On the Record

Report of

The Library of Congress Working Group
on the Future of Bibliographic Control

January 9, 2008

WORKING GROUP
ON THE
FUTURE OF BIBLIOGRAPHIC CONTROL

Richard Amelung
Associate Director
Omer Poos Law Library
Saint Louis University

Diane Boehr
Head, Cataloging Section
Technical Services Division
National Library of Medicine

Diane Dates Casey
Dean of Library Services and
Academic Computing
Governors State University

Daniel Clancy
Engineering Director
Google

Christopher Cole
Associate Director, Technical Services
National Agricultural Library

Lorcan Dempsey
Vice President, Programs and Research,
and Chief Strategist
OCLC, Inc.

Jay Girotto
Windows Live Search
Group Program Manager
Microsoft Corporation

José-Marie Griffiths *(Co-Chair)*
Dean and Professor
School of Information and Library Science
University of North Carolina at Chapel Hill

Janet Swan Hill *(Co-Editor)*
Professor and Associate Director for
Technical Services
University of Colorado Libraries

John Latham
Director, Information Center
Special Libraries Association

Clifford Lynch
Executive Director
Coalition for Networked Information

Olivia M. A. Madison *(Co-Chair)*
Dean of the Library
Iowa State University

Judith Nadler
Director and University Librarian
University of Chicago Library

Brian E. C. Schottlaender *(Co-Editor)*
The Audrey Geisel University Librarian
University of California, San Diego

Sally Smith
Manager of Cataloging and Processing
King County Library System
Seattle, WA

Robert Wolven
Associate University Librarian for
Bibliographic Services and
Collection Development
Columbia University

Project Consultants
Karen Coyle
Library Consultant

Nancy Fallgren
Johns Hopkins University

Library of Congress Liaison
Beth Davis-Brown
Executive Secretariat
Office of the Associate Librarian for
Library Services

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EXECUTIVE SUMMARY

In November 2006, Deanna Marcum, Associate Librarian for Library Services at the Library of Congress, convened a Working Group to examine the future of bibliographic control in the 21st century. The formal charge to the Working Group on the Future of Bibliographic Control was to:

- Present findings on how bibliographic control and other descriptive practices can effectively support management of and access to library materials in the evolving information and technology environment;
- Recommend ways in which the library community can collectively move toward achieving this vision;
- Advise the Library of Congress on its role and priorities.

The Working Group interpreted this charge at its broadest. It considered current trends, current practices, new and emerging developments, and the growing array of participants in the evolving environment of knowledge production, distribution, and use.

At its first meeting in November 2006, the Working Group decided to structure its process around a series of public meetings on the following themes:

- Users and uses of bibliographic data;
- Structures and standards for bibliographic control; and
- Economics and organization of bibliographic control.

While this Report is presented to the Library of Congress, it situates recommendations to the Library in the broader context of the environment in which the Library does and could function. Thus, the Report discusses and makes recommendations not only to the Library, but also to other current and potential participants in this environment. The Report is also aimed at policy-makers and decision-makers who influence the scope of operation of and constraints imposed upon participating organizations.

The Working Group envisions a future for bibliographic control that will be collaborative, decentralized, international in scope, and Web-based. The realization of this future will occur in cooperation with the private sector and with the active collaboration of library users. Data will be gathered from multiple sources; change will happen quickly; and bibliographic control will be dynamic, not static.

The Report is based on the key premise that the community is at a critical juncture in the evolution of bibliographic control and information access/provision. It is time to take stock of past practices, to look at today's trends, and to project a future path consistent with the goals of bibliographic control: to facilitate discovery, management, identification, and access of and to library materials and other information products. Libraries must work in the most efficient and cooperative manner to minimize where possible the costs of bibliographic control, but both the Library of Congress and library administrators generally must recognize

that they need to identify and allocate (or, as appropriate, reallocate) sufficient funding if they are serious about attaining the goals of improved and expanded bibliographic control.

The Working Group identified three broad guiding principles that formed the foundation for the Report and its recommendations. They are the need to **redefine**:

> **Bibliographic Control** as broader than cataloging, comprehending all materials accessed through libraries, a diverse community of users, and a multiplicity of venues where information is sought.
>
> **The Bibliographic Universe** beyond libraries, publishers and database producers to include creators, vendors, distributors, stores, and user communities, among others, across sectors and international boundaries.
>
> **The Role of the Library of Congress**. The Library of Congress plays a unique role in the U.S. library community. Since it started distributing catalog cards, the Library has had a role as the primary source of bibliographic records for libraries in the United States. The environment within which the Library operates has changed dramatically (technological evolution and economic forces have driven the creation, production, distribution and use of information in multiple forms). It simply is neither feasible nor necessarily appropriate for the Library to continue to perform all its assumed roles—particularly when considering its own demanding legislative mandate for managing its vast and complex internal collections, services, and programs.

This Report deliberately sets broad directions for the future, rather than proposing specific implementation plans. The Report cannot address or even consider every future possibility as there are simply too many interdependencies, areas of responsibility, and spheres of influence to take into account. The Working Group views both immediate and long-term planning and implementation resulting from this Report to be a consultative, collaborative, community-based endeavor.

The recommendations in this Report fall into five general areas:

> **Increase the efficiency of bibliographic production for all libraries** through increased cooperation and increased sharing of bibliographic records, and by maximizing the use of data produced through the entire "supply chain" for information resources.
>
> **Transfer effort into higher-value activity**. In particular, expand the possibilities for knowledge creation by exposing to more users rare and unique materials held by libraries that are currently hidden from view and, consequently, underused.
>
> **Position our technology for the future** by recognizing that the World Wide Web is both our technology platform and the appropriate platform for the delivery of our standards. Recognize that people are not the only users of the data we produce in the name of bibliographic control, but so too are machine applications that interact with those data in a variety of ways.
>
> **Position our community for the future** by facilitating the incorporation of evaluative and other user-supplied information into our resource descriptions. Work to realize the potential of the FRBR framework for revealing and capitalizing on the various relationships that exist among information resources.
>
> **Strengthen the library profession** through education and the development of measurements that will inform decision-making, now and in the future.

Each area includes a broad discussion of the issues to be examined, followed by our perceptions of the consequences of maintaining the status quo, the recommendations themselves, and the desired outcomes of those recommendations.

The Working Group anticipates U.S. leadership in bibliographic control to be a collaborative and coordinated effort on the part of the Library of Congress and other major participants. Given the expansive scope of its recommendations, this Report, while commissioned by and delivered to the Library of Congress, will be distributed broadly outside the Library. The Working Group recommends that the Library review and prioritize the recommendations that, in whole or in part, are directed to it. The Library should incorporate prioritized recommendations into its strategic and tactical plans. The Working Group also recommends that the broader library community and its constituent parts review those recommendations intended for broader consideration and coordinate priorities for participation and implementation.

