the LRM definition, but also defines the entity as an entity super-type with two entity sub-types, Family and Corporate Body. The RDA definition for Corporate Body requires the group of persons or organizations to be identified by a name, just as LRM does for "Collective Agent." The other sub-type, Family, matches the original FRAD definition.

Referring back to table 7, BIBFRAME differs completely from LRM and does not use "Collective Agent." In LRM, "Agent" has two subclasses, and has five in BIBFRAME. The first, "Person," has already been discussed in this paper. The other four, Family, Organization, Jurisdiction, and Meeting, are "Collective Agents" in LRM. BIBFRAME's definition of "Family" is the same as the definition first introduced in FRAD. The "Organization" entity is a match for the original definition created by FRBR. In its definition, BIBFRAME does not specifically state that the group acting as a unit must have a specific name, leaving room for the user's judgement, and the set of cataloging rules in use. The Jurisdiction entity is defined as a "legal or political unit administering a geographic area." The last sub-type, Meeting, is a "gathering of individuals or representatives of various bodies for the purpose of discussing and/or acting on topics of common interest." Considering that LC created BIBFRAME with its own collections in mind, it is apparent they have decided Jurisdiction and Meeting are relevant to its bibliographic application.

MARC format has defined fields for Meeting (111, 611, 711, 811), while Jurisdiction was an indicator under the Corporate Name fields. By defining the two as sub-types, it allows the retention of these specific agents when converting from MARC.

Nomen

In FRAD, the definition for name initially described only characters, words, or a group of words and/or characters used to identify an entity. In FRSAD, Nomen is defined as "any sign or sequence of signs (alphanumeric characters, symbols, sound, etc.) that a *thema* is known by, referred to, or addressed as." This is much broader than the original definition for "Name." In LRM, the definition is simply "an association between an entity and a designation that refers to it." By not defining the signs or sequence of signs for the designation, the LRM definition is the most inclusive.

RDA has also changed the definition to both broaden it and make it more specific, adding the following statement, "A designation includes a name, title, access point, identifier, and subject classification codes and headings." Hence, any identifier can be a "Nomen." However, BIBFRAME does not seem to have a corresponding entity to "Nomen." According to the LRM model, "A nomen associates whatever appellation (i.e., combination of signs) is used to refer to an instance of an entity found in the bibliographic universe with that entity. Any entity referred to in the universe of discourse is named through at least one nomen."[27] Therefore, by this definition, the "Nomen" expresses the relationship(s) between a resource and the designation(s) associated with it. RDA and LRM both also clarify that "Nomen" is expressed by a nomen string, "the combination of signs that forms an appellation associated with an entity."[28] BIBFRAME is the actual implementation of RDA, LRM and/or other cataloging models. To label a Work with a nomen string and then label the nomen string as a "Nomen" in BIBFRAME would be redundant.

Place

Concept, Object, Event, and Place are the FRBR Group 3 entities. Of the four, "Place" is the only one with a counterpart in LRM, although the original "Place" entity has been deprecated. With FRBR, a "Place" is "a location," as seen

Table 9. Place

Entity	FRBR	LRM	RDA	BIBFRAME
Place	a location	A given extent of space	A given extent of space	Geographic location or place entity associated with a resource or element of description

Table 10. Timespan

Entity	FRBR	LRM	RDA	BIBFRAME
Timespan	Not found in FRBR	A temporal extent having a beginning, an end and a duration	A temporal extent having a beginning, an end and a duration	Called Temporal, a chronological period

in table 9. This definition encompasses a range of locations: "terrestrial and extra-terrestrial; historical and contemporary; geographic features and geo-political jurisdictions." It also may include fictional places, as explained earlier in the entity "Person." FRBR allows fictional places to be "Places" or "Concepts." However, in LRM, a "Place" is "the human identification of a geographic area or extent of space." While both FRBR and LRM allow a "Place" to be on Earth or extra-terrestrial, LRM eliminates imaginary, legendary or fictional places from its definition. RDA and BIBFRAME give brief definitions of "Place," and do not describe what constitutes a "Place." In RDA a "Place" is "a given extent of space," while in BIBFRAME it is a "geographic place."

Timespan

"Timespan," an entity not found in FRBR, has a shared definition in LRM and RDA, as shown in table 10. Their definition, "a temporal extent, having a beginning, an end, and a duration," specifies that "Timespan" cannot be recorded as open-ended. BIBFRAME has named the entity "Temporal," with the simple definition "a chronological period," a less specific but very broad definition that could be used to describe any sort of length of time associated with a resource.

Other Entities

As previously explained, not all entities in FRBR/FRAD/FRSAD were included in the transition to LRM, and as a result, in RDA. Most of these entities were, as LRM describes, deprecated. LRM defines deprecated as "The entity, attribute or relationship is eliminated from LRM (i.e. it is unneeded, or reconceptualized)."[29] The FRBR Group 3 entities Concept, Object, and Event have all been deprecated. Place was redefined. FRAD introduced the entities Identifier and Controlled Access Point. Both have been deprecated in LRM, though they can be used as subclasses of "Nomen." Two other FRAD entities, Rules and Agency, are out of scope for LRM. Out of scope entities are "outside the functional scope of LRM, and so not included at all. It might be conceptually valid, but in a model with a broader scope."[30]

The entities shown in BIBFRAME are only the entities relevant to the main LRM and RDA conceptual models. The BIBFRAME class and property list is extensive and the purpose of this study was to focus on BIBFRAME's implementation of these models. While BIBFRAME has entities relating to FRBR's deprecated entities, they are not covered here.

Relationships Among Entities

Entities are only one part of the entity-relationship model. Carlyle gives the following explanation of an entity-relationship model: "A simplified explanation of the structure stipulated by an ER model is that three kinds of things are allowed in it: *entities*, *attributes*, and *relationships*. *Entities* are things, either physical or abstract. Thus, an entity can be virtually anything: *relationships* are interactions among entities and *attributes* are properties or characteristics of either entities or relationships."[31] Table 11 illustrates the two-way relationships possessed by all WEMI entities.

The LRM provides the following example of Agent relationships: Agent (isA) PERSON, PERSON (isA) AGENT, and (LRM-R5i) AGENT 'created' WORK. This sequence implies the more specific relationship: PERSON 'created' WORK. These LRM relationships also seem to have been designed with the classic "entity-relationship-entity" format to allow for production of RDF triples. This observation is based on the structure of entity relationships as described in both the LRM and BIBFRAME. Figure 1 below is an example of a relationship between entities that would produce a triple in RDF.

"It is important to note that while relationships are declared between entities, in reality they are established

Table 11. WEMI Entity Relationships in FRBR

Entity	Attribute	Relationship
Work	Is realized through	Expression
Expression	Is embodied in	Manifestion
Manifestion	Is exemplified by	Item
Item	Is exemplar of	Manifestation
Manifestion	Is embodiment of	Expression
Expression	Is realization of	Work

and exist between instances," according to the IFLA LRM.[32]

BIBFRAME describes this Agent relationship differently, as an association, thus:

> A BIBFRAME Agent may be associated with a BIBFRAME resource (e.g. Work) through some role, like author, illustrator, or editor.
>
> Role Association Expressed as a Contribution
>
> **Property bf:contribution and Class bf:Contribution**
> The property bf:contribution has expected value a bf:Contribution, which pairs an agent with a specific role. For example, Role is illustrator, and the association is expressed as a Contribution.[33]

Therefore, the Agent's bf:Contribution is illustrator. This sequence recalls the entity-relationship definition, consisting of entities, relationships, and properties.

The RDA Toolkit Beta version offers a relationship matrix for each of the entities. The relationship matrix for Agent provides the instruction, "To record an association between this entity and a related entity, use a relationship element that is sufficiently specific to meet the needs of the agency creating the data."[34] It includes a listing of possible relationships, with a description and example of each. An example of an RDA Agent to Work relationship is "author of." Other potential relationships listed in the matrix are "composer of "work of" or "director of." Several of the listed relationships have sub-relationships that are more specific. "Creator of," for example, has twenty-three sub-relationships from which to choose, such as "photographer of work of" or "remix artist of." The cataloger can specify the Work's relationship to an "Agent" using one of these. Like BIBFRAME, these relationships are intended to be used in the production of metadata, including but not limited to MARC records, in which the subfield e within a 1XX or 7XX field would be used to specify the type of relationship such as "Creator of."

Each entity can have numerous relationships linking it to others, creating a network that, when a URI is defined

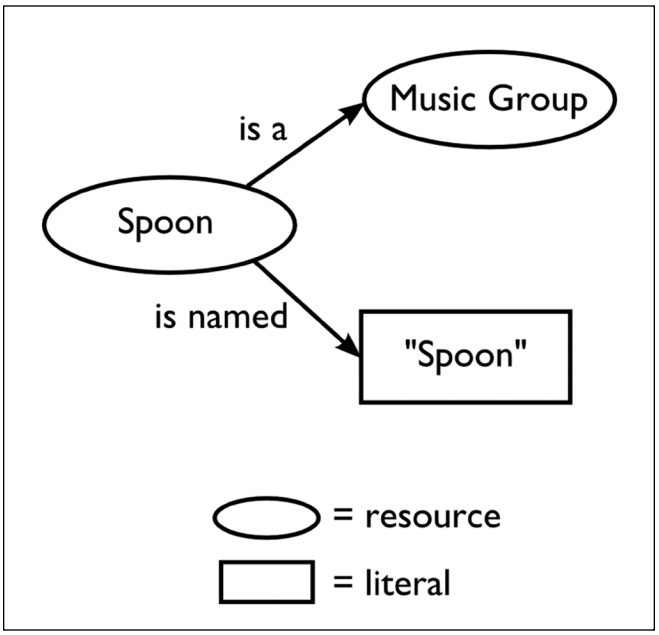


Figure 1. RDF Triple

for each entity and relationship, becomes linked data. Interestingly, each of the models describes these relationships differently. FRBR explains how the entities can have relationships with each other with explanatory charts. This approach was perhaps used because the entity relationship model was not as well known when FRBR was released in the late 1990s. LRM and BIBFRAME offer examples of the resulting RDF triples for each relationship, whereas RDA includes lists (relationship matrixes) of relationships possible for each entity to be used for MARC records and other types of metadata production.

Conclusion

More than twenty years have passed since IFLA issued its final report on FRBR, creating its entity-relationship model. Because FRBR was intended to define requirements for a minimal-level bibliographic record, it was followed by FRAD and FRSAD to address name authority and subject authority data respectively. These models took over a decade to be finalized. The consolidation of these models led to the next step of evolution for the WEMI model, LRM. The differences between FRBR, FRAD, FRSAD, and LRM can be explained by the differences in each model's scope. LRM does not distinguish between data traditionally stored in bibliographic, holding, or name and subject authority records, instead "all of this data is included under the term bibliographic information and as such is within the scope of the model."[35] The goal of the LRM as a conceptual model

is to cover a broad scope, which can also explain its differences from RDA and BIBFRAME.

In 2016, LC introduced BIBFRAME 2.0, to follow up its initial model. Both versions of BIBFRAME were introduced after FRBR and its companions but before LRM. This timing only partly explains its differences from LRM. BIBFRAME, while also concerned with bibliographic description, has the purpose to aid in the transition from MARC 21 formats to formats that are more linked data-friendly. This purpose can explain the other differences.[36] This paper discusses some, but not all, of the entities found in BIBFRAME. The most important distinction between BIBFRAME and the other entity-relationship models is its simplification of the WEMI model. This difference was perhaps intended for an easier transition from MARC 21. Additionally, BIBFRAME is not concerned with a "Work" until it has become an "Expression."

The original version of RDA was released in June 2010, and it did not include RDA entities. In 2017, the RDA Toolkit Restructure and Redesign (3R) Project began, with one of its goals to implement LRM in RDA. Because the RDA Toolkit Beta version was modeled after LRM, it resembles LRM more than any of the other models examined. Yet RDA also has a more specific goal than LRM's general overview of bibliographic information. RDA's purpose is to enable the creation of "library and cultural heritage metadata that are well-formed according to international models."[37]

Despite these differences in purpose and scope, all studied models share the common goal to help users to Find, Identify, Select, and Obtain the resources they need. These user tasks were first introduced in FRBR. While the WEMI model continues to evolve and be fine-tuned by LRM and implementation models like BIBFRAME and RDA, these user tasks have remained.

References

1. IFLA Study Group on the Functional Requirement for Bibliographic Records, "Functional Requirements for Bibliographic Records" (Munich: K.G. Saur, 1998), https://www.ifla.org/files/assets/cataloguing/frbr/frbr_2008.pdf.
2. Olivia M. A. Madison, "The IFLA Functional Requirements for Bibliographic Records," *Library Resources & Technical Services* 44, no. 3 (2000): 153–59, https://doi.org/10.5860/lrts.44n3.153.
3. Peter Pin-Shan Chen, "The Entity-Relationship Model: Toward a Unified View of Data," *ACM Transactions on Database Systems* 1, no. 1 (1976): 9–36, https://doi.org/10.1145/320434.320440.
4. IFLA Study Group, "Functional Requirements for Bibliographic Records."
5. Pat Riva, Patrick Le Bœuf, and Maja Žumer, "IFLA Library Reference Model: A Conceptual Model for Bibliographic Information" (Netherlands: International Federation of Library Associations and Institutions, 2017), https://www.ifla.org/files/assets/cataloguing/frbr-lrm/ifla-lrm-august-2017.pdf.
6. IFLA Study Group, "Functional Requirements for Bibliographic Records."
7. Glenn E. Patton, ed., "Functional Requirements for Authority Data: A Conceptual Model," K.G. Saur, 2009, https://www.ifla.org/files/assets/cataloguing/frad/frad_2013.pdf.
8. Marcia Lei Zeng, Maja Žumer, and Athena Salaba, "Functional Requirements for Subject Authority Data (FRSAD): A Conceptual Model," in *Encyclopedia of Library and Information Sciences*, ed. John D. McDonald and Michael Levine-Clark (Berlin: DeGruyter Saur, 2011), https://www.ifla.org/files/assets/classification-and-indexing/functional-requirements-for-subject-authority-data/frsad-final-report.pdf.
9. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
10. RDA Steering Committee, "RDA Toolkit," 2019, https://beta.rdatoolkit.org/.
11. Library of Congress, "BIBFRAME 2.0 Vocabulary List View," 2017, http://id.loc.gov/ontologies/bibframe.html.
12. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
13. Pat Riva, Patrick Le Bœuf, and Maja Žumer, "Transition Mappings: User Tasks, Entities, Attributes, and Relationships in FRBR, FRAD, and FRSAD Mapped to Their Equivalents in the IFLA Library Reference Model" (Netherlands: IFLA, 2017), accessed September 16, 2019, https://www.ifla.org/files/assets/cataloguing/frbr-lrm/transitionmappings201708.pdf.
14. Library of Congress, "BIBFRAME Profiles: Introduction and Specification, Draft," May 5, 2014, https://www.loc.gov/bibframe/docs/bibframe-profiles.html.
15. Library of Congress. "Overview of the BIBFRAME 2.0 Model (BIBFRAME—Bibliographic Framework Initiative, Library of Congress)," April 21, 2016. https://www.loc.gov/bibframe/docs/bibframe2-model.html.
16. Library of Congress, "Overview of the BIBFRAME 2.0 Model."
17. Sally H. McCallum, "BIBFRAME Development," *Italian Journal of Library, Archives & Information*

Science 8, no. 3 (2017): 71–85, https://doi.org/10.4403/jlis.it-12415.
18. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
19. Library of Congress, "Overview of the BIBFRAME 2.0 Model."
20. IFLA Study Group.
21. Patton, "Functional Requirements for Authority Data."
22. Zeng, Žumer, and Salaba, "Functional Requirements for Subject Authority Data."
23. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
24. Patton, "Functional Requirements for Authority Data."
25. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
26. Riva, Le Bœuf, and Žumer.
27. Riva, Le Bœuf, and Žumer.
28. RDA Steering Committee, "RDA Toolkit."
29. Riva, Le Bœuf, and Žumer, "Transition Mappings."
30. Riva, Le Bœuf, and Žumer.
31. Allyson Carlyle, "Understanding FRBR as a Conceptual Model," Library Resources & Technical Services 50, no. 4 (2006): 264–73, https://doi.org/10.5860/lrts.50n4.264.
32. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
33. Library of Congress, "BIBFRAME 2.0—Expressing Roles," March 2017.
34. RDA Steering Committee, "RDA Toolkit."
35. Riva, Le Bœuf, and Žumer, "IFLA Library Reference Model."
36. Library of Congress, "Overview of the BIBFRAME 2.0 Model."
37. RDA Steering Committee, "RDA Toolkit."