The Working Group hopes that this Report is viewed as a "call to action" that informs and broadens participation in discussion and debate, conveys a sense of urgency, stimulates collaboration, and catalyzes thoughtful and deliberate action. We anticipate broad discussion of the Report's recommendations and their implications, and look forward to the development of specific implementation plans, research agendas, and educational programs.

INTRODUCTION

The future of bibliographic control will be collaborative, decentralized, international in scope, and Web-based. Its realization will occur in cooperation with the private sector, and with the active collaboration of library users. Data will be gathered from multiple sources; change will happen quickly; and bibliographic control will be dynamic, not static. The underlying technology that makes this future possible and necessary—the World Wide Web—is now almost two decades old. Libraries must continue the transition to this future without delay in order to retain their significance as information providers.

The Working Group on the Future of Bibliographic Control encourages the library community to take a thoughtful and coordinated approach to effecting significant changes in bibliographic control. Such an approach will call for leadership that is neither unitary nor centralized. Nor will the responsibility to provide such leadership fall solely to the Library of Congress (LC). That said, the Working Group recognizes that LC plays a unique role in the library community of the United States, and the directions that LC takes have great impact on all libraries. The Working Group also recognizes that there are many other institutions and organizations that have the expertise and capacity to play significant roles in the bibliographic future. Wherever possible, those institutions must step forward and take responsibility for assisting with navigating the transition and for playing appropriate ongoing roles after that transition is complete.

To achieve the goals set out in this document, the library community must look beyond individual libraries and toward a systemwide deployment of resources. We must realize efficiencies in order to be able to reallocate resources from components of the bibliographic control activity that have become of lesser value in today's environment into other, higher value components.

The recommendations in this report are directed at a number of parties, indicated either by their common initialism (e.g., "LC" for Library of Congress, "PCC" for Program for Cooperative Cataloging) or by their general category (e.g., "Publishers," "National Libraries"). When a recommendation is addressed to "All," it is intended for the library community as a whole and its close collaborators. The Working Group assumes that, upon receipt of this report, the Library of Congress will pursue a variety of approaches to engaging appropriate parts of the broader community in its implementation.

The Library of Congress must begin by prioritizing the recommendations that are directed in whole or in part to LC. Some recommendations define tasks that can be achieved immediately and with moderate effort; others require analysis and planning that will have to be coordinated broadly and carefully. Still others define tasks that the Library of Congress has initiated, often within the framework of an internal pilot project, not necessarily scaled to broader internal applications or informed by feedback from the greater cataloging community. The Working Group has consciously not associated time frames with any of its recommendations.

The recommendations fall into five general areas:

1. Increase the efficiency of bibliographic production for all libraries through increased cooperation and increased sharing of bibliographic records, and by maximizing the use of data produced throughout the entire "supply chain" for information resources.
2. Transfer effort into higher-value activity. In particular, expand the possibilities for knowledge creation by "exposing" rare and unique materials held by libraries that are currently hidden from view and, thus, underused.
3. Position our technology for the future by recognizing that the World Wide Web is both our technology platform and the appropriate platform for the delivery of our standards. Recognize that people are not the only users of the data we produce in the name of bibliographic control, but so too are machine applications that interact with those data in a variety of ways.
4. Position our community for the future by facilitating the incorporation of evaluative and other user-supplied information into our resource descriptions. Work to realize the potential of the Functional Requirements for Bibliographic Records (FRBR) framework for revealing and capitalizing on the various relationships that exist among information resources.
5. Strengthen the library profession through education and the development of measurements that will inform decision-making now and in the future.

The Working Group intends what follows to serve as a broad blueprint for the Library of Congress and its colleagues in the library and information technology communities for extending and promoting access to information resources.

BACKGROUND

BIBLIOGRAPHIC CONTROL AT THE LIBRARY OF CONGRESS

> The Library of Congress (LC) is a living and vital library and at the same time an icon. It is easier to be a library than to be an icon, but it is no easy thing to be a library amid the turmoil of the digital revolution.[1]

Bibliographic control is the organization of library materials to facilitate discovery, management, identification, and access. It is as old as libraries themselves, and our current approaches to it are direct descendents of the librarianship of the 19th century. One of the outgrowths of standards developed in that century is that the libraries of today are able to collaborate on the creation of cataloging and catalog entries. In 1902, LC began producing catalog cards for purchase so that libraries that purchased the same book could buy those cards, rather than having to catalog the book themselves. That service continues to this day, although now bibliographic data are machine-readable and are shared over networks. Today's technology facilitates the contribution by any number of libraries to the pool of available bibliographic records. This sharing of records and the effort that produces them, result in considerable cost savings for U.S. libraries.

Currently, the Library of Congress serves as the primary source of bibliographic data for many libraries in the United States and beyond. LC creates a bibliographic record for its catalog, either at the prepublication stage (Cataloging in Publication, or CIP) or when LC receives an item. From LC's catalog, the record enters a variety of record distribution channels where it becomes available to other libraries that hold the same item. Libraries may acquire machine-readable cataloging records from a bibliographic utility, or they may purchase them from vendors, many of whom use LC copy. Still other libraries may, as the basis for their own records, rely on the printed CIP data that appear in some books. Library of Congress cataloging records have traditionally been considered to represent the highest quality cataloging. Although even LC records aren't perfect, they are still the cataloging records of choice for most other libraries. Within WorldCat, more holdings are attached to Library of Congress records than to records from other sources. This widespread acceptance of LC cataloging contributes to the consistency of access to materials across the nation's libraries, and it reduces the overall cost of bibliographic control.

The Library of Congress Mandate

Creation of bibliographic records for use by others, and leadership in the area of standards development are common activities in national libraries. LC is a recognized world leader in both endeavors. However, unlike other international players in this arena, LC enjoys neither a mandate to be a national library, nor funding concomitant with playing such a role. More to the point, it receives no funding specifically directed at providing bibliographic services for U.S. libraries. While it is beyond the scope of this report to comment on whether or not the Library of Congress should be given the statutory standing of a national library, it is necessary to observe that its lacking such status, and in particular the funding that should accompany such status, compromises its continuing ability to carry out functions depended upon by many of the nation's libraries.

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[1] *LC21: A Digital Strategy for the Library of Congress* (Washington, D.C.: National Academy Press, 2000).

LC's willingness, nevertheless, to step forward and assume responsibilities beyond its designated mandate has greatly benefited libraries in the United States and throughout the world. It has also fostered, however, dependencies that limit LC's freedom of action in meeting changing circumstances and needs. Like other libraries, LC is now faced with the need to catalog a growing variety of digital resources and to improve access to its unique and rare collections. Digitization of LC's own collections also brings with it the need for major new investment in metadata creation and digital resource management. Because a large percentage of LC's cataloging workforce is nearing retirement age, sustaining its cataloging operations as currently construed will soon require major investment in recruitment and training.

These needs and pressures cannot be ignored; they require efficient innovation and creative adaptation. Any major change by LC in its bibliographic services will have consequences not only for libraries and educational institutions that have come to rely on those services, but also for the entire market sector that provides goods and services to libraries. These latter entities often make direct or indirect use of LC cataloging as part of their product offerings.

According to current congressional regulations, LC is permitted to recover only direct costs for services provided to others. As a result, the fees that the Library charges do not cover the most expensive aspect of cataloging: namely, the cost of the intellectual work. The economics of creating LC's products have changed dramatically since the time when the Library was producing cards for library catalogs. It is now time to reevaluate the pricing of LC's product line in order to develop a business model that allows LC to more substantially recoup its actual costs.

Standards and Practices at the Library of Congress

In addition to producing bibliographic records, LC provides leadership in the bibliographic control standards arena. The Library is the maintenance agency for MARC21, the machine-readable record format used by libraries, and plays a key role in the creation and maintenance of the descriptive cataloging rules used in U.S. libraries.[2] It also manages two vital access tools, the Library of Congress Classification (LCC) and the Library of Congress Subject Headings (LCSH), both of which are used by libraries throughout the United States as well as by some other libraries worldwide. LC hosts online sites for numerous other information standards, including the Metadata Encoding and Transmission Standard (METS) and Information Retrieval (Z39.50). LC staff participate in the development and maintenance of literally dozens of standards related to bibliographic control and to other library functions, such as preservation and digitization.

These standards and others that are relevant to bibliographic control are international in nature, just as the exchange of bibliographic information has become global. In recent years, for instance, development and use of MARC21 have expanded beyond an exclusively United States base to include Canada and the United Kingdom, and work is underway to enable the participation of German libraries. In this, as in so many other international standards activities, it is LC that represents U.S. library interests.

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[2] Joint Steering Committee for the Revision of AACR. *Anglo-American Cataloguing Rules*. 2nd ed., 2002 rev. (Chicago: American Library Association, 2002). See also the current work taking place on the new version of the cataloging rules, *Resource Description and Access* (http://www.collectionscanada.ca/jsc/rda.html)

THE FUTURE OF BIBLIOGRAPHIC CONTROL

What shape and form the future of bibliographic control will take is a question that the Library of Congress has investigated periodically. The motivation for the most recent investigations has been the dramatic transformation of the field of librarianship brought about by digital technologies.

A report on digital strategies was conducted by the National Research Council at the behest of the Librarian of Congress in 2000.[3] In 2001, the Bicentennial Conference on Bibliographic Control for the New Millennium—subtitled "Confronting the Challenges of Networked Resources and the Web"[4]—produced an action plan for the Library.[5] Although primarily focused on the control of networked and digital resources, the conference covered general topics of metadata creation; augmentation of library cataloging rules to make them more suitable for describing electronic resources; support for interoperability among libraries and between libraries and other information providers; and investigation of ways to increase the efficiencies of bibliographic record creation through partnerships. Many of these topics surfaced again in a 2006 report commissioned by LC and written by Karen Calhoun.[6] At the same time, other institutions also undertook similar investigations, including work done at the University of California on the future of bibliographic services at the University,[7] and consideration of the future of cataloging by Indiana University.[8]

In 2004, the Joint Steering Committee for the Revision of the Anglo-American Cataloguing Rules began work on a new code to replace the Anglo-American Cataloguing Rules (AACR) first published in 1967 and revised substantially since then. The new rules, named Resource Description and Access (RDA), are "… being developed as a new standard for resource description and access designed for the digital world."[9] This work is facilitated by related work done by the International Federation of Library Associations and Institutions (IFLA) on a new model for a bibliographic framework: the Functional Requirements for Bibliographic Records[10] and the initiation in 2003 of a new set of IFLA Cataloguing Principles.[11]

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[3] *LC21: A Digital Strategy for the Library of Congress* (Washington, D.C.: National Academy Press, 2000).
[4] *Bicentennial Conference on Bibliographic Control for the New Millennium: Confronting the Challenges of Networked Resources and the Web* (Washington, D.C.: Cataloging Directorate, Library of Congress. 2001).
http://www.loc.gov/catdir/bibcontrol/conference.html
[5] *Bibliographic Control of Web Resources: A Library of Congress Action Plan.*
http://www.loc.gov/catdir/bibcontrol/actionplan.html
[6] Karen Calhoun, *The Changing Nature of the Catalog and Its Integration with Other Discovery Tools* (March, 2006).
http://www.loc.gov/catdir/calhoun-report-final.pdf
[7] University of California Bibliographic Services Task Force, *Rethinking How We Provide Bibliographic Services for the University* (December 2005). http://libraries.universityofcalifornia.edu/sopag/BSTF/Final.pdf
[8] Jackie Byrd et al., *A White Paper on the Future of Cataloging at Indiana University* (2006).
http://www.iub.edu/~libtserv/pub/Future_of_Cataloging_White_Paper.pdf
[9] Joint Steering Committee for the Development of RDA, *Prospectus* (Last updated, June, 2007)
http://www.collectionscanada.ca/jsc/rdaprospectus.html
[10] IFLA Study Group on the Functional Requirements for Bibliographic Records, *Functional Requirements for Bibliographic Records: Final Report* (Munich: K.G. Saur, 1998). http:// www.ifla.org/VII/s13/frbr/frbr.pdf
[11] Barbara B. Tillett, Renate Gömpel, Susanne Oehlschläger, *IFLA Cataloguing Principles: Steps Toward an International Cataloguing Code* (Munich: K.G. Saur, 2004).

THE WORKING GROUP ON THE FUTURE OF BIBLIOGRAPHIC CONTROL

The Working Group on the Future of Bibliographic Control[12] was formed by the Library of Congress to address changes in how libraries must do their work in the digital information era. The Working Group is co-chaired by Dr. José-Marie Griffiths, Dean and Professor of the School of Information and Library Science at the University of North Carolina at Chapel Hill, and Olivia M. A. Madison, Dean of the Library, Iowa State University. Members of the Working Group are information professionals representing key professional organizations and information technology companies.

Although a primary catalyst for formation of the Working Group was reaction in the library community to a Library of Congress decision to discontinue series authority control for the materials it catalogs, the focus of the Group's work was much broader.

The Working Group was charged to:

- Present findings on how bibliographic control and other descriptive practices can effectively support management of and access to library materials in the evolving information and technology environment;
- Recommend ways in which the library community can collectively move toward achieving this vision; and
- Advise the Library of Congress on its role and priorities.

The Working Group met first in November 2006. At that meeting the Group decided to structure its process around a series of public meetings covering three specific areas:

- Users and uses of bibliographic data;
- Structures and standards for bibliographic control; and
- Economics and organization of bibliographic control.

These meetings included presentations by invited speakers, as well as testimony from members of the community. Two of the three public meetings were available as Webcasts both during and after the meeting. In addition, the community was invited to submit written testimony. The Working Group received seventy-four written submissions, of which more than fifteen were submitted on behalf of organizations or institutions. The Library of Congress mounted a public Web site for the Working Group, where it posted the Group's membership, charge, and schedule as well as links to background documents, and summaries of the public meetings. A draft report for public comment was issued on November 30, 2007, and received more than one hundred pages of comments. This final report takes into consideration comments and testimony received.