Notes on Operations Database Discovery

From a Migration Project to a Content Strategy

Sandra Wong

After migrating to Ex Libris's Alma and Primo for its integrated library system (ILS) and discovery layer, library staff at Simon Fraser University (SFU) maintained duplicate database information in a locally developed electronic resources management (ERM) system known as the CUFTS ERM for fifteen months. The CUFTS ERM provided the data for the library's public-facing database list known as the CUFTS resource database (CRDB). A database search function had been on Ex Libris's Primo roadmap for product development and was announced six months after the library went live with Alma and Primo. However, the new Primo database search function lacked the ability to replace the CRDB. Members of the library's ILS Steering Committee who managed Alma and Primo were concerned about significant negative impacts on end-users if the library adopted Primo to replace the CRDB. The steering committee formed a task group to investigate options for creating a database list from Alma records to reduce duplication of staff time and effort, and systems resources, and to replicate the main functions of the existing CRDB for end-user discovery and access.

Simon Fraser University (SFU) is a publicly funded research university offering comprehensive undergraduate and graduate degrees located in Metro Vancouver, Canada. In November 2015, SFU library's Integrated Library System (ILS) Steering Committee issued a request for proposal for a new ILS to replace their Innovative Millennium system. After months of evaluations and demonstrations, the associate university librarian for Library Technology Services and Special Collections announced the selection of Ex Libris's Alma with Primo as its new ILS and web-scale discovery service in September 2016. Prior to implementation of Alma and Primo, SFU's library had used a locally developed knowledge base (KB) and link resolver service and electronic resources management (ERM) system to manage its electronic resources (e-resources). These locally developed systems formed SFU library's reSearcher suite, an alternative to commercial link resolvers and ERM services. The reSearcher suite consisted of the CUFTS KB with the GODOT openURL link resolver, and the CUFTS ERM system.[1] The reSearcher suite was available to libraries as open source software. Libraries could download and install the software independently and obtain monthly updates from the master CUFTS KB at no cost. SFU's library also offered hosting and support for the reSearcher suite like any other library service vendor on a cost-recovery basis.

Between 2002 and 2010, many academic libraries (primarily in western Canada) subscribed to the reSearcher suite through SFU library's hosting service. At its peak, SFU's library hosted and provided support to more than fifty libraries using its reSearcher suite. However, after this period of continued

Sandra Wong (swongj@sfu.ca) is the Electronic Resources Librarian at Simon Fraser University in Metro Vancouver, Canada.

Manuscript submitted September 26, 2019; returned to author for revision December 26, 2019; revised manuscript submitted January 22, 2020; accepted for publication January 26, 2020.

growth and interest in the reSearcher suite as an alternative to commercial equivalents, SFU's library began losing reSearcher library clients in 2010. This decline seemed to coincide with the growth and adoption of web-scale discovery services like Summon, Primo, and EBSCO Discovery Services. If a library chose a discovery service from a provider other than their existing link resolver service, it usually meant managing two KBs. Often a KB and link resolver service might be included with the discovery service as part of a bundled package.[2] As libraries began subscribing to web-scale discovery services, they cancelled their subscriptions to the reSearcher suite to avoid managing multiple KBs. Once the decision had been made to adopt Alma with Primo, senior SFU library administration concluded that continuing reSearcher operations was no longer feasible. Alma was able to handle both print and e-resources natively without the need for additional separate services such as a KB with a link resolver and an ERM system. A formal notice to decommission the reSearcher suite was sent to all SFU-hosted library clients and known reSearcher users informing them of the decision to cease the service effective August 31, 2017. These reSearcher users were given a full year to find a replacement. By the time the reSearcher suite was decommissioned, SFU's library was hosting twenty-three client libraries.

Although the entire reSearcher suite at SFU was shut down to external library clients on August 31, 2017, SFU library staff continued to use the CUFTS ERM because it was the source for its public facing database list known as the CUFTS Resource Database (CRDB). Earlier, in May 2017, the library had gone live with Alma and Primo. However, Primo did not offer a public-facing database search service at the time. A database search function was on Ex Libris's Primo roadmap for future product development and an announcement was expected shortly after SFU's formal go live date. That announcement came with the November 2017 release of Primo software updates. This update included a database search page derived from Alma data that allowed users to search for databases by title or to browse alphabetically.[3] A review of this new feature in the sandbox environment proved disappointing. End-users would need to know the exact name of a database to use the Primo database search. Since end-users frequently do not know database names, many members of the ILS Steering Committee felt that this was not an adequate substitute for the CRDB. The ILS Steering Committee could have waited for further enhancements to this feature, but duplicating information in Alma and in the CUFTS ERM for two or more years was not a sustainable option. Managing information such as access URLs, proxy prepends for off-campus authentication, license data, and other details in the CUFTS ERM was redundant when the same details were also managed in Alma. Errors between the two systems were anticipated over time. However, adopting the Primo database search feature was not viable either, as doing so would have had significant negative impacts on end-users. Wanting to avoid another significant change so soon after the ILS migration meant that the ILS Steering Committee needed a solution to balance the library's requirement to rationalize staff time and effort without disrupting end-user database access and discovery. Thus, in February 2018, the steering committee formed the CRDB Replacement Task Group to investigate options for creating a suitable database list from Alma data that would replicate the end-user functions of the existing CRDB to relieve staff of the need to maintain duplicate data in the CUFTS ERM.

Task group members included the Head of Library Systems, the Systems Librarian, the Systems Consultant, the Electronic Resources Librarian, and the Head of the eBranch who is responsible for the user experience of the library's online presence. In addition to the technical details and specifications of extracting data from Alma to populate a public-facing database list, the task group developed a library-wide strategy to maintain a sustainable, reliable, and useful database list to meet end-user needs. The task group created a "Database List Criteria and Guidelines" document that ultimately formed the basis for policy, practice, maintenance, and administration for this new database list. The document contained criteria for inclusion in the database list and guidelines for database descriptions, resource types, and subject headings. The document also formally assigned responsibility to the Electronic Resources Librarian for administering and interpreting the criteria and guidelines. Coincidentally, the task group's activities plus this document formed the basis of a content strategy for SFU library's new database list.

Literature Review

Despite the seemingly important role of e-resources and databases on academic library websites, there is very little recent literature on the topic. Hoeppner commented on the scarcity of papers related to a library's public-facing database list in a 2017 paper.[4] Brisbon, Parlette-Stewart, and Oldham agreed with Hoeppner's findings in 2018.[5] Hoeppner presented the results of a survey on the systems used to manage access to databases. She found that half of the respondents used LibGuides, a content management system from Springshare, to manage their public facing database list. The remaining responses varied from web editors and content management systems such as Drupal and WordPress to commercial products like Serials Solutions and Alma to a combination of ILS and ERM systems. Hoeppner also provided a brief history of the evolution of database lists at the University of Central Florida, outlining

the growth of entries and how the list was maintained. She concluded by offering practical tips on managing a database list.[6] At the University of Guelph, Brisbin et al. emphasized the role of project management and collaboration to migrate their database list from a homegrown system written in the ColdFusion programming language to using a LibGuide. The migration team held multiple workshops with librarians and library staff to assign subjects to databases and "best bets" to denote top or recommended databases. They implemented a peer-review process for writing database descriptions that conformed to a set of criteria.[7] Tobias provided a case study on Michigan State University Libraries' migration from a homegrown database list called ERASMUS to using a LibGuide. In her case study, the centralization of management was essential to controlling the proliferation of entries that occurred in ERASMUS when all librarians had permission to add e-resources, including freely available websites.[8] Ramshaw, Lecat, and Hodge described the technical details of creating and managing a database list after migrating from Millennium to OCLC's WorldShare at the American University of Sharjah in the United Arab Emirates. They used OCLC's application programming interface (API) and a Perl script to automate the populating and updating of their LibGuide database list with information from their WorldShare instance.[9] A published conference report from the 2015 NASIG annual conference described how Oberg, at Wheaton College, used CORAL, an open source ERM, and its public interface generator add-on, to create a public-facing database list and to streamline workflows.[10] Evelhoch studied whether the adoption of a web-scale discovery service impacted the webpage views of Central Washington University's database lists by title and by subject. He monitored webpage views before and after the implementation of the Primo web-scale discovery service and found that webpage views of database lists by title and by subject declined after Primo adoption.[11]

Prior to the widespread adoption of web-scale discovery services by academic libraries that occurred after 2010, several studies on library website usability included sections on a library's database list. Caudle and Schmitz conducted an inventory of electronic journal (e-journal) and database webpages of Association of Research Libraries (ARL) organizations' websites in 2005. They found that many ARL libraries were consistent in offering an A to Z list plus a database list by subject. The authors then ranked library websites subjectively for their usability, specifically whether they included library jargon or were difficult to navigate.[12] Fuller et al. conducted usability tests at the University of Connecticut Libraries to improve the design of their database list, which was generated by their in-house ERM system. As a result, subject headings were no longer nested and database descriptions were rewritten to reduce the amount of text. Each subject heading presented only the top five databases instead of a long alphabetical list. A keyword search box was de-emphasized as the authors discovered that users tended to enter research topics into the search box, rather than a database name.[13] Fry and Rich conducted a 2010 usability study at Bowling Green State University to determine how students were using their database list, which was generated by their Innovative ERM system. They found that users struggled to find additional databases even when presented with a list organized by subject. Users tended to return to known and familiar database brands. In their discussion of the results, Fry and Rich hypothesized that a discovery layer with its single search box to search all of the library's content would solve some of the usability issues encountered by students. The authors concluded by stating their plans to investigate alternative formatting for their database list and how to add relevancy ranking. They also recommended marketing campaigns so that students would recognize database brands to increase awareness of their database options.[14]

Ho wrote about using her catalog's built-in forms to request enhancements to bibliographic records at Texas A&M University. The library's bibliographic records populated a separate database of e-resources, including article indexes and databases plus e-journals and e-books. She found that librarians often requested uncontrolled subject headings and alternative titles for e-resources in an effort to increase their discoverability.[15] Published in 2008, before discovery services were widely available, Geckle, Pozzebon, and Williams of Middle Tennessee State University (MTSU) suggested that "Cataloging electronic resources improves discovery and access." The authors argued for a central access point for all of the library's e-resources in addition to a separate A to Z or subject listing. As part of a website redesign, MTSU implemented an open source solution to manage their database list called LibData. What began as a clean-up project to ensure that all e-resources were properly cataloged became an ongoing activity that required policies and procedures to enable better discovery and to maintain accuracy. E-resources needed to be added to LibData before they could be cataloged. The LibData database details webpage served as the official MARC 856 access link in their catalog to minimize the need for link maintenance in two places. At MTSU, the Electronic Resources Librarian and the Acquisitions unit both ordered electronic products separately. Improving communications between the two areas would ensure that e-resources would be added to both the catalog and to LibData.[16]

The authors of all of these studies concur that making e-resources more discoverable by end-users is the primary goal of any database list. Discovery is dependent upon a user-friendly and easy to navigate website. Novice information seekers unfamiliar with the options and layout of a library's website with its myriad of choices need guidance. Applying a content strategy to a small subset of the

library's website, such as the database list, can rationalize the library's database list and promote continuity and stability among the many hundreds of electronic resources (e-resources) made available by the library.

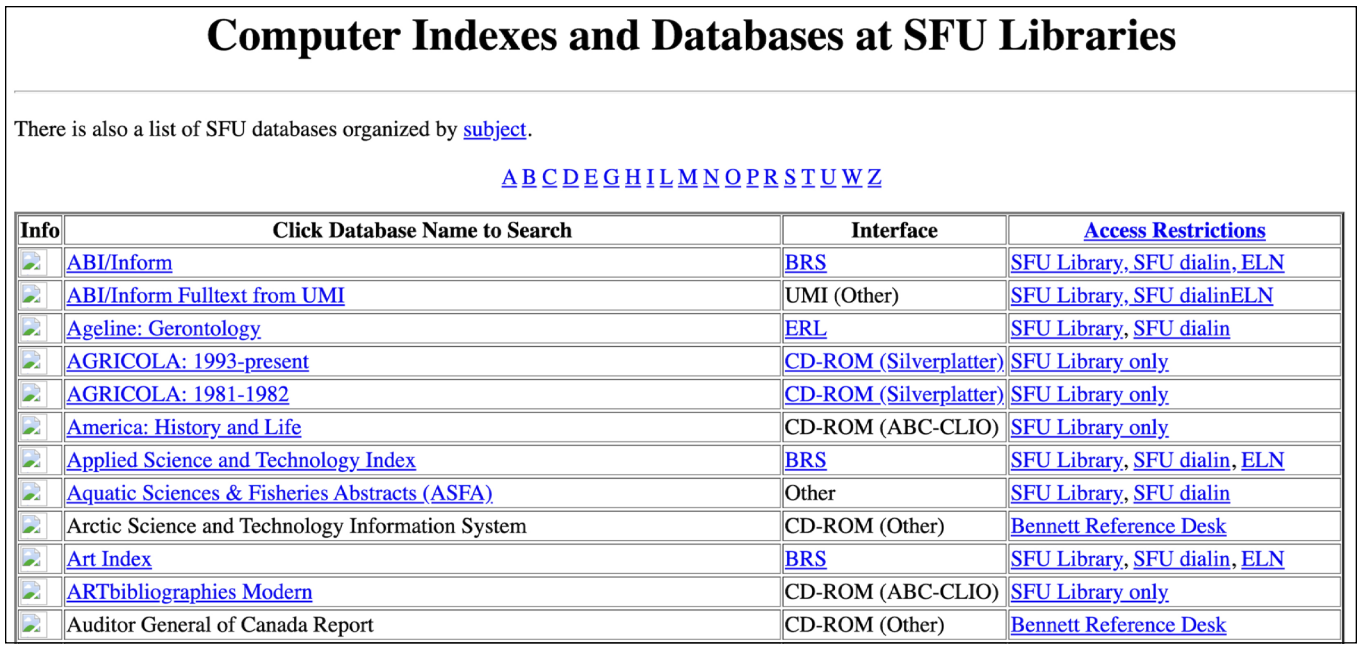
A special section of the January 2011 issue of the *Bulletin of the American Society for Information Science* introduced the concept of content strategy by top content strategy practitioners to the library literature. In that issue, Baille described how content seemed to be a peripheral aspect of the web development process. User experience, user-design, and usability seemed to be the drivers of website applications. Baille outlined the problems that can occur when content is not made an equal player in a web project along with the developers who write the code and the designers who are responsible for the user experience. Form no longer follows function when content is not at the center of the project. User experience is only successful when users find relevant content. If there is no useful content, the user experience is a failure. By making content central to the project and acknowledging that content has a lifecycle, an organization increases its potential return on investment through its acceptance of content as an asset rather than "the stuff that goes into the design."[17] Preeminent content strategist Halvorson reiterated that: "Content strategy plans for the creation, publication, and governance of useful, usable content." She outlined what should be defined in a content strategy, such as key themes and messages, a description of the content purpose, metadata frameworks, and "strategic recommendations on content creation, publication and governance."[18]

Content strategy in libraries is often associated with usability in libraries. The library literature on content strategy tends to focus on library websites. Many authors provide case studies for initiatives related to website redesigns that include some aspect of creating and applying content strategy or standards. Blakiston published a case study about developing a content strategy for the University of Arizona Libraries' website. Upon appointment as the library's website product manager, Blakiston was inspired by Halvorson's seminal *Content Strategy for the Web* and decided that her library needed a content strategy. Blakiston outlined her approach to conducting a content audit of the website that included cleaning up and deleting webpages that were redundant and/or outdated. She also provided detailed information on analyzing the results of the audit to define the website's core purpose and created standards for web authors. The University of Arizona Libraries' content strategy included the creation of a new role within library teams. Content managers for each library team were responsible for general oversight and management of the webpages assigned to their team.[19]

Fritch and Pitts from Kansas State University (KSU) took the opportunity to use a migration to LibGuides V2 to implement content standards for their LibGuide webpages and a checklist for content creators to follow. At KSU, the new standards came with "bite," where LibGuide administrators could ensure compliance by the content creators through annual evaluations with supervisors.[20] Greene described the development of a policy at Duke University for adding freely available and open access resources to their catalog to make them accessible, discoverable, and also manageable. Although Greene's case study is not identified as a content strategy, it has some of the hallmarks of a content strategy: a purpose, criteria and guidelines, and a maintenance schedule.[21]

Dempsky and Chapman outlined organizational culture problems and resistance to applying content strategy principles to the University of Michigan Library's website. They described a large, decentralized organization that encountered a mixed response in setting limits on what to produce and maintain. Communicating their content strategy to library staff was often regarded as criticism of a librarian's work. The authors mention the "strong sense of ownership and attachment to content by librarians" that is often used as evidence for professional productivity that may not align with the library's core content strategy principles. A web content coordinator group with representatives from each library division was formed to communicate and guide the divisions in understanding and applying the new web content policies, strategies, and best practices. Reinforcement from middle managers seemed to be more effective than working with individual web content authors. Explicit support from library leadership was also important to gain acceptance for the new content strategy principles.[22]

Datig from Nazareth College in New York described the steps for preparing, implementing, and assessing a content strategy for a library. She suggests beginning with a content audit, creating user personas, formulating a content vision statement, and identifying a channel strategy. Implementing a content strategy involves creating an editorial calendar and preparing workflow documents and editorial standards. The assessment piece includes setting goals and tracking progress. Gathering user feedback and obtaining analytics from websites and social media platforms all contribute to the evaluation of the content strategy. She described some of the efforts made towards content strategy at her own institution. Nazareth College's librarians audited the library's FAQs and LibGuide webpages and established workflows and guidelines for print and digital materials. Datig's case study offers practical strategies for moving forward with a content strategy.[23] Newton and Riggs documented the University of Wollongong in Australia's comprehensive plan that produced their library-wide content strategy. The authors introduce the idea of design thinking to empathize with their users so that "user experience is at the center of decision-making." Content strategy, design thinking, personas, and continuous



Computer Indexes and Databases at SFU Libraries

There is also a list of SFU databases organized by subject.