[12] Working Group on the Future of Bibliographic Control. http://www.loc.gov/bibliographic-future/

GUIDING PRINCIPLES

REDEFINE BIBLIOGRAPHIC CONTROL

The phrase "bibliographic control" is often interpreted to have the same meaning as the word "cataloging." The library catalog, however, is just one access route to materials that a library manages for its users. The benefits of bibliographic control can be expanded to a wide range of information resources both through cooperation and through design. The Working Group urges adoption of a broad definition of bibliographic control that embraces all library materials, a diverse community of users, and a multiplicity of venues where information is sought.

The bibliographic universe today includes an enormous variety of materials: published materials that are purchased by libraries; materials that libraries license for user access; digital materials on public networks; and materials that are unique to an individual library. It is not uncommon that these disparate materials are described and managed through different processes, and are offered separately for user access. Users would be better served if access to these materials were provided in the context of a unified philosophy of bibliographic control.

Different communities of bibliographic practice have grown up around different resource types: library collections of books and journals; archives; journal articles; and museum objects and images. As these resources and others become increasingly accessible through the Web, separation of the communities of practice that manage them is no longer desirable, sustainable, or functional. Bibliographic control is increasingly a matter of managing relationships—among works, names, concepts, and object descriptions—across communities. Consistency of description within any single environment, such as the library catalog, is becoming less significant than the ability to make connections between environments, from Amazon to WorldCat to Google to PubMed to Wikipedia, with library holdings serving as but one node in this web of connectivity. In today's networked information environment, bibliographic control cannot continue to be seen as being limited to library catalogs.

Although cataloging will and must continue to play a key role in bibliographic control, today there are many other sources of data that can and must be used to organize and provide access to the information universe. To take advantage of these sources, it is necessary to view bibliographic control as a distributed activity, not a centralized one. Data about collection usage—such as inclusion in curricula or bibliographies, citation links, circulation and sales figures—are all valuable bits of information in the universe of bibliographic control. User-contributed data, such as reviews or rankings, can help other users identify resources of possible interest to them. Any collection of electronic data, from library catalogs to collections of full-text works, can be mined for information through automated means. Even those resources that do not originate inside the library or its systems can be seen as tools to serve the library user.

REDEFINE THE BIBLIOGRAPHIC UNIVERSE

> "The library is, of course, only one link in the supply chain of bibliographic information between author and reader. Its needs are unique, but not necessarily exclusive. All parties contribute value through the vehicle of the bib. record: Creator, Publisher, Vendors/Distributors, and Stores/Libraries. To date, there is not a strong tradition of sharing data and metadata throughout the publication cycle. It may be useful, then, to think about what information is available at each

stage, and how to aggregate and build on that foundation. What value is added at each stage? How can the existing value be captured and leveraged in the next?"[13]

Once solely considered a public good, information access today is also a commodity in a rapidly-growing marketplace. Many information resources formerly managed in the not-for-profit sector are now the objects of a significant for-profit economy. Entities in this latter economy have financial capabilities far beyond those of libraries. Further, they have the resources to engage in large scale research and development.

Libraries of today need to recognize that they are but one group of players in a vast field, and that market conditions necessitate that libraries interact increasingly with the commercial sector. One example of such interaction can be found in the various mass digitization projects in which for-profit organizations are making use of library resources and library metadata. Another is found in the increasing exchange of data along the publishing supply chain, as publishers produce data essential for online bookstores, and as library systems link to those online stores for data not traditionally carried in library bibliographic records, such as cover images or reviews.

The expanding and evolving bibliographic environment is today very much Web-enabled and, as such, it crosses international boundaries. No longer is bibliographic control the domain only of libraries, publishers, and database producers. The supply chain of published and shared information and of bibliographic data and derived services, along with their current and potential users, can today be anywhere and everywhere simultaneously.

The continued sharing of effort will be one of the keys to the future success of libraries. Moreover, libraries will need to collaborate not just with each other, but with other organizations as well. For LC, collaboration can take many forms: LC can incorporate data from others into its records; it can create links to data created and held by others (as an alternative to including such data in an LC record); it can create basic records that serve LC and allow others to enhance those records for their own purposes; and it can itself enhance basic records created by others. These methods of collaboration are not mutually exclusive, nor do they constitute a complete list. All possible means of collaboration should be considered.

Sharing, however, is not a strategy for LC alone. The entire library community and its many partners must also be part of it. Rather than relying as heavily as it has on LC, the community needs to acknowledge that in at least some areas, LC may need to be able to rely on the work of others. Moreover, the community—and LC for that matter—needs to consider carefully when it is appropriate to distribute effort and when to discontinue it.

REDEFINE THE ROLE OF THE LIBRARY OF CONGRESS

For every activity area within LC, it is important that the community ask itself whether there is some other institution or group that might take on that work so that LC can reallocate resources. Is duplicate effort being expended? Are there possible partnerships that could reduce the burden on the Library? Since LC is not funded for the role of national library, are there any national library-type functions that LC currently performs that could be collectively fulfilled by the community?

The Library must analyze its tasks to identify areas where work is being done primarily to benefit other libraries. If these tasks are not of direct and substantial benefit to the Library, they should be considered for divestment. In working toward divestment, LC must work with the members of the

[13] Rick Lugg, "Working Group on the Future of Bibliographic Control: Economics and Organization of Bibliographic Data." (July 2007). http://www.loc.gov/bibliographic-future/meetings/docs/ricklugg-july9-2007.pdf

community that benefit from the work to develop a plan for its transition. The immediately affected community should be encouraged to consider if those tasks still return value. If so, and only if so, the community must devise mechanisms to ensure their management and fulfillment outside LC. Even in areas where work currently being done by LC is not done primarily to benefit others, LC may still conclude that the work can no longer be supported, or that it no longer repays the effort. Again, decisions to cease work previously performed must be taken only after engaging interested and affected parties. Because no one has full knowledge of all of the activities and skills within the community at large, there needs to be a mechanism for other institutions to approach LC with proposals for collaboration or even for transfer of responsibilities.

This need to divest extends to the creation of bibliographic data. Since the time that the Library of Congress first began distributing catalog cards, it has had a role as the primary source of bibliographic records for libraries in the United States. In addition, for libraries around the world, LC has also become a primary source of bibliographic records for materials published in the United States. The Library of Congress took on this role at a time when it was uniquely positioned to provide these services, but circumstances have changed. Participation in bibliographic networks and initiatives such as the Program for Cooperative Cataloging (PCC) have led to the library community as a whole having at least as much bibliographic expertise as LC. The Working Group urges LC to identify areas wherein it no longer need be the sole provider of bibliographic data and to create partnerships to distribute responsibility for data creation. Although it will undoubtedly remain a major producer of cataloging copy, LC can and should begin to see itself as one of many peer institutions that can contribute bibliographic data to the community. Determining how much and what work might be shared more broadly will require discussion and evaluation of what other members of the bibliographic community can contribute. It will also require coordination and management so that all participants understand their respective roles. The goal should be that of LC's deriving increasing benefit from the work of other libraries.

The Library has long accepted a leadership role in the areas of standards development and maintenance. The range of standards (both formal and ad hoc) that applies to the digital environment is broad and growing. No single institution can understand, much less participate in the development and maintenance of, all standards relating to information management. In addition, the standards landscape in the library field is overly complex, with many different organizations working on similar standards in a non-coordinated fashion. LC should consider sharing the standards effort within the community and collaborating with other interested institutions to create a rational and efficient means of managing the standards needed for information exchange. This includes sharing the management of the primary data standard for bibliographic records, a standard that should belong to the community rather than to a single institution.

More than most libraries, the Library of Congress has incredible untapped value in its unique and rare holdings. These remain largely outside of bibliographic control while the Library puts most of its effort into managing modern, traditionally published items of the sort commonly found in many other libraries. Great benefit to scholars and citizens could result from a shift in the relative level of attention accorded the Library's unique and rare materials. The Working Group urges that greater bibliographic attention be paid to the primary resources within the Library, recognizing that their nature and quantity is such that they may not realistically lend themselves to the application of traditional cataloging practices.

FINDINGS AND RECOMMENDATIONS

1 INCREASE THE EFFICIENCY OF BIBLIOGRAPHIC RECORD PRODUCTION AND MAINTENANCE

1.1 Eliminate Redundancies

Some of the interest in looking for new ways to effect bibliographic control is based on the current costs of that activity. Because the incredible growth in information resources is not matched by a related growth in library funding, it is necessary to re-examine the efficiency with which the work of bibliographic control is performed. The Working Group identified three primary areas of redundancy in the bibliographic production process:

- the supply chain, wherein some data are created by publishers and vendors and later re-created by library catalogers;
- the modification of records within the library community, wherein such modifications are not shared, even though they could be useful to others; and
- the expenses that are incurred when individual libraries must purchase records because the sharing of those records is prohibited or restricted.

Until very recently, bibliographic control has been an artisan activity, as there was no alternative for providing access except to transcribe, by hand, data from the objects being described. Now, however, publishers and vendors are working in an electronic environment, and print material generally originates in electronic format.

Publishers can provide some elements of descriptive metadata in electronic format for much of their output and libraries need to capitalize on those metadata. Despite the fact that descriptive metadata are being created in other venues, libraries have so far taken minimal advantage of them. Given the explosion of material requiring some level of bibliographic control, the model of item-by-item full manual transcription can no longer be sustained. Libraries must find ways to make use of the data created by others in the supply chain, including data that can be derived from algorithmic analyses of digital materials.

The redundant modification of records in libraries results in unnecessary costs to the library community as a whole. Redundancies occur when individual libraries make changes to records in their local library systems but do not share the those changes that might benefit the broader community. Their reasons for not sharing record modifications may be operational, technical, or economic.

A major operational reason is the distributed nature of cataloging workflow, wherein record creation and management occur in many systems, local, shared and third party. Streamlined local workflow is now a major goal for many libraries, which may be reluctant to take on additional or exceptional tasks. OCLC's business model also has a significant impact on the distributed system of bibliographic data exchange. While OCLC policies do allow qualified libraries to enrich WorldCat records centrally, some consider these policies to be overly restrictive.

Another area of redundancy relates to vendor-supplied records that are corrected by libraries that receive them, but outside the mainstream cataloging workflow. As a consequence, local changes are not re-distributed. In still other cases, re-distribution of records (whether changed or not) may

be forbidden by the license agreement between the vendor and the library. This leads to duplication of effort on the part of other libraries that own the same titles.

Some unnecessary changes to records could be eliminated if there were a persuasive body of evidence that indicated what parts of the record are key to user access success.[14] Such data would enable catalogers and cataloging managers to make informed judgments about how best to direct efforts to improve record quality. Cataloger judgment and institutional policies are applied with care, but absent actual data it is difficult to determine or justify changes in practice.

Consequences of Maintaining the Status Quo

Redundant work means wasted resources. Time and money are spent redoing work that has already been done, rather than creating new records for materials not yet cataloged. This leads to delays in providing access to materials, and to users being unable to locate materials that, though owned, are not yet accessible.

Duplication of work may also lead to duplicate records being input into consortial databases or into OCLC. These duplicate records—with or without minor inconsistencies that make it difficult to identify duplicates from true variants—lead to more wasted resources as libraries have to examine multiple records in order to find the best matches for the items they are cataloging.

Recommendations

1.1.1 Make Use of More Bibliographic Data Available Earlier in the Supply Chain

1.1.1.1 All: Be more flexible in accepting bibliographic data from others (e.g., publishers, foreign libraries) that do not conform precisely to U.S. library standards.

1.1.1.2 All: Analyze cataloging standards and modify them as necessary to ensure their ability to support data sharing with publisher and vendor partners.

1.1.1.3 All: Develop standard crosswalks for the conversion of vendor data to library system formats.

1.1.1.4 All: Develop managed processes for creating and sharing conversion programs so that programming is not done redundantly at multiple institutions.

1.1.1.5 All: Work with publishers and other resource providers to coordinate data sharing in a way that works well for all partners.

1.1.1.6 All: Demonstrate to publishers the business advantages of supplying complete and accurate metadata.

[14] Some studies have been done but have not had clear influence on practice. In particular, studies have been done relating to the changes that are made to OCLC records. See, for example: Walter High, "How Catalogers Really Edit OCLC Records." *North Carolina Libraries* (Fall 1991): 163.

1.1.2 Re-purpose Existing Metadata for Greater Efficiency

1.1.2.1 All: Develop workflow and mechanisms to use data and metadata from network resources, such as abstracting and indexing services, Amazon, IMDb, etc., where those can enhance the user's experience in seeking and using information.

1.1.2.2 All: Use metadata supplied by sound recording, motion picture, and other audio-visual distribution sources.

1.1.2.3 All: Use descriptive cataloging provided by book vendors and non-U.S. libraries whenever available.

1.1.3 Fully Automate the CIP process

1.1.3.1 LC: Develop content and format guidelines for submission of ONIX data to the CIP program and require publishers participating in the program to comply with these guidelines.

1.1.3.2 LC: Develop a mechanism to accept these data in a fully automated fashion so that the descriptive portion of the bibliographic record is created prior to cataloging.

1.1.4 Re-Examine the Current Economic Model for Data Sharing in the Networked Environment

1.1.4.1 LC: Convene a representative group consisting of libraries (large and small), vendors, and OCLC to address costs, barriers to change, and the value of potential gains arising from greater sharing of data, and to develop recommendations for change.

1.1.4.2 LC: Promote widespread discussion of barriers to sharing data.

1.1.4.3 LC: Reevaluate the pricing of LC's product line with a view to developing an economic model that enables more substantial cost recovery.