A B C D E G H I L M N O P R S T U W Z

Info	Click Database Name to Search	Interface	Access Restrictions
	ABI/Inform	BRS	SFU Library, SFU dialin, ELN
	ABI/Inform Fulltext from UMI	UMI (Other)	SFU Library, SFU dialinELN
	Ageline: Gerontology	ERL	SFU Library, SFU dialin
	AGRICOLA: 1993-present	CD-ROM (Silverplatter)	SFU Library only
	AGRICOLA: 1981-1982	CD-ROM (Silverplatter)	SFU Library only
	America: History and Life	CD-ROM (ABC-CLIO)	SFU Library only
	Applied Science and Technology Index	BRS	SFU Library, SFU dialin, ELN
	Aquatic Sciences & Fisheries Abstracts (ASFA)	Other	SFU Library, SFU dialin
	Arctic Science and Technology Information System	CD-ROM (Other)	Bennett Reference Desk
	Art Index	BRS	SFU Library, SFU dialin, ELN
	ARTbibliographies Modern	CD-ROM (ABC-CLIO)	SFU Library only
	Auditor General of Canada Report	CD-ROM (Other)	Bennett Reference Desk

Figure 1. Computer Indexes and Databases at SFU Libraries on July 20, 1997.

evaluation contributed to the University of Wollongong's ongoing review of their library's content to place the user at the center of their strategic design plan.[24]

Buchanan's paper offers practical advice and tools to manage website content as Portland State University Library's content strategist. She includes a link to a template to define website goals, priorities, and principles. She also includes links to a style guide, a website calendar, an inventory of usability test questions and scenarios, and a Google Analytics template for website reports.[25]

McDonald and Burkhardt published a review of content management systems used in libraries to reinforce an organization's need for a content strategy. They stress that a content strategy is necessary "to meet the ever-increasing demands on our resources to produce timely, user-centered content that advances our missions for supporting teaching, research, and learning."[26] Content strategy is a key theme in the commercial digital industry that is transforming how libraries manage their own digital presence. Developing a content strategy for a library database list can guide users to better database discovery and ultimately to a successful and rewarding user experience.

History of Database Lists at SFU's Library

From 1997 to 2002, SFU's databases were listed in a series of webpages with a common format. The format included a table with four columns containing a link to a description of the database, the database name, the interface name, and access restrictions. Entries in these lists included CD-ROMs that users needed to check out, locally networked resources that required patrons to use a library computer to access the database, and telnet and web-accessible resources through SFU's dial-in service. In 1997, the database list contained eighty-eight entries listed under nine broad subject categories. Figure 1 is screenshot of the database list retrieved from the Internet Archive's Wayback Machine captured on July 20, 1997.[27]

By 2002, the list of databases had grown to 191 entries organized into seventy-four subjects that generally corresponded to SFU's academic departments, nested under nine broad subject categories. Many of the CD-ROM databases and locally networked resources were replaced by web-accessible equivalents. This increase in entries resulted in the creation of an in-house system to manage the list of databases, colloquially referred to as the database of databases (DB of DBs). This DB of DBs exposed a brief description of the database on the initial pages instead of just a link to a description. The nine broad subject categories were removed in favor of using the longer list of subjects that aligned with the departments and courses offered at SFU. Figure 2 is a screenshot of the DB of DBs dated September 6, 2002 from the Wayback Machine.[28] The Systems Librarian who created the system managed the DB of DBs from 2002 to 2008.

In 2008, the library introduced the CRDB when the CUFTS ERM was developed. Responsibility for managing the database list was transferred to the Electronic Resources Librarian in Collections Management. The CRDB

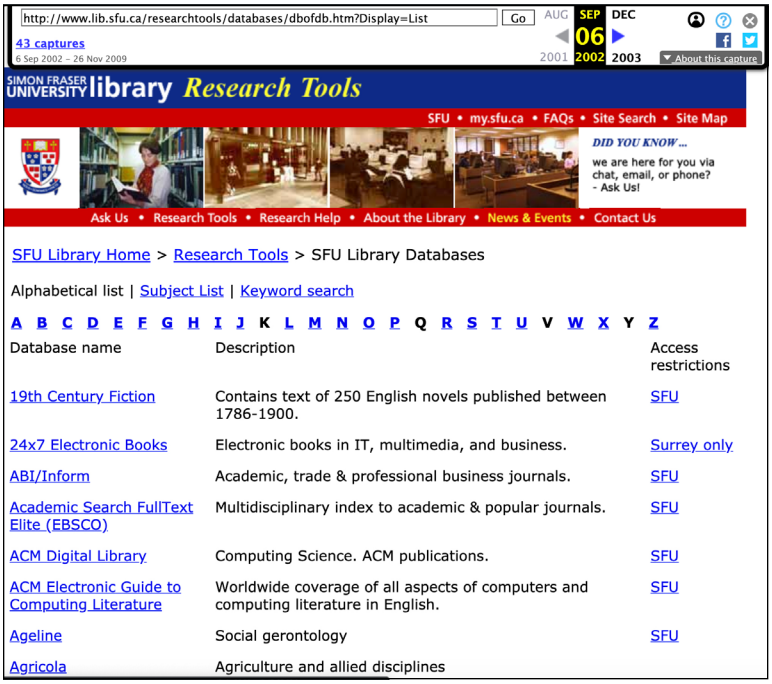


Figure 2. SFU Library Databases also known as the DB of DBs on September 6, 2002.

empowered liaison librarians to write both a brief and a full description of the database entries. These descriptions included html to add formatting and links to additional information. Liaison librarians could add and remove databases under the various subject headings at their own discretion. Subject headings were divided by "top" and "other," and liaisons could rank each entry within a subject through a click and drag procedure. Databases in any subject could be ranked in any order within the subject heading. Figure 3 shows the list of databases in the CRDB for chemistry with their brief description from December 26, 2014.[29]

The CUFTS ERM also contained other fields that were displayed publicly in a full CRDB record, such as resource type, links to help, title lists, and license terms. Clicking on a database name revealed the full CRDB database record. Figure 4 shows a screen capture of the full CRDB record for the Reaxys database.[30]

Unlike previous versions of the database lists, the CUFTS ERM served multiple purposes in addition to generating the public-facing database list. The CUFTS ERM managed details such as institutional administrator logins and account numbers, vendor contacts, order information, license information, and COUNTER usage data for the library's e-resources. The CUFTS ERM was a welcome addition at the time to help the Electronic Resources Librarian manage the increasing number of e-resources licensed by the library. By the time the library went live with Alma and Primo in May 2017, the CRDB portion of the CUFTS ERM contained 767 records, including open access and free resources.

In the months following Alma and Primo implementation, the maintenance of duplicate database and license information in the CUFTS ERM was becoming unsustainable. The automated ingestion of CRDB records into the library's former Millennium ILS had not been replicated for Alma in anticipation of a Primo database search function. Centralized maintenance of database information in Alma was needed to reduce the duplication of staff time and effort, and system resources. Thus, SFU library's ILS Steering Committee charged the CRDB Replacement Task Group with finding a solution and making recommendations when it was clear that the new Primo database search was insufficient to meet end-user's expectations for database discovery.

CRDB Replacement Task Group

The CRDB Replacement Task Group members began by documenting all the CRDB functions and taking an inventory of every CRDB database record. They conducted an environmental scan of the library literature to determine the common practices of academic libraries in providing database access. The task group also reviewed other Alma and Primo library websites to determine how they were handling their database lists. Not surprisingly, most Alma libraries were using Springshare's LibGuides service as Hoeppner had found.[31] One library, Swinburne University in Australia, was using Alma APIs to create its database list. With this information, the Systems Consultant investigated the Alma APIs to establish a proof of concept for a new database list. Following Alma implementation, the Electronic Resources Librarian made the decision to maintain separate electronic collections for database-like access. For readers unfamiliar with Alma, e-resources are organized into electronic collections. Each electronic collection must be assigned one of three types: aggregator, selective or database. Electronic collections may also have two levels of service: a collection and a service level. The service level lists all of the full-text titles, known as portfolios in Alma. Both aggregator and selective electronic collection types contain portfolios. Database type electronic collections do not have portfolios. Therefore, an e-resource containing full-text can be maintained on a single electronic collection. Database-like access could be provided at the collection level, and access to the individual full-text titles within the database could be provided at the service level through its portfolios. However, the Electronic Resources Librarian decided that where an e-resource may contain portfolios and a database-like searching function,

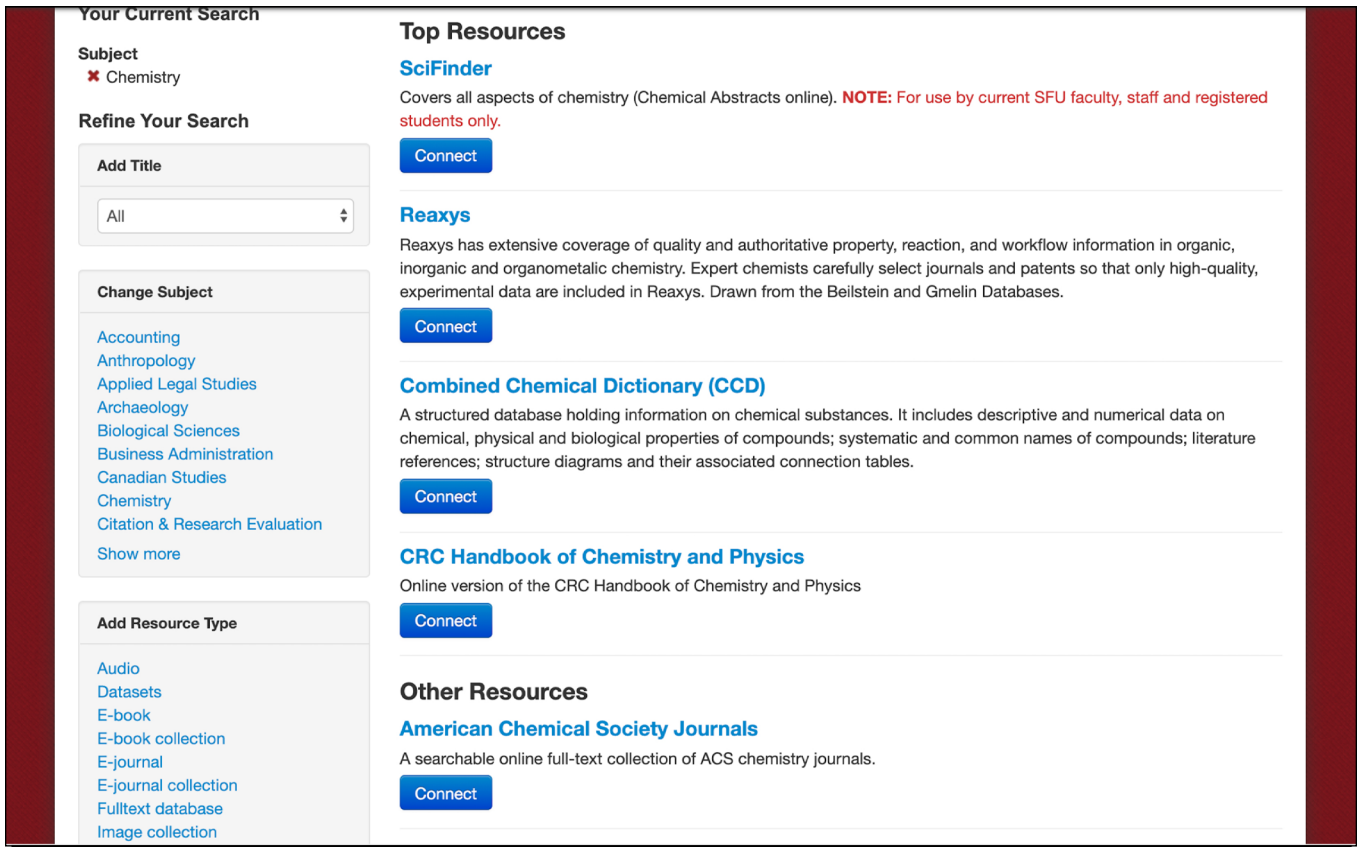


Figure 3. CRDB list of databases for chemistry on December 26, 2014.

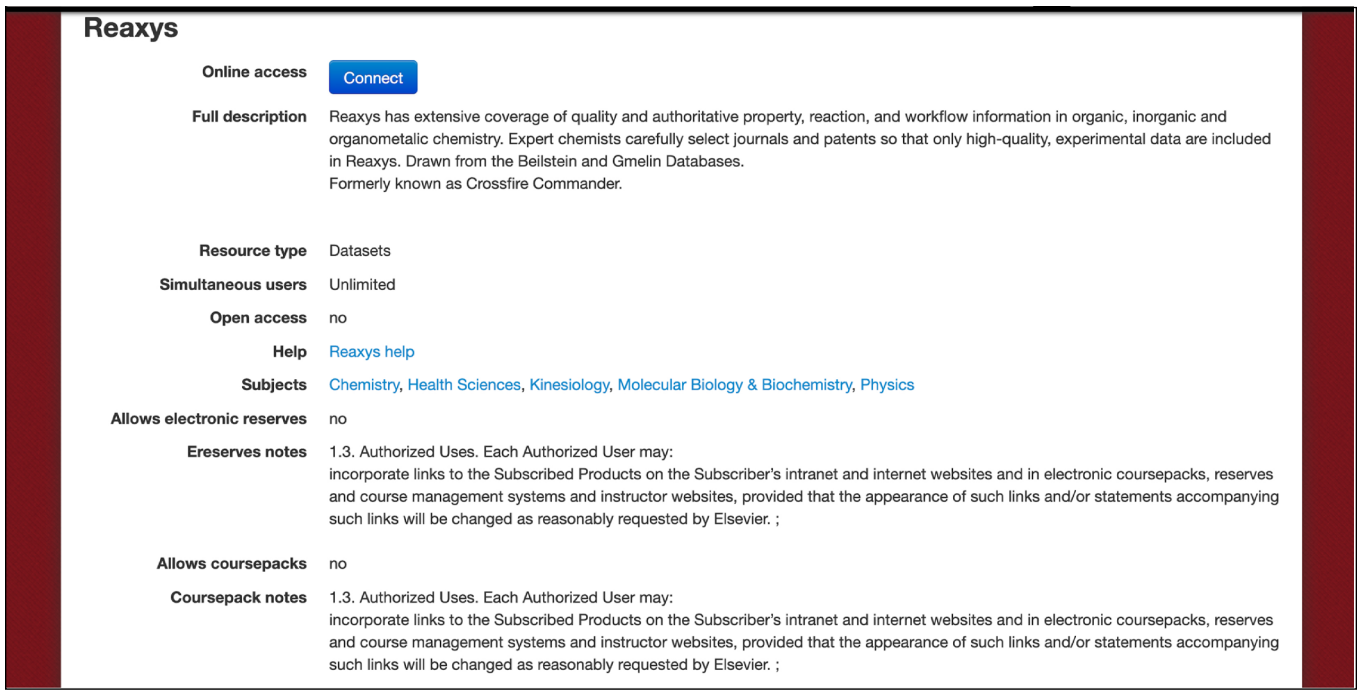


Figure 4. Reaxys database full record from CRDB displaying additional CUFTS ERM fields.