1.1.5 Develop Evidence about Discovery Tools to Guide Decision-Makers

1.1.5.1 All: Make use of existing, and gather additional, evidence on user behavior to establish empirically the correlation between user behavior and the content of bibliographic records.

Desired Outcomes

LC's increased use of publisher- and vendor-supplied data for bibliographic description will signal to other libraries that effective record creation can be achieved by using these data. Catalogers' time will be freed to enable increased focus on the intellectual work of providing controlled access points for discovery and retrieval of more material.

More records will be shared, thus enabling reallocation of time and effort to the processing of materials and collections that are currently not described and therefore not readily accessible to the public.

With a body of evidence-based research data, decisions about changes to current practice can be made based on known impact. Libraries can confidently eliminate or retain various types of record editing based on knowledge of the actual effect they have on user success in the catalog.

1.2 Increase Distribution of Responsibility for Bibliographic Record Production and Maintenance

Libraries of all types rely heavily on the Library of Congress for the original cataloging records on which they base the bibliographic control of their own collections. They obtain these records from various sources: they use LC's CIP records; harvest bibliographic records from LC's online catalog; use LC-supplied records from OCLC; or purchase records from vendors that obtain their records from OCLC or directly from LC. These same libraries also rely on LC for substantive aspects of their authority work, either because the LC bibliographic records they use include LC-performed authority control or because the authority records they otherwise use are supplied by LC to OCLC and other vendors. The long history of LC's supplying cataloging and authority data has supported this reliance on LC on the part of the nation's libraries, but the burden on LC has become increasingly heavy as funding has not kept pace with demand.

For well over twenty years, the Library of Congress has recognized the need to share with other libraries in the community the work of creating bibliographic and authority records. The Program for Cooperative Cataloging—and its component programs, BIBCO (Bibliographic Cooperative), NACO (Name Authority Cooperative), SACO (Subject Authority Cooperative), and CONSER (Cooperative Online Serials)—attempts to distribute the load of original cataloging and authority work required in an expanding information universe by accepting contributions to the national bibliographic and authorities databases from libraries across the country. These libraries' personnel are trained by LC and by PCC members to produce records at certain levels of quality and in certain quantities. Unfortunately, there are a limited number of library participants in the cooperative programs, which limits the extent to which these programs relieve LC of some of its bibliographic control production responsibilities.[15]

Because many libraries provide bibliographic control to their collections chiefly via copy cataloging and the loading of LC authority files into their online systems, over the past century these libraries have not only reduced the number of staff in their cataloging operations, but also have reduced the proportion of staff who are professionally educated to catalog. Cataloging personnel in most libraries are predominantly paraprofessionals whose training often does not include the creation of authoritative name forms, subject analysis, or in-depth description. Thus, when LC makes decisions that have a substantive impact on the flow of authority work or bibliographic records, these libraries are unable to compensate for the loss without the addition or reallocation of resources. The libraries that are most dependent on LC for bibliographic data are often the smallest and least well funded, and are therefore the most vulnerable to any LC cutbacks, since they do not have the resources to pursue other options such as joining OCLC or outsourcing work to a service vendor. One of the lessons learned from LC's announcement that it intended to stop series authority control was just how vulnerable libraries can and do feel when faced with peremptory change on LC's part.

The dependency on LC for bibliographic data goes beyond libraries to the market segment that makes use of library bibliographic data and that creates library applications. Even though they are heavy users of LC data, these parties often do not participate in decision-making about bibliographic records and are also not considered in the creation or modification of cataloging standards and practices.

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[15] For example, CONSER has approximately 60 participants (http://www.loc.gov/acq/conser/conmembs.html) and BIBCO has 47 (http://www.loc.gov/catdir/pcc/bibco/libraries.html)

Consequences of Maintaining the Status Quo

Long-term dependence on Library of Congress bibliographic services leaves the users of those services increasingly vulnerable to any changes in them.

Long-term reliance on Library of Congress leadership and on its provision of cataloging records leads some libraries—even some large libraries with relatively plentiful staff—to think that they bear no responsibility, individually or collectively, for sharing substantively in the work of bibliographic control.

System-wide redundancies result in higher overall costs and lower effectiveness. Financial pressures on library operations make this increasingly unsustainable. It is important to achieve greater efficiencies within the overall system so as to release effort to higher value activities.

As a consequence of management decisions relating to PCC, BIBCO, NACO, SACO, and CONSER, and of the rigorous membership requirements of those programs, libraries that might participate are discouraged from contributing significantly to the effort of creating bibliographic records.

Recommendations

1.2.1 Share Responsibility for Creating Bibliographic Records

1.2.1.1 LC, library and publishing communities: Share responsibility for creating original cataloging according to interest, use, and ability. Consider categories of materials for which responsibilities can be distributed and categories of metadata that can be appropriately provided by each of the participants.

1.2.1.2 LC: Analyze the Library's use of PCC-produced data and determine how to take full advantage of the shared product.

1.2.1.3 LC: Recognize the impact of LC practice on other libraries. Changes in practice must be openly arrived at with sufficient opportunity for public input, and widely announced with sufficient time to allow other libraries to consider the ramifications, if any, for their own practices and workflows.

1.2.2 Examine Current Original Cataloging Programs and Sub-Programs at the Library of Congress

1.2.2.1 LC: Identify all distinct cataloging programs and operations within the Library of Congress; determine the relative importance of each to the Library and to other libraries; use these determinations to inform management decisions as to priority, continuation, or reshaping of programs, etc.

1.2.2.2 LC: For those aspects of operations that extend beyond the Library's immediate mission as the Library of Congress, identify other entities or groups with the interest and ability to assume responsibility for them.

1.2.2.3 LC: Work with interested entities such as PCC, the Association of Research Libraries (ARL), professional organizations, publishers, etc. to plan transition to new distribution of responsibilities.

1.2.2.4 LC: Examine the management of internal pilot projects relating to cataloging programs, including funding, prioritization, assessment for scalability, viability, and internal and external impact. Identify process for moving from project to service program with feedback from broad constituencies and potential partners.

1.2.3 Expand Number of PCC Participants

1.2.3.1 PCC: Assess barriers and incentives to participation by more libraries, including PCC's and LC's abilities to manage a larger scale effort of collaboration.

1.2.3.2 PCC: Reduce personnel and other costs to PCC participants and to LC.

1.2.3.3 PCC: Actively recruit new participants. Develop a "marketing program" for PCC, publicizing its work and benefits.

1.2.3.4 PCC: Develop management mechanisms to ensure nimble decision-making and planning by PCC.

1.2.4 Increase Incentives for Sharing Bibliographic Records

1.2.4.1 LC, PCC, and OCLC: Explore ways to increase incentives and tools for contributions of new bibliographic records, as well as upgrades or corrections to existing records to the national (and international) shared bibliographic and authority databases.

1.2.4.2 All: Explore tools and techniques for sharing bibliographic data at the network level using both centralized and non-centralized techniques (e.g., OAI-PMH (Open Archive Initiative – Protocol for Metadata Harvesting)).

Desired Outcomes

Rather than continuing to occupy the position of the "alpha library," LC will become a true partner with many other libraries and organizations in creating bibliographic control in the future.

Greater efficiencies will enable libraries to redirect effort from enhancing the cataloging of mainstream materials to other activities that contribute to bibliographic control. These might include more broadly based authority work and greater attention to cataloging collections of unique, rare, and other hidden materials.

LC will have more resources to devote to making its own collections accessible to the American public.

All types of libraries will contribute to the best of their abilities and resources to the "public good" that comes from bibliographic control and resource sharing.

More libraries will participate in PCC, BIBCO, NACO, SACO, and CONSER.

1.3 Collaborate on Authority Record Creation and Maintenance

The Working Group received substantial input concerning the present state of and future possibilities for authority control. Testimony consistently bore out the fact that both libraries and their users rely on the Library of Congress to provide catalog records with current, valid, and unambiguous access points.

Although there is much speculation that improvements in machine-searching capabilities and the growth of databases eliminate the need for authoritative forms of names, series, titles, and subject concepts, both public testimony and available evidence strongly suggest that this is not the case. While such mechanisms as keyword searching provide extremely useful additions to the arsenal of searching capabilities available to users, they are not a satisfactory substitute for controlled vocabularies. Indeed, many machine-searching techniques rely on the existence of authoritative headings even if they do not explicitly display them.

While the creation of authoritative headings is critical to user success in finding and identifying resources, it adds significantly to the cost of bibliographic record creation. Although costs can be managed to some degree by sharing the burden of authority record creation, the need for authoritative forms is driven by the resources themselves and by the high rate of increase in the production of intellectual resources. In a time when anyone can be an author, the number of new creators is growing rapidly. As libraries expand their application of bibliographic control to include more digital materials, the number of name authority records that must be created for new authors will only increase, placing an added burden on cataloging departments. To continue to provide effective authority control, a variety of strategies must be pursued. One strategy might be to develop automated means to assist in authority control, for example to assist in disambiguation among authors; another might be to engage publishers and authors themselves in the process of unambiguous creator identification.

Subject analysis—including analyzing content and creating and applying subject headings and classification numbers—is a core function of cataloging; although expensive, it is nonetheless critical. While subject headings are recognized as essential for collocating topical information, the complexity of LCSH creates difficulties for heading creation and use. At present, the process of maintaining LCSH and of creating new or revised headings can be slow to meet the needs of those working with emerging concepts in both published and archival materials.

The Working Group identified a number of areas that might lend themselves to greater cooperative attention. First, there may be opportunities to work with the abstracting and indexing community, which is increasingly interested in the ability to identify more precisely the authors represented in its indexes. It may also be possible for LC to work with foreign national libraries that are engaged in similar activities.

Internationalization of bibliographic data requires heading equivalencies in different languages, reflecting different national practices. The work begun on a Virtual International Authority File is a step in this direction. Finally, work needs to be done to create data structures that use neutral, non language-based identifiers for terms and headings.

Consequences of Maintaining the Status Quo

Authority control will be limited to library applications, and often only to well-established or large systems that can afford to acquire the data.

Erosion of authority control will impede users' abilities to retrieve desired information in a timely fashion.

As keyword searching becomes increasingly prevalent, non-textual works and works in languages other than English are at risk of becoming less accessible, or even inaccessible.

Recommendations

1.3.1 Increase Collaboration on Authority Data

1.3.1.1 LC, PCC: Identify ways to promote wider participation in the distribution of responsibility for creating, enhancing, and maintaining authority data.

1.3.1.2 LC, PCC, and library community: Work with other interested parties (e.g., American Library Association (ALA) divisions, state libraries, regional OCLC affiliates) to enhance, expand, and make more affordable training opportunities in the area of authority data creation.

1.3.1.3 All: Explore the creation of more tools to facilitate authority record creation and to better integrate record sharing within library workflows.

1.3.1.4 LC, PCC, and OCLC: Explore ways to increase incentives to facilitate contributions of new authority records and of upgrades or corrections to existing records in the national (and international) shared bibliographic and authority databases.

1.3.2 Increase Re-Use of Assigned Authoritative Headings

1.3.2.1 LC, library community, library system vendors, publishers: Investigate convergences of name authority and identity management in various contexts, such as libraries, publishing, and repository management.

1.3.2.2 LC: Bring together other communities working on problems of identification of authors and other creators; map the issues; and investigate possibilities for cooperation.

1.3.2.3 LC: Make the LC Name Authority file available as a Web resource, for downloading or linking to through various Web service interfaces.

1.3.3 Internationalize Authority Files

1.3.3.1 LC, OCLC, and National Libraries: Pursue more aggressively the development of internationally shared authority files.

1.3.3.2 LC, OCLC, and National Libraries: Work actively to advance a uniform approach to linking national and international authority records that represent the same entity.

1.3.3.3 All: Create a file structure that will enable institutions to determine which forms of headings are authorized for use in various languages and for specific geographical audiences.

Desired Outcomes

There will be increased sharing of authority data between libraries and between library systems and systems from other communities, with library authority data available to anyone working with bibliographic data. Economies will be realized by minimizing the number of times the same entity needs to be researched. Exchange of information about the same name from one system to another will be made simpler and more reliable. Access to data will be unimpeded and barriers to using data will be minimized.

New partnerships will result from collaboration and coordination among a wide array of stakeholders. This will realize workflow efficiencies and minimize redundancies between and among entities that create and use both authority and bibliographic data.

Better access to materials in a more seamless search environment will mean fewer failed searches and fewer faulty search results.

Internationally shared authority files will enhance access to non-English language materials, including those in non-Roman alphabets and scripts, and will encourage international sharing of information and data.

2 ENHANCE ACCESS TO RARE, UNIQUE, AND OTHER SPECIAL HIDDEN MATERIALS

Special collections (including but not limited to books and pamphlets, archival and manuscript materials, audio and visual materials, photographs, and maps) are of great value to scholars for research purposes. In addition, as educators seek to engage more students, including undergraduates, in research that utilizes primary sources, these materials are increasingly important for teaching and learning. Non-textual special collections are of particular interest to scholars as they make increasing use of images and sound in their teaching and research. Special collections also reflect the unique identity of a particular library, and are often considered showcases of community cultural and intellectual life.

Processing has never kept up with the acquisition of unique and primary source materials. As a result, there are backlogs of unprocessed collections of these materials at libraries and repositories across the country that are not accessible through the libraries' online discovery tools. This situation is especially critical for materials in non-textual formats (e.g., sound recordings, photographs, films, and videos). The 1998 survey of ARL special collections libraries illustrated this problem quantitatively.[16] Even when materials are fully processed, past practice has often been not to share bibliographic data for unique and archival materials, in part because the value of sharing data has been equated largely with its potential for use by catalogers in other institutions.