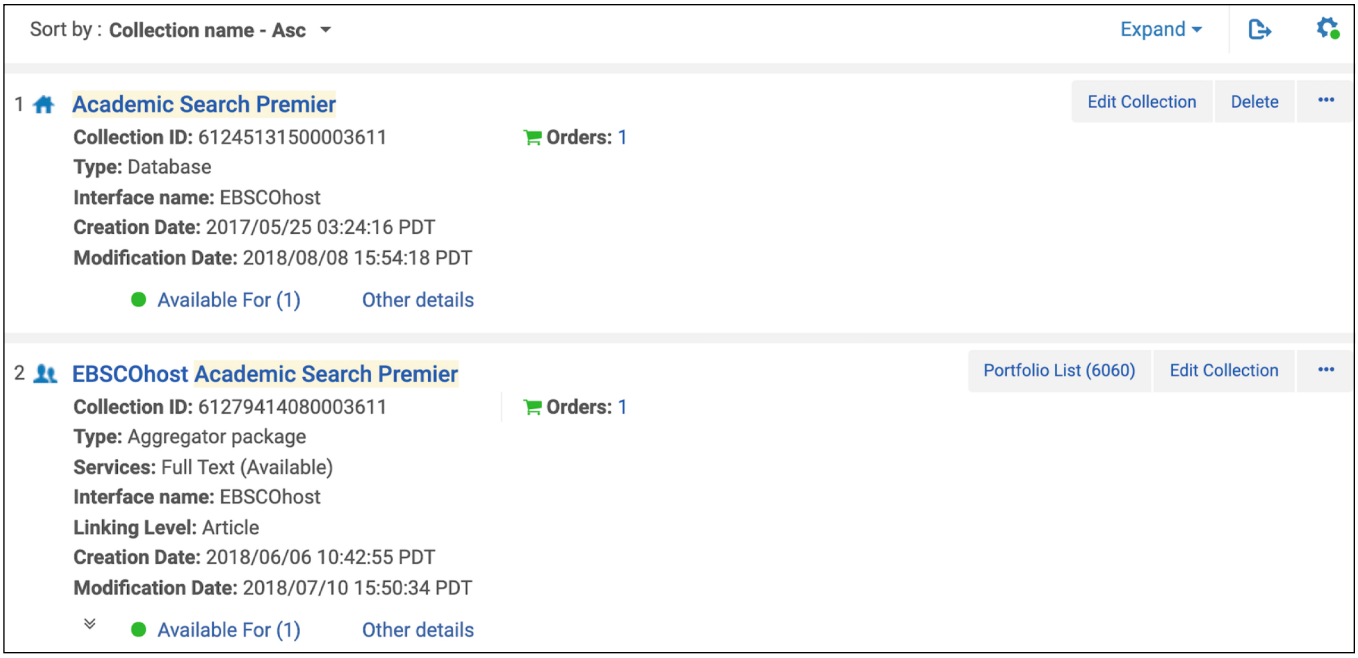


Figure 5. Two Alma electronic collections for EBSCO's Academic Search Premier are listed for SFU's library.

that the database level access would be maintained on a separate electronic collection with its type designated as database for easier future maintenance in Alma. For example, EBSCO's Academic Search Premier could be maintained on a single electronic collection in Alma. But at SFU's library, Alma has two entries for Academic Search Premier—one for the database access where the electronic collection is set to type equals database and a second electronic collection that contains all of the portfolios or full-text titles in the database with its collection level details suppressed, as displayed in Figure 5. The top record in figure 5 is the database version with no portfolios. The bottom record contains the portfolios or full-text titles included in the database.

Thus, it was easy for the Electronic Resources Librarian to create a saved logical set of Alma database type electronic collections that the Alma API could access to create the new database list. Whenever a new electronic collection whose type equals database was added to Alma, the set would automatically update. Using this saved logical set of Alma database records, the Systems Consultant was able to create a prototype using Alma APIs to produce a new database list. The API retrieved information from the database electronic collection record, its linked license record, and from MARC fields in the bibliographic record attached to the electronic collection. The task group then needed to determine what content from Alma and the CRDB should be added to the new database list and how to migrate data from the CRDB into Alma.

The task group sent an informal email request to all library staff soliciting feedback to identify the two or three primary features that were most important to keep in a database list. The results confirmed the task group member's instincts on the top features: databases by subject, an ability to rank the list of databases, plus the ability to edit or annotate the description. Part of the project included an inventory of the CRDB. How many entries were in the CRDB, how many entries per subject heading, and how many "top" and "other" database entries were listed in each subject heading. The number of databases assigned to each subject heading ranged from as few as four to as many as 110. Some subjects had more than ten "top" databases with a few subjects with well over twenty "top" databases. Some of the subject headings, such as Datasets, News sources, and Primary Sources, were not actual subjects. Thus, the task group decided to delete these headings and convert them to resource types instead. Subject headings that represented programs no longer offered by the university were also deleted. The task group arbitrarily decided that up to five "top" would be sufficient for each subject and would incorporate ranking for the top five databases. Everything labelled as "other" would be listed alphabetically. Eventually, the task group consulted with the appropriate liaison librarians to create additional subject headings to better reflect the diversity of disciplines where the original subject heading contained close to 100 or more entries. For example, History had 110 entries and English had eighty-three. New subject headings with geographic regions or

sub-genres were added to each that matched how information was presented in the corresponding subject research guide. For example, instead of a single entry for "History," the new database list contains seven additional headings:

- History—Asia
- History—Canada
- History—Europe & the United Kingdom
- History—Middle East
- History—Military & War
- History—Social & Cultural
- History—United States of America

The task group planned to use and migrate the CRDB subject headings that aligned with SFU's faculty and departments rather than the formal Library of Congress subject headings found in the MARC 650 fields in the bibliographic records attached to each database electronic collection in Alma. Additionally, the task group decided to use CRDB resource types written in plain text because they would be easier to manage than the complex MARC tags and notations used to designate a resource type for Primo display.

The CRDB inventory also included a full export of all of the brief and full database descriptions for each CRDB record. Upon review, task group members felt that the brief descriptions were too brief in many cases. The full descriptions were also inconsistent, containing many broken links, a lot of HTML code, and obsolete information. Since the migration plan involved overlaying CRDB data into MARC fields, it seemed unlikely that any MARC field could ingest the full descriptions with all of the extra HTML code and formatting. After discussion, the task group decided to use a single succinct database description in plain text for the new database list rather than maintain both brief and full descriptions. At this point, the task group met with two cataloger librarians to determine which MARC fields could be used to record the CRDB data without adversely affecting general cataloging standards and procedures. The task group needed a means to record a single CRDB database description, multiple subject headings, a top subject designation with a ranking number, and the resource type written in plain text. Catalogers suggested MARC 592 $a for the database description, MARC 690 $a for the subject headings and 690 $g for the "top" and ranking number, and MARC 691 $a for the resource type. MARC 59X fields are reserved for local notes. The 69X fields are for local subject use. The MARC 69Xs were also repeatable to accommodate multiple subject headings in a single bibliographic record. The Systems Consultant modified the CRDB MARC export to match this specification. Simultaneously, support staff reconciled all CRDB records to ensure the presence of the CUFTS ERM number in the MARC record that was linked to the corresponding Alma database type electronic collection for matching. Since the library went live with Alma and Primo in May 2017, new databases had been added to the CRDB that lacked the CUFTS ERM number in its corresponding Alma MARC record. Thus, support staff confirmed that every CRDB record matched an Alma database electronic collection with a MARC bibliographic record containing the matching CUFTS ERM number. Next, the task group tested the process of exporting CRDB MARC records and importing the records into Alma to overlay the CRDB database descriptions, subject headings and rankings, and the resource types into their appropriate MARC tags. Then the Systems Consultant wrote scripts using the Alma API to pull the relevant data from Alma to populate a prototype which eventually became the new database list.

The task group knew that the decision to use only one description for each database and limiting the "top" to five databases might be met with some consternation among liaison librarians. The prospect of editing every database description was daunting for both task group members and liaison librarians. Although the new database list could have simply used the existing brief descriptions from the CRDB, task group members felt strongly that these descriptions required significant editing. Initially, liaison librarians were responsible for populating the brief and full descriptions for the databases purchased with their departmental collection budgets. However, there was significant staff turnover since 2008, and liaison librarian priorities changed. Liaison librarians began to focus more on scholarly communication and direct research support and less on reference and general information services. Therefore, maintaining the CRDB database descriptions became less important to them, resulting in dated, obsolete descriptions and broken links. The task group did not want to migrate incorrect and outdated information into the new database list. To avoid unnecessary workflow between Alma and the CRDB, the task group required that all the edits and changes be performed by the liaison librarians in the CRDB environment. This requirement would enable a single export of all the edited CRDB MARC records for migration into Alma. Thus, the task group needed the liaison managers' support and endorsement to ensure that the tasks required of the liaison librarians would be completed before the final migration of data from the CRDB into Alma.

The CRDB Replacement Task Group's final report and recommendations included an appendix titled "Database List Criteria and Guidelines" that was adopted by the liaison managers and supported as a library-wide policy. This appendix consisted of a seven-page document that formed the policy, practice, administration, and maintenance for the new database list. This document outlined the purpose

of the database list, the criteria for inclusion in the list, and guidelines for subject headings, resource types, and database descriptions. The document also included statements on responsibility and authority for administering the database list. The guidelines for the database descriptions section was written entirely by librarians in the eBranch, who were responsible for the user experience of the library's online presence. In addition to descriptions limited to plain text, the eBranch added website usability principles adapted to fit the needs of the database list, such as keeping descriptions brief, using jargon-free language, avoiding vendor marketing terminology, and keeping the descriptions evergreen by not listing specific dates or facts that could date quickly.

CRDB Replacement Task Group Results

With the endorsement of the ILS Steering Committee and the liaison managers, which were supported by the liaison managers, the task group implemented the project plan. Notwithstanding the programming provided by the Systems Consultant to make the new database list almost identical to the CRDB, the project plan gave liaison librarians ten weeks from mid-May to July 31, 2018 to edit the CRDB subject lists and database descriptions. Liaison librarians had to select and rank up to five "top" databases in each of their liaison subject headings, and review and edit each database description for their assigned databases. Permissions in the CRDB were altered so that liaison librarians could only edit the brief description to avoid circumstances such as editing the full description by mistake. Knowing that some subject areas contained an overwhelming number of databases, the task group arranged with the liaison managers to provide assistance with the labor from reference librarians (contract librarians hired to help with public services and other projects) and a master of Library and Information Studies student employed by the library at the time. The Electronic Resources Librarian and eBranch librarians handled general, multidisciplinary, and orphaned subject headings and databases. From the 230 open access and freely available resources in the CRDB, fifteen were removed due to cessation, disappearance, or where the content was duplicated in another source. Where there were separate entries for e-journal and e-book platforms from the same publisher on the same website, the journal entry was edited to accommodate both e-journal and e-book content, and the e-book platform entry was deleted.

Prior to Primo implementation, the CRDB was needed to expose license information for e-books at the platform level that could not be accommodated with the former Millennium ILS. Separate database entries for e-book platforms to display license information were no longer necessary since Primo could display license information on each individual e-book title, which satisfied the library's obligation to expose license permissions related to course packs and electronic reserves under the Canadian copyright environment. Indeed, in 2018, many publishers consolidated their e-journal and e-book content under a single website. When the project began, the CRDB contained 767 entries. By August 1, 2018, the number of entries in the CRDB had decreased to 740 entries for import into Alma.

SFU library's new database list went live on August 15, 2018. Dual access was maintained until the end of August with notes on every CRDB entry warning users of the impending URL change to the new database list and asking users to update their links or bookmarks. In addition to notifying all library staff of the change, an email notice was sent separately to SFU's Centre for Online Distance Education (CODE) to provide advance notice of the change so that CODE staff could update links in online courses. On September 1, 2018, the CRDB was decommissioned and redirects were provided to point users to the new database list. Many links to the CRDB on library webpages were rewritten systematically by the Systems Consultant who is also the technical administrator for the library's public website. Any links that could not be rewritten programmatically were reviewed manually for context to determine to what they should point or whether they should be deleted. In addition to mimicking the CRDB's overall look and feel, the new database list included some functionalities that were not provided by the CRDB. For example, the CRDB had offered users a single drop-down menu to select a subject heading. An additional facet could be added only after a user selected a subject. The new database list allowed users to select from three initial drop-down menus: by subject, by content type (previously referred to as resource type but renamed to distinguish it from Primo resource type facets), and by provider.

The new database list has required little attention aside from regular maintenance in Alma as a part of the life cycle of managing e-resources. The API retrieves data from Alma and rebuilds the new database list daily at 1:00 am Pacific time to account for any changes made to Alma database records, such as databases added or removed, access URL changes, or revised descriptions or subject heading assignments. Because the new database list contained no significant changes from the CRDB's main functions and had almost the exact same look and feel of the CRDB, the change was likely imperceptible to most end-users. In the absence of any negative comments or feedback from end-users, the task group safely assumed that the transition from the CRDB to the new database list was successful.

Content Strategy for SFU Library's New Database List Discussion

The CRDB Replacement Task Group did not begin its work with a plan to create formal criteria and guidelines for the library's database list. Like many academic libraries, additions to the library's list of databases was ad hoc at best, and followed some very basic guidelines, such as:

- abstracting and indexing sources;
- online bibliographies;
- online statistical sources;
- the resource should be searchable or have some kind of searching component;
- a subscription-based collection of e-books; and
- a searchable collection of reference works (dictionaries, encyclopedias, handbooks, directories).

These basic guidelines were originally documented to justify declining requests from liaison librarians to add free websites and blogs to the CRDB. Coincidentally, as the CRDB Replacement Task Group was beginning its work, a discussion on the Electronic Resources in Libraries Email List (ERIL-L) took place in March 2018 that asked list members to describe their criteria for adding e-resources to an A to Z database list. Some respondents stated that they had no documented criteria. Others had similarly worded guidelines about abstracting and indexing sources and licensed or subscribed databases. A few respondents expressed a wish for more control and centralization, stating that database criteria were too inclusive at their libraries.[32] The ERIL-L discussion led to the idea of creating something more formal to replace the relatively short list of bullet points that described the criteria of what could be added to the CRDB.

Indeed, task group members anticipated that convincing a large diverse group of liaison librarians, who generally managed their own professional work and time, to perform the work requested in the CRDB Replacement Task Group's report and recommendations might be challenging. None of the task group members directly supervised the liaison librarians. Thus, it was important for the three liaison managers to publicly support the task group's recommendations as a library-wide priority. Adding formal "Database List Criteria and Guidelines" to the final report was a strategic maneuver to add weight to the liaison managers' support. The task group emphasized the need for the liaison librarians' subject matter expertise to rank the databases listed in their subject liaison areas and to rewrite or review the database descriptions to ensure that the new database list would be current and useful to end-users. Knowing that some liaison librarians felt a sense of ownership for the databases acquired through their departmental collection budgets, the task group anticipated that the liaison librarians would accept the responsibility of rewriting the database descriptions without protest. It was a delicate matter for the task group to direct the work of other library professionals in a project where the liaison librarians had minimal input into the final report and recommendations.

From a content strategist's point of view, the "Database List Criteria and Guidelines" form a part of the content strategy for SFU library's new database list. A copy is included as an appendix to this paper to provide a model for other library personnel who may wish to replicate, create, or modify existing database list criteria documents. The task group created a detailed inventory of all CRDB records. According to content strategy literature, this inventory was the equivalent of a content audit. The task group performed a quantitative audit of all the CRDB records and their subject headings, resource types, and rankings. They also completed a qualitative assessment of the CRDB database descriptions. From this audit, the task group identified where additional subject headings and resource types could be added and deleted. The qualitative assessment of the brief and full database descriptions helped the task group analyze the extent of outdated information and broken links that existed in CRDB database descriptions. The CRDB Replacement Task Group's primary goal to centralize database information in Alma was countered by a strong focus on end-user discovery and access for the database list. Thus, the core content strategy for the new database list was not to centralize data in Alma, but was defined by the purpose as written in the new "Database List Criteria and Guidelines" document: "The database list provides increased discovery of the library's list of electronic resources by subject and content type separate from the library's main catalogue Primo. The database list is used by patrons and library staff who are looking for guidance in finding information for their research needs among the many hundreds of resources available." Following Brain Traffic's original content strategy quad, each database description and their subject assignments and ranking forms the substance or content for the new database list. Figure 6 is a copy of Brain Traffic's original content strategy quad with the core strategy at the center.[33] Brain Traffic is a content strategy consulting firm founded by Halvorson, author of *Content Strategy for the Web*.

The structure of the content strategy is described by the technical specifications for the new database list as detailed in the CRDB Replacement Task Group's final report and recommendations, such as the MARC fields used for the subject headings, rankings and database descriptions. A copy of these specifications (appendix B) is also provided with this paper for readers who are interested in the technical details. The guidelines for assigning

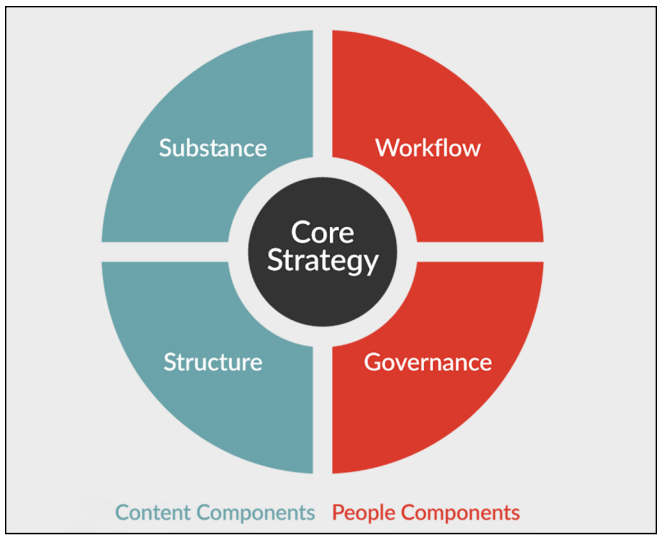


Figure 6. Brain Traffic's original Content Strategy Quad. Reproduced by permission from Kristina Halvorson. Brain Traffic, "Brain Traffic Lands the Quad!," Brain Traffic, July 6, 2017, www.braintraffic.com/blog/brain-traffic-lands-the-quad.

subject headings and resource types, and the guidelines for writing the database descriptions formed the workflow quadrant that make up the standards to which content creators adhere when creating or revising content. By specifically assigning the Electronic Resources Librarian with full administration and interpretation of the "Database List Criteria and Guidelines," the governing quadrant was fulfilled. Like the lifecycle of e-resources, content strategy also has a lifecycle. The Electronic resources Librarian can use her professional experience managing the e-resources lifecycle to govern the content strategy for the new database list as a part of the routine management of e-resources. As reports of platform changes, mergers and other changes to licensed e-resources are communicated from vendors, she can take action or direct staff or librarians to review and revise as needed. As renewals and new orders for e-resources move through the acquisitions process, the Electronic Resources Librarian is well positioned to apply the content strategy to any new content added to the database list so that it adheres to the criteria and guidelines. While licensed content can be easily incorporated into the content strategy, an editorial calendar for reviewing free and open access resources in the database listing should likely be integrated to ensure consistency over time. No such calendar currently exists, but it is under consideration.

Conclusion

The original goals of the CRDB Replacement Task Group were achieved. Database information was centralized in Alma to reduce duplication of staff time and effort, and library system resources. The new database list replicated the main functions of the CRDB for access and discovery with no disruption to end-users. The new database list retained the subject headings that aligned with SFU's departments and courses rather than formal LC Subject Headings. Up to five databases could be listed as "top," and were ranked by the subject liaison librarian. All "other" databases within a subject were listed alphabetically. Additionally, every database description was reviewed and rewritten according to a set of guidelines. "Database List Criteria and Guidelines" were published and adopted by the liaison managers, and now forms the policy for maintenance and administration of the public-facing database list. These criteria and guidelines can be considered the basis for a content strategy for SFU library's new database list.

Although the CRDB Replacement Task Group did not intend to create new policies and strategies, and the phrase "content strategy" was not invoked by any task group member, the work, analyses and final outcomes of the task group followed the practices of content strategists. Academic libraries are a significant source of scholarly content and a library's identity and reputation can be formed by its digital presence. Strategies adapted from key trends in the digital industry can have significant positive benefits for the academic library community. Applying content strategy in conjunction with web usability principles can provide a better user experience. An easy-to-use database list with content that ultimately leads end-users to data, sources, information and/or supporting research for their academic pursuits can be achieved through continuous application of a content strategy. When users find what they are seeking, the library's reputation as a reliable source is maintained.

References and Notes

1. Kevin Stranack, "The ReSearcher Software Suite: A Case Study of Library Collaboration and Open Source Software Development," *Serials Librarian* 55, no. 1–2 (2008): 117–39, https://doi.org/10.1080/03615260801970824; Donald Taylor, Frances Dodd, and James Murphy, "Open-Source Electronic Resource Management System: A Collaborative Implementation," *Serials Librarian* 58, no. 1–4 (2010): 61–72, https://doi.org/10.1080/03615261003623039.
2. Leanna Jantzi, Jennifer Richard, and Sandra Wong, "Managing Discovery and Linking Services," *Serials Librarian* 70, no. 1–4 (2016): 184–97, https://doi.org/10.1080/0361526X.2016.1153331.

3. Ex Libris, "Primo November 2017 Release Notes," n.d., https://knowledge.exlibrisgroup.com/Primo/Product_Documentation/030Highlights/026Primo_November_2017_Highlights#Database_Search_for_Alma_(New_UI).
4. Athena Hoeppner, "Database Lists A to Z: A Practitioner's Tips and Caveats for Managing Database Lists," *Serials Librarian* 73, no. 1 (2017): 27–43, https://doi.org/10.1080/0361526X.2017.1320779.
5. Kailey Brisbin, Melanie S. Parlette-Stewart, and Randy Oldham, "A-Z List Migration: Employing Collaborative Project Management at the University of Guelph McLaughlin Library," *Collaborative Librarianship* 10, no. 4 (2018): 234–50, https://digitalcommons.du.edu/collaborativelibrarianship/vol10/iss4/4.
6. Hoeppner, "Database Lists A to Z."
7. Brisbin et al., "A-Z List Migration."
8. Christine Tobias, "A Case of TMI (Too Much Information): Improving the Usability of the Library's Website through the Implementation of LibAnswers and the A–Z Database List (LibGuides V2)," *Journal of Library & Information Services in Distance Learning* 11, no. 1–2 (2017): 175–82, https://doi.org/10.1080/1533290X.2016.1229430.
9. Veronica Ramshaw, Véronique Lecat, and Thomas Hodge, "WMS, APIs and LibGuides: Building a Better Database A-Z List," *Code4Lib Journal* no. 41 (2018), https://journal.code4lib.org/articles/13688.
10. Andrea Imre et al., "The Future Is Flexible, Extensible, and Community-Based: Stories of Successful Electronic Resources Management," *Serials Librarian* 70, no. 1–4 (2016): 204–10, https://doi.org/10.1080/0361526X.2016.1147878.
11. Zebulin Evelhoch, "Web-Scale Discovery: Impact on Library Database Web Page Views and Usage," *Journal of Web Librarianship* 10, no. 3 (2016): 197–209, https://doi.org/10.1080/19322909.2016.1191048.
12. Dana M. Caudle and Cecilia M. Schmitz, "Web Access to Electronic Journals and Databases in ARL Libraries," *Journal of Web Librarianship* 1, no. 1 (2007): 3–26, https://doi.org/10.1300/J502v01n01_02.
13. Kate Fuller et al., "Making Unmediated Access to E-Resources a Reality," *Reference & User Services Quarterly* 48, no. 3 (2009): 287–301, https://doi.org/10.5860/rusq.48n3.287.
14. Amy Fry and Linda Rich, "Usability Testing for E-Resource Discovery: How Students Find and Choose e-Resources Using Library Web Sites," *Journal of Academic Librarianship* 37, no. 5 (2011): 386–401, https://doi.org/10.1016/j.acalib.2011.06.003.
15. Jeannette Ho, "Enhancing Access to Resources Through the Online Catalog and the Library Web Site: A Collaboration Between Public and Technical Services at Texas A&M University Libraries," *Technical Services Quarterly* 22, no. 4 (2005): 19–37, https://doi.org/10.1300/J124v22n04_02.
16. Beverly J. Geckle, Mary Ellen Pozzebon, and Jo Williams, "Records for Electronic Databases in the Online Catalog at Middle Tennessee State University," *Journal of Electronic Resources Librarianship* 20, no. 4 (2008): 243–55, https://doi.org/10.1080/19411260802557457.
17. Rahel Anne Bailie, "What's the Buzz about Content Strategy?," *Bulletin of the American Society for Information Science & Technology* 37, no. 2 (2011): 19–22, https://doi.org/10.1002/bult.2011.1720370207.
18. Kristina Halvorson, "Understanding the Discipline of Web Content Strategy," *Bulletin of the American Society for Information Science & Technology* 37, no. 2 (2011): 23–25, https://doi.org/10.1002/bult.2011.1720370208.
19. Rebecca Blakiston, "Developing a Content Strategy for an Academic Library Website," *Journal of Electronic Resources Librarianship* 25, no. 3 (2013): 175–91, https://doi.org/10.1080/1941126X.2013.813295.
20. Melia Fritch and Joelle E. Pitts, "Adding Bite to the Bark: Using LibGuides2 Migration as Impetus to Introduce Strong Content Standards," *Journal of Electronic Resources Librarianship* 28, no. 3 (2016): 159–71, https://doi.org/10.1080/1941126X.2016.1200926.
21. Bethany Greene, "Developing a Freely Accessible/Open Access Resource Management Policy at Duke University Libraries: A Case Study," *Serials Review* 44, no. 3 (2018): 182–87, https://doi.org/10.1080/00987913.2018.1534537.
22. Ian Demsky and Chapman, Suzanne, "Taming the Kadzu: An Academic Library's Experience with Web Content Strategy," in *Cutting-Edge Research in Developing the Library of the Future: New Paths for Building Future Services*, ed. Bradford Lee Eden, *Creating the 21st-Century Academic Library 3* (Lanham: Rowman & Littlefield, 2015), 19–25.
23. Ilka Datig, "Revitalizing Library Websites and Social Media with Content Strategy: Tools and Recommendations," *Journal of Electronic Resources Librarianship* 30, no. 2 (2018): 63–69, https://doi.org/10.1080/1941126X.2018.1465511.
24. Kristy Newton and Michelle J. Riggs, "Everybody's Talking but Who's Listening? Hearing the User's Voice above the Noise, with Content Strategy and Design Thinking" (presentation, VALA 2016: Libraries, Technology and the Future, Melbourne, Australia, February 11, 2016), www.vala.org.au/conference/vala2016-proceedings/vala2016-session-14-newton/.
25. Sherry Buchanan, "A Toolkit to Effectively Manage Your Website: Practical Advice for Content Strategy," *Weave: Journal of Library User Experience* 1, no. 6 (2017), https://doi.org/10.3998/weave.12535642.0001.604.
26. Courtney McDonald and Heidi Burkhardt, "Library-Authored Web Content and the Need for Content Strategy," *Information Technology & Libraries* 38, no. 3 (2019): 8–21, https://doi.org/10.6017/ital.v38i3.11015.

27. "Computer Indexes and Databases at SFU Libraries: Alphabetical Listing," July 20, 1997, https://web.archive.org/web/19970720123248/http:/www.lib.sfu.ca/kiosk/other/cmptind.htm.
28. "SFU Library—SFU Library Databases, Alphabetical List," September 6, 2002, https://web.archive.org/web/20020906015519/http:/www.lib.sfu.ca/researchtools/databases/dbofdb.htm?Display=List.
29. "SFU Library—Chemistry Databases," December 26, 2014, https://web.archive.org/web/20141226134722/cufts2.lib.sfu.ca/CRDB4/BVAS/browse?subject=563.
30. "SFU Library—Reaxys," September 18, 2015, https://web.archive.org/web/20150918204327/http:/cufts2.lib.sfu.ca/CRDB4/BVAS/resource/9113.
31. Hoeppner, "Database Lists A to Z."
32. See the ERIL-L Archives entries for March 2018 under the thread "criteria for e-resources on A-Z databases list." http://lists.eril-l.org/pipermail/eril-l-eril-l.org/2018-March/thread.html.
33. Brain Traffic, "Brain Traffic Lands the Quad!," Brain Traffic, July 6, 2017, www.braintraffic.com/blog/brain-traffic-lands-the-quad. Brain Traffic has since revised and published a new take on their content strategy quad: "New Thinking: Brain Traffic's Content Strategy Quad," Brain Traffic, April 26, 2018, www.braintraffic.com/blog/new-thinking-brain-traffics-content-strategy-quad.

Appendix A. Database List Criteria and Guidelines

Purpose

The database list provides increased discovery of the library's licensed electronic resources by subject and resource/content type separate from the library's main catalogue Primo. The database list is used by patrons and library staff who are looking for guidance in finding information for their research needs among the many hundreds of resources available. Free and open access content may be included if such resources meet the criteria outlined below and are considered to be of significant value and interest for the SFU community. Subject headings, top rankings in a subject, descriptions and resource/content types will form stable and reliable information about a database. These criteria and guidelines are intended to limit the need for frequent edits to database information in Alma.

Criteria for Inclusion in the Database List

Licensed Databases

- Abstracting and indexing sources, full-text databases, and searchable online bibliographies.
- Statistical sources including datasets and summarized statistics.
- A searchable collection of datasets and/or statistical-sources.
- Searchable collections of full-text content and/or digital content.
- Searchable collections of streaming audio and video.
- Reference sources (encyclopedias, handbooks and directories) that can be searched and are of significant value for their subject areas.
- Publisher websites with a search option where the SFU library has significant access entitlements and where there is evidence that users are accustomed to searching the publisher's website directly.
- Publisher websites that can limit the display of material to that licensed by the library.
- A database with searching capabilities or a searchable component.

Open Access and Free Databases

- Searchable collections of open access or free content published by the SFU Library or another university department or group with a searching component.
- Significant collection of BC or Canadian content likely to be of interest for researchers and students at SFU.
- Significant collection of content that would otherwise meet the library's subject collection policies.
- Collections of strategic value to the SFU Library or SFU.
- Stable, reliable and searchable source of academic scholarly content, regularly updated and relevant for researchers and students at SFU with a persistent URL that is not likely to change overtime.

Guidelines for Subject Lists

- Subject lists are divided by "top" and "other."
- "Top" databases in any subject list will be limited to a maximum of 5 databases.
- Liaison librarians may rank the "top" 5 databases in order of importance for display in the subject listing.
- "Other" databases in the subject list will be arranged alphabetically.
- Should a librarian want to add a new database to the "top" ranked subject listing and where there are 5 "top" already listed, the librarian must select a database to remove from the "top" in the subject list.

- New subject headings will be considered if there is a demonstrated need for a new subject heading, such as a new program, new areas of research or new course offerings.
- Ideally, there should be at least 5 databases to include under any subjectlist.

Guidelines for Resource/Content Types

- Each database shall be given one resource/contenttype.
- Where a database contains numerous types, select the resource/content type that best suits the description.
- New resource/content types will be considered if there is a demonstrated need for an additional resource/content type.
- Ideally, there should be at least 5 databases to include under any resource/content type.

Resource/content type	Definitions
Datasets	Computer and machine-readable data files.
Digital collection	Objects that have been digitized. Such objects may include: text, images, audio, video, or print material. Often includes optical character recognition (OCR) technology to transform original printed/written material. Generally includes content that is not born digital.
Ebook collection	A significant, searchable collection of ebooks from a single publisher or platform.
Ejournal collection	A significant, searchable collection of full-text journals from a single publisher or platform.
Full-text database	A searchable collection of content containing the complete text of materials, such as books, journals, transcripts, or other textual documents.
Geospatial	Data, software and tools for manipulating data associated with location or a geographic place.
Image collection	Collections of digitized images, photographs, slides, or other visual content.
Index	An abstracting/indexing source that does not natively contain full-text content.
Major reference work	Current and regularly updated handbooks, encyclopedias, and guides that are core reference works for their subject area.
News sources	Full-text online sources of newspapers, newswires, news transcripts, press digests and journalistic reports. An index to newspapers.
Partial full-text database	A searchable indexing/abstracting source with multiple content types (newspapers, journal articles, books, proceedings) with full-text for only a portion of the content indexed.
Primary sources	Documents, manuscripts, diaries, speeches, letters, minutes, interviews, news film footage, autobiographies, and official records. May also include digitized versions of original creative works: poetry, drama, novels, music, art and visual material.
Statistical sources	Numeric information offered in a human-friendly, summarized, readable format, often from government and non-governmental agencies.
Streaming audio	Music, oral histories and other audio files.
Streaming video	Video content such as films, performances, interviews, lectures, instructional or training videos.

Guidelines for Database Descriptions

Introduction

Many researchers, especially undergraduates, browse our databases by subject area and very quickly select a database based on its description. Descriptions are important in that they allow end users to ascertain whether a database will be useful for their research.

As part of replacing the CRDB, we ask that you review and revise, if necessary, the brief description for each database in your subject area assigned that has a record in the CRDB. When revising the brief description, please adhere to the following guidelines.

Note that there will now be a single description for each database instead of separate brief and full descriptions. For help with writing brief descriptions, contact the eBranch.

Guidelines

Keep It Brief

The description should consist of 1–3 concise sentences.

Use Plain, Jargon-Ffree Language

The description should be written in plain, jargon-free language.

Outline Utility or Value of Database to End User

Descriptions should briefly and clearly explain why an end user should choose this specific database rather than a different one. The user will see a list of databases for a subject and they need help choosing one. Be sure to include the most important information about coverage in simple language, and where possible, address issues where users are likely to be confused. For example:

- JSTOR does not include recent articles.
- Early English Books Online (EEBO) includes scholarship published between 1475-1700 [use X database for recent articles on works published during this period].

Examples of well-written descriptions:

MathSciNet
Reviews and abstracts of books, articles and conference proceedings on mathematics, statistics, and computing science.

PsycTESTS
Psychological tests, measures, scales, surveys, and other assessment tools. In most cases actual test or test items provided, but without scoring key information.

Compustat North America & Global
Detailed financial and market data covering publicly traded companies from around the world.

For databases with a relatively broad appeal the description should be written to be understood by a broad cross-section of end users; for highly specialized databases, write the description for a specialist audience.

Specialized:
Thomson Financial Ownership: 13f Institutional Holdings
CDA/Spectrum Institutional 13(f) Common Stock Holdings and Transactions.

Non-specialized:
Associations Canada
Details on Canadian organizations and international groups including industry, commercial and professional associations, registered charities, and special interest organizations.

Non-specialized:
Project MUSE Search
Humanities and social science ebooks and journals.

Keep Content Evergreen

Keep content evergreen by not stating facts or dates that may change quickly. DO NOT USE specific numbers or facts that will quickly date e.g. "Contains 12,341 journals."

Use Plain Text Only (no HTML)

Use plain text only. DO NOT USE HTML or any formatted text. Brief descriptions will no longer accept HTML.

Leave out unnecessary or unwanted text

With very rare exceptions:

a. AVOID the words "online," "database," "searchable," "web-based," "digital" (as they are unnecessary).
b. DO NOT repeat standard functions, such as "keyword searchable," "allows citations to be emailed," etc.
c. DO NOT USE OR COPY promotional writing or "marketese" e.g. "The most comprehensive and heavily traveled resource on the Internet."
d. DO NOT REPEAT words already included in the title of the database e.g. "Computer Science Bibliographies—A collection of bibliographies in the field of computer science."
e. DO NOT use abbreviations or acronyms (e.g. CCICED, CHASS) without writing out long versions.

Database List Administration

Interpretation of the criteria and guidelines for the database list resides with the Electronic Resources Librarian.

When a new resource is added to the library's collection that fits the criteria for inclusion in the database list, the Electronic Resources Librarian will ask the appropriate liaison or subject librarian(s) to select subjects to add, whether to add to top and to update rankings (if necessary), and to provide a brief description.

Requests for changes to database descriptions, subject heading assignments, top rankings, resource/content types, the addition of new subject headings or new resource/content types shall be made to the Electronic Resources Librarian.

The Electronic Resources Librarian will provide direction to cataloguing staff for edits, updates and changes to database descriptions, subject heading assignments, top rankings, resource/content types, the addition of new subject headings and/or new resource/content types that are all managed in MARC fields following the Technical Specifications in appendix B.

Appendix B. Technical Specifications

CRDB/ERM field	CRDB MARC Export and Alma Import
ERM#	035
Description brief	592
Subjects	690 a
Subjects: top and rank #	690 g
Resource/content type	691
CRDB MARC records are exported as MARC8. Use MARCEdit to convert MARC8 to UFT8 for import into Alma.	

New database list outputs via Alma API for https://databases.lib.sfu.ca	
Database name	MARC 245
Database description	MARC 592
Subjects	MARC 690 a
Subjects: top and rank #	MARC 690 g
Resource/content type	MARC 691
Connect button	Electronic collection > Additional information > Level URL
Proxy	Electronic collection > Additional information > Proxy enabled
Open access note and icon	Electronic collection > Additional information > Is free?
Authentication note*	Electronic collection > Notes > Authentication note
Public note**	Electronic collection > Notes > Public note
License terms***	Electronic collection > General information > Acquisitions and license information > License
License terms***	Course Pack Print Course Pack Note Course Reserve Electronic Copy Course Reserve Note Interlibrary loan electronic Interlibrary loan note

*Authentication note is reserved for databases requiring a privacy notice.
**Public note is reserved for communicating user limits. Where there is unlimited simultaneous users, no public note is added for databases.
***License terms match Primo display.

Notes on Operations
Making a Case for User Experience Research to Drive Technical Services Priorities

Emma Cross and Shelley Gullikson

This paper takes a technical services perspective on user experience (UX) research into student searching behaviors. In this observational study, students were free to search as they normally would while conducting research for an upcoming essay or assignment. Researchers took careful note of the search process, including how searches were composed and which metadata fields students looked at in their results lists. The findings of the study, and how local technical services staff responded to them, are discussed in this paper. The project was a useful way to prioritize the work of technical services based on insights from user searching behavior and to help ensure library resources are discoverable in the most effective manner.

User experience (UX) can be difficult to pin down in a single definition, or as Buley notes, it is "a famously messy thing to describe."[2] UX describes the overall experience and emotions of users as they engage in a service, product, or space. The UX of the circulation desk would include how easy it is to find, whether there is a line, the friendliness of the staff, the user's physical comfort while being served, whether staff can meet the user's need, etc. UX research describes the work done to understand the user and their experience. UX design describes the work done to create a good user experience and is generally undertaken in conjunction with UX research to iterate improvements. Any or all of these things—the experience, the research, the design—can be referred to with the shorthand of "UX."

UX became popularized as a concept in libraries in 2010. Its focus on users makes it attractive to public services staff who use UX techniques to improve spaces, services, and the overall user experience. The roots of UX in usability and human-computer interaction make it a natural fit for systems staff in libraries who use UX techniques to improve interfaces and task flow in digital library spaces and services. Technical services staff, however, despite their long history of conducting user research into bibliographic records and search behavior, have been largely absent from the emergence of UX in libraries over the past decade.

This paper aims to fill a gap in the literature by taking a technical services perspective on UX research into student search behaviors. This paper shows how Carleton University Library's technical services department collected and used observational data to improve the search experience for their students. This UX study, and how the technical services department responded to the resulting data, could be used as a model for other technical services departments to study their own students and respond to user needs.

Emma Cross (emma.cross@carleton.ca) is a Cataloguing and Metadata Librarian, Cataloguing, Metadata, and Digitization Department, Carleton University, Ottawa, Ontario. **Shelley Gullikson** (shelley.gullikson@carleton.ca) is a Systems Librarian, Library Technology Services, Carleton University, Ottawa, Ontario.

Manuscript submitted July 30, 2019; returned to authors for revision October 7, 2019; revised manuscript submitted December 3, 2019; returned to authors for additional revision February 4, 2020; revised manuscript submitted February 19, 2020; accepted for publication February 23, 2020.

The authors wish to thank the students who participated in the study and provided so much useful information. Thanks also to Amber Lannon, Associate University Librarian, Academic Services and Erika Banski, Head, Cataloguing, Metadata and Digitization Department, Carleton University Library for their support and ongoing interest in this study. Preliminary results from this study were presented at the Access 2017 conference in Saskatoon, Saskatchewan, Canada.[1]

In this paper, the authors discuss a UX research project in which ten undergraduate and ten graduate students were observed as they conducted research for essays and assignments. The researchers analyzed the observation data to determine how the user experience was—or could be—affected by technical services work. The results were presented at a technical services staff meeting for discussion. The outcomes of this study have been extremely helpful for adjusting technical services workflow in response to user behavior, needs, and expectations at the Carleton University Library.

Carleton University is a comprehensive university located in Ottawa, Canada. In 2018 to 2019, the student population was just over twenty-seven thousand undergraduate students and four thousand graduate students, and the library had an annual acquisitions budget of approximately $7 million. The library has a collection of over 1,000,000 print monographs, 872,000 eletronic books (e-books) and 78,000 electronic journals.

Literature Review

As alluded to above, the literature has no standard definition of UX. In 2010 there was a wave of papers describing the concept of UX to a library audience, and in one of the first, Walker said in part, "the study of user experience helps those providing library services understand how our patrons use the services we offer, and how they integrate them into their daily lives."[3] She went on to explain that "user experience design seeks to understand and assess users' actual behavior and performance, rather than their opinions and attitudes."[4] This focus on understanding actual user behavior in the context of their lives is key to UX.

There is very little literature on UX in libraries from the technical services perspective. Much has been written about the UX of discovery platforms, library catalogs, and other elements of library search.[5] However, this research has been largely undertaken by public services or systems staff, with the analysis and conclusions geared toward instruction, reference work, or interface design. One exception is Walsh, who observed three graduate students and two faculty members searching for monographic series in a library catalog, which led to UX recommendations related to both cataloging practice and interface design.[6] Walsh's 2012 paper may stand alone as an example of UX research with a technical services perspective, but technical services staff were conducting research into users' search behavior years before UX appeared in the library literature.

Yee's 1991 review of research on the user interfaces in OPACs covered user studies related to various issues with the OPAC interface. For each issue she provided both "record design solutions" (i.e., recommendations for catalogers) and "system design solutions" (i.e., recommendations for OPAC designers). Yee asserted that questions about the design of OPAC interfaces "should be answered based on research into user needs, and based on dialogue between the record designers and system designers who together create the user interfaces for our online public access catalogs."[7] Yee's vision did not become reality; the user research literature on OPAC design in the 2000s is, with a few exceptions, the domain of system designers and public services staff.

There was a small surge of cataloging-related user research as the Functional Requirements for Bibliographic Records (FRBR) were introduced. Pisanski and Žumer conducted user research on the bibliographic model behind FRBR, but their aim was to see whether the structure of FRBR made sense within the mental models of users, not to make suggestions related to cataloging work.[8] The eXtensible Catalog project aimed to build a better (and FRBR-based) catalog and, to this end, employed interviews with eighty students and faculty members across the four participating universities to better understand user needs related to resource discovery.[9] Zhang and Salaba also took a user research approach to FRBR, but—like so much of the user research into online catalogs—they were primarily interested in how users interacted with the interface of a FRBR-based catalog, rather than the records within it.[10]

In 2015, Wilson discussed the possible relevance of ethnographic research methods to catalogers who want to better understand user behavior.[11] She examined how ethnographic methods such as observation and interviews could provide a richer picture of user behavior than other qualitative methods commonly used in libraries. In particular, she critiqued what she called the "think aloud" method, where users complete assigned tasks while verbalizing their thoughts. She found it wanting: "While this method can reveal how a user would undertake a contrived task, it does not reveal what features a user would wish or need to exploit if left to their own devices, or what sort of queries they would typically bring to the catalog of their own accord. It does not therefore construct a picture of the actual uses to which the catalog might be subject in the real world."[12] While certainly participants can "think aloud" while completing any task—assigned or self-directed—Wilson's underlying frustration with basing research on "contrived" tasks was not new.

Markey reviewed twenty-five years of research into end-user searching looking solely at research based on transaction logs to capture only "user-initiated searches in which no observers were present."[13] Based on this review, she made recommendations to improve the effectiveness of searches by helping users to access controlled vocabulary and recommendations for future directions for user research. One of her recommendations included: "let us

avoid research protocols that assign tasks to end users. As much as possible, researchers should design experiments that capture what end users really do, not what researchers want or expect them to do."[14]

Markey was likely reacting to the majority of early user research into searching, which assigned participants specific tasks. Only a few studies allowed participants to search as they normally would. In 1990, Charles and Clark asked users who had just completed a search using a CD-ROM database to replicate their search strategy in an online database and then observed those searches.[15] In their 1998 study, Twidale and Nichols clearly state that "volunteers undertook authentic activities, bringing along a search task that they had to undertake anyway."[16] Komlodi observed eight attorneys searching "for a topic of their choice" in 2004.[17] Anderson conducted a longitudinal ethnographic study of research practice in 2005 that included observation of searching behaviors, though searching was not the study's primary driver.[18] These examples are the exceptions rather than the rule; most researchers have observed users performing assigned search tasks, not observing users searching more naturally.

After the landmark ethnographic study of students at the University of Rochester in 2007, ethnographic methods became more popular in library research.[19] One might assume there would be an increasing appetite for observing users searching how they would normally search, but the literature does not bear this out; again, it is difficult to find more than a few examples. As part of the Ethnographic Research in Illinois Academic Libraries (ERIAL) Project in Illinois in 2012, researchers observed students searching for sources they needed for their coursework.[20] More recently, Leeder and Shah's 2016 study asked students to collaboratively search for sources on their research topic and "[t]he goal of this task was to capture participants' authentic behavior in an exploratory search condition."[21] Most current studies of user search behavior in libraries continue to use a task-based methodology rather than, as Markey suggested, "experiments that capture what end users really do."[22]

Observation studies that capture natural user behavior are much more common in the physical library. One example is "'Sweeping the library': mapping the social activity space of the public library" by Given and Leckie, who studied how patrons used the space in two large public libraries.[23] They described the observational method as particularly applicable in situations where "observed behaviors may not match what individuals say that they do on a written or oral survey and therefore might be able to provide concrete evidence to support a particular library design or certain types of policy decisions."[24] Given and Leckie note that it is important to be mindful that observational studies provide "an insightful glimpse into "what" is happening in libraries", but require additional methods to also capture the "why" of patron behavior.[25]

To address the question of "why," the authors' study also incorporates the idea of "emplacement, the interrelationship of body, mind, and place" recently described by Polkinghorne, Given, and Carlson.[26] In their paper "Interviews that Attend to Emplacement: The 'Walk-Through' Method," the authors examine the limitations of the traditional sit-down interview for collecting data on user behavior that underreports the role of place in people's experiences. Their study of undergraduate use of library space incorporated both a traditional sit-down interview and a "walk-though" interview where participants led a researcher around the library spaces they had described in the sit-down interview. "During the walk-through interviews, participants clarified details they provided in the sit-down interview, they recalled new details that they had not mentioned previously, and in some cases, they raised entirely new topics beyond those first explored in the sit-down interview."[27] Polkinghorne, Given, and Carlson conclude by stating that the walk-through interview "elicits greater detail because participants are powerfully prompted by perceiving and moving in a place."[28] Thus, the authors' own study could be considered a form of "digital emplacement" with students taking researchers on a "click-through" interview providing a great deal of detailed information about how they experience the online environment (or online "place") as they work on research for an assignment.

Data Collection and Analysis

The research project aimed to understand and possibly improve the user experience of search by observing students conducting research for an upcoming assignment. At the time of the study, Carleton University Library had both an online library catalog (Innovative Interfaces' Millennium) and a discovery layer (ProQuest's Summon). Summon was most visible on the library's website, with a search box on the main page, but links to the catalog were available nearby. The library website also provided a list of databases—subscription and otherwise—and various library guides. Students in the study were free do their research in any way they liked and were not limited to using the library website.

The authors recruited undergraduate students and graduate students via the library website, library Twitter account, and emails to student academic societies, the Graduate Student Association, and members of the Student Library Advisory Committee. Ten undergraduate and ten graduate students volunteered to participate, and the twenty individual sessions were held between February and March 2017. As is common for this type of study, each

student was given a gift card at the start of their session in appreciation for their time. They could keep the gift card—a $10 Starbucks card they could use at the library's café—regardless of whether they continued with the study. All twenty students completed their sessions.

Each session was held in a private room in the library, equipped with a desktop computer and a small table. Students could choose to use the room's computer or their own laptop. One of the authors moderated the session, while the other observed and took notes. Students were told that the authors wanted to observe them searching for information they needed for an upcoming research assignment, and that they should do what they would normally do, not what they thought they should do. They were specifically told that even though we were from the library—and in the library—the authors did not want them to feel that they should use library resources if they would not normally do so. They were assured that there was no right or wrong way to do anything during the session (see appendix for the session script).

Students were asked for consent to record their screen while they were searching. Although all gave their consent, continuing with the session was not contingent on consent for recording. After signing consent forms, they were asked what year they were in and their major or field of study. They were also asked for a short description of what they would be working on during the session and what they hoped to find.

Finally, the students were asked to think aloud as they worked. They were asked to mention some specific things: for what they were looking, if they found something helpful, if they were confused by anything, and if something did not work the way they expected. They were also asked to explain any decisions they were making—a decision to look at something, to ignore something, to change their strategy, to continue, or to give up. If they remained quiet, students were prompted with these topics or asked neutral questions such as "What are you looking at now?" or "Is that what you expected?"

Students were told that the sessions would last thirty minutes, and were notified when twenty-five minutes had passed and given the option to continue or stop. In some cases, it was clear before the twenty-five-minute mark that the students were satisfied with the number of resources they had found and were finished with the searching stage of their process. In these cases, sessions ended at this point. Overall, sessions ranged from ten to forty minutes, but most were between twenty-five and thirty minutes.

Once each session was over and the student had left the room, the authors discussed what had been observed and made additions to the observation notes. When all the sessions were completed, one of the authors watched the video captures, noting the stated topic, the search terms used, which tool was searched (Summon, Google Scholar, etc.), and any filters or facets used. It was also noted how many search results each student scanned, how many results were examined more closely, and how many were saved. The students' stated reasons for changing their search terms or search strategy were captured as well. The other author analyzed and coded her notes, identifying themes most relevant to technical services. Session notes were carefully reviewed to identify frequently occurring keywords and concepts. Related comments and actions were grouped together using different colored highlighters to create key themes.

Findings

Based on the detailed written transcripts and the video, five main themes emerged. These are not novel themes, having been discussed elsewhere in the library literature, but they were the most striking and the most relevant to technical services staff.

Overwhelming Use of the Single Search Box

Students in the study showed a strong preference for the single search box provided by the library's discovery layer, Summon. Out of twenty total participants, Summon was used by fifteen participants, Google Scholar was used by twelve people, and the classic library catalog by two people. Nine participants used both Summon and Google Scholar, six used Summon but not Google Scholar, and three used Google Scholar but not Summon. In comparison, only seven participants used subject-specific databases—four undergraduates and three graduate students. In terms of total searches during the twenty sessions, participants completed seventy-eight searches in Summon, thirty-four searches in Google Scholar and nine in the library catalog. The two students who used the library catalog were both undergraduate students. Aside from catalog use, there were no striking differences in the graduate and undergraduates who used these tools.

The Get it! Button

Carleton University has a Get it! button that students click to access full text through the link resolver. The logical corollary to the overwhelming use of unified search platforms is the corresponding popularity of the Get it! button with students. One graduate student said, "I love the Get it! link—it makes my life much easier." Another noted, "Get it! is really useful." Four of the twenty students in the study expressed genuine enthusiasm about the Get it! button. Even when students did not mention or recognize the Get

it! button, they used it seamlessly to access full text. Every student appeared to be clear about what the button does: click on it to access full text content.

Students in the study also recognized that they could access Carleton Library content in Google Scholar. Indeed, there was a moment of joy when a student made this realization during a session. "Hey, look! Carleton offers to 'get this' in Google Scholar. Hey! That is great!" an undergraduate exclaimed.

Most Frequently Cited Metadata Fields

After careful analysis of the transcripts, the same pattern appeared repeatedly, with participants: 1) rapidly scanning the search results list; 2) quickly reviewing the titles for relevant keywords; 3) checking the date (the majority of students were not interested in older material); 4) if the title and date sparked interest, clicking on the record to read the abstract; and 5) if title, date, and abstract met the searcher's criteria, downloading or saving for further reading. This pattern of search behavior was completed at high speed (see theme 5). For example, an undergraduate told us, "I scan the list and look at titles," while a graduate student said, "I'm looking at title and dates. The earliest in the list are the most recent. I also read the abstract."

A puzzling point was students looking for an abstract for books. With the overwhelming use of unified search platforms that intermingle a large number of journal articles with a small number of books, students appear to be conditioned to look for an abstract for all resources. When students did not see an abstract, even when they were looking at a record for a monograph, they moved on. A summary or table of contents in monograph records appeared to be useful and was briefly mentioned by a few students. Given this, it could be helpful for library instruction sessions to prompt students to look at subject headings when summaries or tables of contents are not provided. Students did not seem to realize that if they just scrolled down a little bit, they could find the subject headings to see what a book is about. Only two students mentioned subject headings.

Overwhelming Popularity of Keyword Searching

Almost all the searches in the twenty sessions were keyword searches. Out of a total of 121 searches, only two were subject searches and two were searches by author. Students typically start with general keyword terms and then refine searches. There appeared to be little deliberation about what terms to use. Indeed, it was common for students to work at speed with no pause to reflect on keyword terms even when they stated that a search was not producing the results expected.

Thus, where students could use more assistance is with the choice of keywords. There is a lot riding on keywords, and poor choice of keywords can mean not finding relevant resources and wasting time. Most participants looked solely at titles to determine if a record was relevant, so keyword choice was even more crucial. Some students chose keywords that did not seem to match their stated topics, such as the undergraduate who was looking for "ethics and privacy concerns related to digitization in libraries" but used the search string "privacy and open access." Synonyms and related words occasionally proved problematic; an undergraduate who said they were looking for information on "when girls start ballet" searched for "ballet and girlhood" and found nothing relevant in the results list. In addition, students frequently mistyped and misspelled words, likely because they were working very quickly.

Speed, Impatience, and Ease of Access

As mentioned earlier, a majority of students in the study worked at high speed. In fact, on many occasions it was difficult to keep track of what the students were doing and make written notes. A number of students mentioned they would work faster on their own laptop as they are familiar with how it is laid out and configured. Students quickly skimmed the list of search results and rarely went beyond the first page (or first screen) of search results, averaging less than seven results examined per search. Undergraduates looked at fewer results than graduate students (not quite six versus almost ten results examined per search). It is interesting to note that apart from this, the only striking difference in search behavior between graduate students and undergraduate students was that the library catalog was searched by two undergraduates but no graduate students.

Other Findings

In addition to these five main themes relevant to technical services, there were other interesting observations about students' searching behavior. The authors observed that students skipped over materials that required more effort to obtain. This included books on course reserve, books in the storage facility, slow loading documents, and books out on loan. Surprisingly, no students in the study skipped over a resource just because it was not available online, however, students clearly expressed a preference for online resources for ease of access. They mentioned working off campus and being unable or unwilling to visit the library. One undergraduate, upon finding a print book in the results list said, "This is useful *if* I can find it. It is not online so I will have to search the library itself. This makes me cry a little."

Students had no qualms about clearly stating they were busy and did not wish to waste time. They wanted

and needed research to be as quick and easy as possible. "My sister is a grad student and showed me some quick ways to do things. She told me not to waste time," said one undergraduate. Similarly, students expressed frustration when research took too long or they got stuck and could not find relevant resources. After waiting not quite a minute for search results to load in Summon, a graduate student remarked, "Hmmm, usually the library is kind of fast. I don't have the patience to wait so I go to Google," and then immediately repeated the search in Google Scholar.

Almost half the students (seven, both undergraduate and graduate) apologized at the end of their session for not doing "proper library research." Students apologized even when they had completed competent online searches. Furthermore, most students were not dissatisfied with the searches they completed during the sessions. Indeed, five of the students explicitly stated they were happy with the work they had done. One student did both—expressed happiness with the search research and then apologized right afterwards. This kind of apology may have arisen from having two librarians observe and take notes on their search behavior. However, if students are apologizing but are not actually unhappy, then this could point to an issue of relevance of what they perceive as "proper library research." Students who complete searches with Google Scholar rather than using the library's knowledge base may think what they are doing is not "proper library research." As many of the students referred to Google Scholar as simply "Google," perhaps they have been told in the past that Google should not be used for academic research. This could be an interesting area for further research.

Students mentioned getting information about research from peers and family (four students) and faculty (four students). The use of peer networks especially came up in relation to Google Scholar. One student told us, "Some people have changed their computer so they can access library material via Google Scholar." Another said, "A friend told me about Google Scholar—the library is not teaching this."

Finally, for many students in the study, the research process was not a linear one of searching, selecting, reading, then writing; searching, selecting, reading, and writing were blended. Some students created a document during the session which included citations, notes, and preliminary outlines and thoughts. When emailing this document to themselves at the end of the session, the students often remarked that they were happy with the work they had completed during the session.

Using UX Study Results

After preliminary analysis of the results, findings were presented to the library's technical services staff, followed by a moderated discussion. The presentation and discussion lasted eighty minutes in total. A written transcript was made of the question and answer session to assist with the analysis of the research data. The staff were asked to provide comments, observations, interpretation, opinions, and ideas on the information presented. They were also asked if there was anything they found surprising. It was a very interesting discussion and people appeared engaged.

The link resolver and the knowledge base generated the most discussion. Staff said that learning more about how students actually do research was valuable. For example, "We can put staff time and energy into making sure [link resolver] works," and "this validates where we need to spend time. We can call out vendors where there is a consistent problem. I can be pushy to get Summon issues resolved. If that is what students are relying on, then we have to make sure what we have is right."

The presentation sparked an interesting discussion about what resources are indexed in Summon. One staff person wondered if all library databases were included in a Summon search, because if databases were missing, these resources might not get used by many students. It was decided to review the database content covered in Summon and try to get more included. When staff saw how much Summon was being used, there was general agreement that it was worth taking the time to carefully review the Summon documentation to see exactly how and from where Summon obtains information. After hearing the findings of this research project, staff stated they felt more confident in deciding what should be at the top of the "to do" list, even if it is a time-consuming project. For staff interested in additional information, the authors provided a citation for Wilson's "The Knowledge Base at the Center of the Universe."[29]

Technical services staff were clearly disappointed that the library catalog was used so little and that students overwhelmingly searched keywords as opposed to using subject headings or name searches. There was a very interesting discussion on these points, especially for catalogers. Staff noted that keyword searching is problematic since the title cannot reliably reflect the content of books, and they recommended that students be taught how to search for books using subject headings. We explained that students were generally pleased with their searches and no students expressed a need or a desire to learn about searching with subject headings. Then, a senior staff member stated, "I'm not buying into this discussion that keyword searching is a bad search. Remember that keyword also searches subject. Indexing is the most important part of this. If you search something using keywords then it is still a good result." The tone of the meeting shifted slightly after this comment.

A cataloger suggested that to help students, they could copy catalog with monograph records that contain tables of contents and summaries where such records were

readily available. There was a realization that this would also strengthen keyword search results. Finally, seeing that relatively few students search directly in the library catalog, catalogers gained an understanding that MARC records are now mostly accessed and displayed by the discovery layer.

During the meeting, staff said the student search behavior was familiar; many people search the internet this way, so why would students search for resources any differently? Also familiar was that students skipped over material that was more difficult to obtain, with one staff member noting that she did this when she was a student. Staff generally felt that students were not being lazy, but rather that they were busy and had to use time efficiently. This prompted a discussion about being more careful about what materials were put in library storage as they would be far less likely to be used due to the time required for retrieval. Broken links and the library's e-resource troubleshooting form were also discussed. Staff wondered if perhaps only a small number of broken links are reported. They recommended that the library make it as easy as possible to report broken links and access issues as this was likely the "tip of the iceberg." A note was made to investigate how or if a link to the library e-resource troubleshooting form could appear in Summon search results.

This study began as a grassroots initiative of the library's technical services department to set practical student-centered priorities for workflow to complement the department's more general priorities. The study provided useful information for staff about how students look for information for essays and assignments and why adjustments in priorities are necessary. The concrete steps outlined below are based on staff discussions and relate to technical services functions. This could be helpful to managers in technical services at other institutions wishing to develop a student-centered approach to library service.

Concrete steps taken as a result of this study in priority order:

- Prioritizing ongoing work to keep the library's knowledge base up to date. This includes: checking that metadata for all packages and titles owned by the library are included in the knowledge base; keeping up to date with titles added and dropped from packages and making sure this information is updated in the knowledge base; and reporting errors and omissions to the knowledge base vendor.
- Confirmed the library's e-resource trouble shooting form is easily accessible in discovery layer search results.
- Reviewed relevant documentation from the vendor about the discovery layer to maximize access to library resources.
- Reviewed keyword indexing in the discovery layer and shared this information with staff to enhance their understanding of how the discovery layer works.
- Investigated how MARC contents and summary notes in monograph records appear in searches via the discovery layer. Using MARC records with these fields when they are readily available.

In addition to these concrete actions, technical services staff said they felt more confident in deciding what tasks should take priority. A technical services supervisor explained, "Now I can attack the right problems with purpose. We can put staff time where it is relevant." This is a very positive outcome for this UX research project.

Discussion

The idea of convenience as a key factor in the research process is not new.[30] However, it does appear that ease of access in an online environment and the abundance of information changes searching behavior. Users' expectations and perception about the availability of information results in a general tendency not to follow through; students do not have to make a sustained effort to find any particular resource if they can easily find something else just as good. Students in this study demonstrated limited knowledge of library resources beyond using Summon and Google Scholar to quickly access full text content. Individual databases and subject guides created by subject librarians were rarely mentioned. In a few instances, students tried to find a library subject guide because it had been mentioned in a library instruction session but they were unable to locate it. While this raises a number of issues for front-facing library services, particularly instruction, it clearly indicates the centrality of the work done in technical services to help students find and access library resources.

The participants in this study demonstrated an overwhelming preference for searching Summon and Google Scholar. How does this affect technical services operations? It appears that the library catalog may no longer play a central role in student research and the gradual shift in technical services work is starting to be discussed in the library literature. Wilson discusses the evolution in technical services operations, outlining the development of knowledge bases: "initially created as a byproduct of OpenURL link resolvers and A-to-Z lists, they have evolved into useful tools in their own right," also supporting unified search platforms and e-resource management in key areas such as licensing, usage statistics, and resource sharing.[31] Wilson concludes, "It's safe to say that the knowledge base has truly become the center of the management universe for academic and research libraries."[32] The results of this study indicate the shift from library catalog to unified search platforms is also well underway among students.

Meeting with technical services staff to discuss our results was a productive way in which to engage and orient staff to changes in student research patterns. Rather than listening to a presentation based on library literature, staff heard how the students at their own library are searching. It was rewarding that there appeared to be progress in the attitudes and opinions of staff. While a few people offered a "knee-jerk" response, falling back into traditional approaches, most staff appeared to listen with an open mind, perhaps because they recognized some of the search behaviors being described.

It has now been almost two years since the data was collected. However, it is helpful to have the benefit of hindsight to get a long-term perspective on the value of UX research for technical services operations. After the meeting with technical services staff to discuss the UX data, there was an initial flurry of enthusiasm and clarity on which projects and tasks are higher priority because they directly help students. However, technical services staff work in very busy departments includes dealing with multiple projects with competing priorities, ongoing technological change, and staffing turnover. The results of the UX study, especially the central importance of the knowledge base, continue to influence the priorities of the department. The extent to which students use the discovery layer and are reliant on the knowledge base and the link resolver to access library content did make a lasting impression on staff. However, a one-off discussion of user experience is not sufficient and, even with the best of intentions, a clear focus on user-centered priorities can fade over time in a busy workplace. Thus, it would be helpful to have a regular technical services UX discussion to maintain focus on user needs and address ongoing changes in technology, perhaps on an annual or biannual basis. It would be too labor intensive to repeat the study every year but an ongoing commitment to UX research and updates would be beneficial and should be added to the library's strategic plan. Indeed, the Carleton University Library has moved on to use the library services platform Alma as part of a consortium as of January 2020, so it is clearly time for a follow-up study on search behavior in this new environment.

Limitations

This was a small-scale study with twenty participants at a single academic library, which suited the objectives of this research project. The point of the study was not to make broad generalizations about how students do research but to provide insight into the user experience of research at Carleton University and how it could be improved. Using the data, technical services staff have been able to refocus and realign priorities based on UX research.

Conclusion

Recent trends and changes in library technical services have resulted in an environment where staff no longer work with a single library catalog but are adding metadata in a variety of formats to a growing number of databases. These databases may include the knowledge base, classic catalog, institutional repository, course reserve software, and data repositories such as Dataverse. To direct effort where it is most useful, staff in technical services require more information about how users search and access library resources, including common problems encountered. By adopting a UX focus, libraries can try to ensure the policy decisions taken in technical services are making library resources accessible in the most effective manner and not making research more complicated for users in a fractured digital environment.

In this study, the authors observed how students search online when conducting academic research, paying special attention to themes and issues relevant to technical services. There is a long history of technical services research into user behaviors specific to catalog records and catalog searching, but not into the overall user experience of the search process. This research helps fill a gap in the library literature, which has very little on UX from a technical services perspective, or technical services from a UX perspective. UX research findings can help reorient existing workflows and priorities in technical services to have a user focus. This UX study, and how the technical services department responded to the data, could be used as a model for other technical services departments to respond to user needs. In our experience, it is refreshing for technical services staff to see their work from a user-oriented perspective and empowering to have the data to provide student-centered services.

References

1. Shelley Gullikson and Emma Cross, "User Experience From a Technical Services Point of View," Access 2017, https://www.youtube.com/watch?v=bap1zrcx-ZU&list=PLomHagvStAaDzXullxohONtPPcD_T2AO4&index=14.
2. Leah Buley, *The User Experience Team of One* (Brooklyn, NY: Rosenfeld Media, 2013), 4.
3. Cecily Walker, "A User Experience Primer," *Feliciter* 56, no. 5 (2010): 195.
4. Walker, 196.
5. Julia Gross and Lutie Sheridan, "Web Scale Discovery: The

User Experience," *New Library World* 112, no. 5–6 (2011): 236–47, https://doi.org/10.1108/03074801111136275; Kylie Jarrett, "Findit@Flinders: User Experiences of the Primo Discovery Search Solution," *Australian Academic & Research Libraries* 43, no. 4 (2012): 278–99, https://doi.org/10.1080/00048623.2012.10722288; Andrew D. Asher, Lynda M. Duke, and Suzanne Wilson, "Paths of Discovery: Comparing the Search Effectiveness of EBSCO Discovery Service, Summon, Google Scholar, and Conventional Library Resources," *College & Research Libraries* 74, no. 5 (2013): 464–88, https://doi.org/10.5860/crl-374; Sonya Betz and Ian Roberton, "Integrating Discovery to Improve the User Experience," in *Exploring Discovery: The Front Door to your Library's Licensed and Digitized Content*, ed. Kenneth J. Varnum (Chicago: ALA Editions, 2016), 155–68; Karine Larose et al., *Library Search UX Report Summer 2016* (London: Imperial College London Library Services, 2017), http://hdl.handle.net/10044/1/44345; Rice Majors, "Comparative User Experiences of Next-Generation Catalogue Interfaces," *Library Trends* 61, no. 1 (2012): 186–207, https://doi.org/10.1353/lib.2012.0029; Bill McMillin, Sally Gibson, and Jean MacDonald, "Mapping the Stacks: Sustainability and User Experience of Animated Maps in Library Discovery Interfaces," *Journal of Electronic Resources Librarianship* 28, no. 4 (2016): 219–31, https://doi.org/10.1080/1941126X.2016.1236537; Emery Shriver, "Managing Discovery Problems with User Experience in Mind," *Code4Lib Journal* no. 44 (2019), https://journal.code4lib.org/articles/14481.

6. Larisa Walsh, "The Faceted Catalog as a Tool for Searching Monographic Series: Usability Study of Lens," *Cataloging & Classification Quarterly* 50, no. 1 (2012): 43–59, https://doi.org/10.1080/01639374.2011.610433.
7. Martha Yee, "System Design and Cataloging Meet the User: User Interfaces to Online Public Access Catalogs," *Journal of the American Society for Information Science* 42 no. 2 (1991): 92, https://doi.org/10.1002/(SICI)1097-4571(199103)42:2<78::AID-ASI2>3.0.CO;2-2.
8. Jan Pisanski and Maja Žumer, "Mental Models of the Bibliographic Universe. Part 1: Mental Models of Descriptions," *Journal of Documentation* 66, no. 5 (2010): 643–67, https://doi.org/10.1108/00220411011066772.
9. Nancy Fried Foster et al., ed., *Scholarly Practice, Participatory Design and the eXtensible Catalog* (Chicago: Association of College and Research Libraries, 2011); Jennifer Bowen, "The eXtensible Catalog: Taking Control of Library Metadata" (presentation, June 4, 2009), https://hdl.handle.net/1813/12873.
10. Yin Zhang and Athena Salaba, "What Do Users Tell Us About FRBR-Based Catalogs?" *Cataloging & Classification Quarterly* 50, no. 5–7 (2012): 705–23, https://doi.org/10.1080/01639374.2012.682000.
11. Victoria Wilson, "Catalog Users 'In the Wild': The Potential of an Ethnographic Approach to Studies of Library Catalogs and Their Users," *Cataloging & Classification Quarterly* 53, no. 2 (2015): 190–213, https://doi.org/10.1080/01639374.2014.980022.
12. Wilson, 205–6.
13. Karen Markey, "Twenty-Five Years of End-User Searching, Part 1: Research Findings," *Journal of the American Society for Information Science & Technology* 58, no. 8 (2007): 1072, https://doi.org/10.1002/asi.20462.
14. Karen Markey, "Twenty-Five Years of End-User Searching, Part 2: Future Research Directions," *Journal of the American Society for Information Science & Technology* 58, no. 8 (2007): 1128, https://doi.org/10.1002/asi.20601.
15. Susan K. Charles and Katharine E. Clark, "Enhancing CD-ROM Searches with Online Updates: An Examination of End-User Needs, Strategies, and Problems," *College & Research Libraries* 51, no. 4 (1990): 321–28.
16. Michael Twidale and David Nicols, "Designing Interfaces to Support Collaboration in Information Retrieval," *Interacting with Computers* 10, no. 2 (1998): 177–93, https://doi.org/10.1016/S0953-5438(97)00022-2, 185.
17. Anita Komlodi, "Task Management Support in Information Seeking: A Case for Search Histories," *Computers in Human Behavior* 20, no. 2 (2004): 171, https://doi.org/10.1016/j.chb.2003.10.013.
18. Theresa Dirndorfer Anderson, "Relevance as Process: Judgements in the Context of Scholarly Research," *Information Research: An International Electronic Journal* 10, no. 2 (2005), http://informationr.net/ir/10-2/paper226.html.
19. Nancy Fried Foster and Susan Gibbons, *Studying Students: The Undergraduate Research Project at the University of Rochester* (Chicago: Association of College and Research Libraries, 2007); Donna Lanclos and Andrew D. Asher, "'Ethnographish': The State of Ethnography in Libraries," *Weave: Journal of Library User Experience* 1, no. 5 (2016): http://doi.org/10.3998/weave.12535642.0001.503; Bryony Ramsden, "Ethnographic Methods in Academic Libraries: A Review," *New Review of Academic Librarianship* 22, no. 4 (2016): 355–69, http://doi.org/10.1080/13614533.2016.1231696.
20. Lynda M. Duke and Andrew D. Asher, *College Libraries and Student Culture: What We Now Know* (Chicago: American Library Association, 2012).
21. Chris Leeder and Chirag Shah, "Library Research as Collaborative Information Seeking," *Library & Information Science Research* 38, no. 3 (2016): 202–11, https://doi.org/10.1016/j.lisr.2016.08.001, 204.
22. Markey, "Twenty-Five Years of End-User Searching, Part 2," 1128.
23. Lisa M. Given and Gloria J. Leckie, "'Sweeping the Library': Mapping the Social Activity Space of the Public Library," *Library & Information Science Research* 25 (2003): 365–85.

24. Given and Leckie, "'Sweeping the Library,'" 383.
25. Given and Leckie, "'Sweeping the Library,'" 383.
26. Sarah Polkinghorne, Lisa M. Given, and Lauren Carlson, "Interviews that Attend to Emplacement: The 'Walk-Through' Method," *Proceedings of the Annual Conference of the Canadian Association of Information Science* 2017, https://journals.library.ualberta.ca/ojs.cais-acsi.ca/index.php/cais-asci/article/view/1028, 1.
27. Polkinghorne, Given, and Carlson, "Interviews that Attend to Emplacement," 3.
28. Polkinghorne, Given, and Carlson, "Interviews that Attend to Emplacement," 3.
29. Kristen Wilson, "The Knowledge Base at the Center of the Universe," *Library Technology Reports* 52, no. 6 (2016), https://doi.org/10.5860/ltr.52n6.
30. Shawn V. Lombardo and Kristine S. Condic, "Convenience or Content: A Study of Undergraduate Periodical Use," *Reference Services Review* 29, no. 4 (2001): 327–38, https://doi.org/10.1108/EUM0000000006494; J. Patrick Biddix, Chung Joo Chung, and Han Woo Park, "Convenience or Credibility? A Study of College Student Online Research Behaviors," *Internet and Higher Education* 14, no. 3 (2011): 175–82, https://doi.org/10.1016/j.iheduc.2011.01.003; Lynn Sillipigni Connaway, Timothy J. Dickey, and Marie L. Radford, "If it is Too Inconvenient I'm Not Going After it: Convenience as a Critical Factor in Information-Seeking Behaviors," *Library & Information Science Research* 33, no. 3 (2011): 179–90.
31. Wilson, "The Knowledge Base at the Center of the Universe," 8.
32. Wilson, "The Knowledge Base at the Center of the Universe," 8.

Appendix. Session Script

We're interested in getting a better understanding of how people search for information related to their academic research. We'd like to observe you searching for information you need for an upcoming project—a paper or assignment. We know that it's strange having people watch you do this, but we'd really like you to do what you normally do. We don't want you to feel that you're being evaluated; what will be most helpful to us is to see what you actually do when you look for information. It doesn't matter if you think there's a better way, we just want to know what it is that you do. So even though we're from the library, please don't feel that you should be using library resources if you don't normally do that. This isn't a test; from our point of view there is no right or wrong way to do anything in the next 30 minutes or so.

With your permission, we'd like to record your screen while you're searching. This will help us so that we don't have to take as many notes. We have a consent form here that we'd like you to sign and you can opt out of the video recording if you prefer. [Go over the consent form and give them the Starbucks card.]

I have a few quick questions before we get started:

- What year are you in? / Are you doing your Masters or your PhD?
- What is your major? / What is your area of study?
- And finally, can you tell me a little bit about what you're working on today and what you're hoping to find?

As you're searching, it would be extremely helpful for you to say what you're thinking as you go along. Tell us what you're looking for, if you find something that helps you, if you're confused by anything, if something didn't work the way you expected. Tell us about how you're making decisions—decisions to look at something, to ignore something, to change your strategy, to continue or to give up. It can be difficult to think out loud, so I might ask you some questions, particularly if you've been quiet for a while. Another way to think of it that might be helpful is to tell us the story of what you're doing.

Do you have any questions for me before we start? Please start when you're ready.

Book Review

Elyssa M. Gould

The Data Wrangler's Handbook: Simple Tools for Powerful Results. By Kyle Banerjee. Chicago: ALA Neal-Schuman, 2019. 164 p. $67.99 softcover (ISBN 978-0-8389-1909-5).

Banerjee has had a long-time goal to make technological concepts and skills accessible and comprehensive to a non-technical audience. This recent publication is no different. It expands on the author's purpose to have people adopt technological tools for everyday library projects. It does this by introducing the analogy of a technology cookbook. Practically speaking, this book highlights several recipes using their computers' native tools to solve ordinary problems when managing library data.

Librarians and information professionals have at their disposal powerful tools that come with every computer to help assemble and manage text-based data. Banerjee illustrates how these tools can tackle a wide variety of library data issues. Through the examples, he details how to break down complex issues thus managing smaller, more comprehensible tasks where these tools can be applied. Thanks to this process, the reader can gain confidence with these tools and think through complex data issues.

The book structures concepts and tasks to build on one another. The first two chapters "Getting Started with the Command Line" and "Command Line Concepts" are critical as they constitute the foundation from which Banerjee creates more sophisticated data manipulations in later chapters. These first chapters can be difficult for those with no previous technological knowledge. With that in mind, even those already familiar with these tools would find helpful information and a handy reference of solutions. Chapter Three, "Understanding Formats" by David Forero, describes file formats typically encountered in library work. Chapter Four, "Simplify Complicated Problems" addresses how to break down complex questions and problems into more easily understood ones. Chapters Five, Six, and Seven, "Delimited Text," "XML," and "JSON (JavaScript Object Notation)," continue to delve more deeply into common data formats in library work. Chapter Eight, "Scripting," introduces the concept of creating unique files to run commands from Chapter One. Chapter Nine, "Solving Common Problems," presents a recipe guide to solve common issues encountered with library data. Chapter Ten, "Conclusions," wraps up the handbook by listing additional tips and tricks.

This reviewer found it powerful to follow every example throughout the book. Looking for more information online on topics such as options for Unix commands or regular expressions gave this reviewer more confidence in the themes being discussed. Trying the examples as written, plus variations to see what would happen, encouraged a trial and error approach. As a result, this reviewer began to see the potential of how these tools could solve many library data issues encountered in technical services.

Working through the examples was not without its challenges. This reviewer would have appreciated more explanations for many of the examples in chapters One and Two, and more guidance on how to handle errors or where to find help. Banerjee underscores the importance of adopting a trial and error approach while working through the examples in the handbook. This approach could have been stressed even more in the first two chapters and introduction. That would be helpful, especially for the novice reader. Even with that in mind, those with no knowledge of command line tools might need extra time to work through examples. For those with little to no knowledge, it is still worth spending more time on chapters One and Two.

Overall, this book is a solid starting point. Thanks to its recipe style approach, it can be the focus of a study group, classroom, or self-study. It includes an index, glossary, useful commands, explanation of symbols, and commands to solve common issues. Each chapter provides numerous examples to work through. Although chapters One and Two are important, Chapter Four, "Simplifying Complex Problems," also stands out. Here, Banerjee writes: "It's important to keep in mind that what constitutes a specific data element depends on the specific task that you're working on" (36). It is the foundation from which to understand common data problems in library work and deconstruct these into smaller ones where your new tools can be applied. This chapter equips readers with a method to critically think through complex issues whether or not they are related to data. Chapter Four is the conceptual design of the kitchen where chapters One and Two are the tools found in that kitchen. This reviewer found it useful to spend as much time with Chapter Four as with the first two.

In this way, Banerjee provides a great departure to think about more than just library data problems. Many current handbooks on command line and its tools tend to be from the perspective of computer science. For those without any knowledge, these books can sometimes be

overwhelming. Banerjee here brings to librarianship a clear explanation of these tools as it relates to library or text-based data. The advantage is that this handbook creates a frame of reference to understand common library data issues. This shared framework allows the reader to compare how they currently approach these data issues and the solutions proposed by Banerjee. Moreover, the reference is shared in that all examples come from those that librarians work with on a daily basis, especially in technical services. Lastly, it acts as a starting point to better understand more complex literature on this subject from other fields such as computer science.

This handbook provides a good introduction to the command line and its tools. It is appropriate for a broad audience although it is tailored for those who work with library data. That is one of the best advantages of this book in that the examples are those that librarians might have already encountered or have used other tools to solve. Another bonus is that if the reader adopts a hands-on approach, they will have an even better understanding of these tools. Indeed, this is the book's strength. If the audience is willing to take the time to work through the examples, then they will reap the benefits—*Jennifer M. Eustis (jeustis@umass.edu), University of Massachusetts Amherst*

ALCTS
Association for Library Collections & Technical Services
a division of the American Library Association
50 East Huron Street, Chicago 60611 • 312-280-5038
Fax: 312-280-5033 • Toll Free: 1-800-545-2433 • http://www.ala.org/alcts