The need for trade-offs between broad access and detailed description is increasingly recognized by special collections librarians and archivists, and there is substantial debate in the profession about these issues. Few models exist, however, for how such trade-offs might be made. Moreover, it is difficult to quantify the value differential between trade-offs, because too little is known about use patterns and users' needs.[17]

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[16] Barbara M. Jones, comp., *Hidden Collections, Scholarly Barriers: Creating Access to Unprocessed Special Collections Materials in North America's Research Libraries.* A White Paper for the Association of Research Libraries Task Force on Special Collections (2003). http://www.arl.org/bm~doc/hiddencollswhitepaperjun6.pdf

[17] Mark A. Greene and Dennis Meissner, "More Product, Less Process: Revamping Traditional Archival Processing." *American Archivist,* No. 68 (2005): 208-263.

The ability to digitize special collections materials has the potential to greatly enhance access to and use of these materials, and there is a growing understanding that wherever possible (i.e., subject to copyright and other constraints) these collections should be made public and accessible in digital form. This raises a number of questions, including how the provision of source material in digital form may change the economics and practices of processing collections. For example, full-text indexing of textual materials via optical character recognition is a powerful alternative to many traditional descriptive practices, but given the current state of the various technologies for indexing and retrieval, optical character recognition techniques are much less usefully applied to images and sound recordings. Other questions involve the integration of access to the full range of special collections, either within the total array of information resources held at a single institution, or at a national or international level; and the need for libraries and archives to share, exchange, and consolidate information about special collections material.

Consequences of Maintaining the Status Quo

Uncataloged collections of unique and rare materials are inaccessible because, in addition to not being available via a library's primary discovery tools, they are likely to be in closed stacks, eliminating the possibility of discovery by browsing.

Research and teaching are hindered because researchers cannot locate materials unless they happen to suspect that they exist and invest the effort to find them. Access to unprocessed collections is highly staff-dependent and therefore a cost burden to the institution.

Access to or awareness of materials by information seekers outside the institution is limited. Without straightforward access to special collections materials, service is severely compromised.

The promise of digitizing special collections material is limited in the absence of a concomitant ability to discover them.

Recommendations

2.1.1 Make the Discovery of Rare, Unique, and other Special Hidden Materials a High Priority

2.1.1.1 All: Direct resources to support the discovery of these materials, including resources freed by the institution from economies realized in other areas.

2.1.1.2 All: Gather and share data on access paths that guide researchers to unique materials as a means to inform best practices for access in a Web environment.

2.1.1.3 All: Make finding aids accessible via online catalogs and available on the Internet.

2.1.2 Streamline Cataloging for Rare, Unique, and other Special Hidden Materials, Emphasizing Greater Coverage and Broader Access

2.1.2.1 All: Adopt as a guiding principle that some level of access must be provided to all materials as a first step to comprehensive access, as appropriate. Allow for different cataloging levels depending on the types of documents, their nature, and richness.

2.1.2.2 All: Establish cataloging practices that are practicable and flexible, and that reflect the needs of users and the reality of limited resources.

2.1.2.3 LC: Encourage adoption of current rules and practices (e.g., DCRM(B)[18] and DACS[19]) for cataloging of unique and rare materials, including options for streamlined cataloging, and shared use of and creation of authority records across collections, as applicable.

2.1.2.4 All: Consider different levels of cataloging and processing for all types of rare and unique materials, depending on institutional priorities and importance and potential use of materials, while still following national standards and practices.

2.1.3 Integrate Access to Rare, Unique, and Other Special Hidden Materials with Other Library Materials

2.1.3.1 All: Integrate access tools (finding aids, metadata records, databases, authority files, etc.) for unique and rare materials into the information access structures that serve the institution as a whole.

2.1.4 Encourage Digitization to Allow Broader Access

2.1.4.1 LC: Study possibilities for computational access to digital content. Use this information in developing new rules and best practices.

2.1.4.2 All: Study usage patterns to inform digitization priorities.

2.1.5 Share Access to Rare, Unique, and other Special Hidden Materials

2.1.5.1 All: Encourage inter-institutional collaboration for sharing metadata records and authority records for rare and unique materials.

2.1.5.2 All: Encourage libraries and archives to submit records for rare and unique materials to shared databases such as OCLC.

2.1.5.3 All: Examine financial and other incentives and disincentives to the sharing of records for rare and unique materials. Modify systems, practices, and agreements as necessary to increase incentives and decrease disincentives.

Desired Outcomes

Discovery, accessibility, and use of rare, unique, and other special materials in all formats are comprehensive.

Learning, research, and creation of new knowledge are enhanced.

Reputations of individual institutions are enhanced as information about special bodies of resources becomes more widely known.

Greater value is realized from an individual institution's investment in acquiring and housing rare, unique, and special materials.

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[18] *Descriptive Cataloging of Rare Materials (Books)* (Washington, D.C.: Library of Congress Cataloging Distribution Service, 2007).

[19] *Describing Archives: A Content Standard* (Chicago: Society of American Archivists, 2007).

3 POSITION OUR TECHNOLOGY FOR THE FUTURE

3.1 The Web as Infrastructure

Today, many information access and bibliographic workflows are moving to the Web. Data that were once stored in databases and used only for search and display of bibliographic information are now being used to interact with services outside the databases, such as connecting to full text or interacting with Web-based resources such as maps and reference works.

Data that are stored in separate library databases often do not disclose themselves to Web applications, and thus do not appear in searches carried out through commonly used search engines. Such data are therefore invisible to information seekers using these Web applications, even though a library's catalog may itself be openly available for use on the Web.

The library community's data carrier, MARC, is based on forty-year old techniques for data management and is out of step with programming styles of today. No community other than the library community uses this record format, severely compromising its utility to other communities as a data transmission tool. Bibliographic applications being developed outside of the library environment are not making use of, and may not be compatible with, records encoded in MARC. New and anticipated uses of bibliographic data require a format that will accommodate and distinguish expert-, automated-, and user-generated metadata, including annotations (reviews, comments) and usage data. Flexible design should allow for the selective (modular) use of metadata in different environments (e.g., use of controlled vocabularies appropriate to specific domains). The existing Z39.2/MARC "stack" is not an appropriate starting place for a new bibliographic data carrier because of the limitations placed upon it by the formats of the past.

Libraries have defined many standard vocabularies such as gazetteers, controlled terminologies, and authority lists that help them create compatible resource descriptions. Some of these vocabularies, however, are available only as textual documents, and are often buried within lengthy standards, for example the General Material Designation list contained in the Anglo-American Cataloguing Rules, and the MARC Code List for Languages, contained in the MARC standard. These vocabularies have great value within the library community but because of how they are made available (or not), that value is not easily shared with other communities.

The use of language strings such as personal or corporate names as identifiers for both display and data manipulation hinders data exchange across languages and across different information communities. Emphasis on textual strings as identifiers binds entries to a single language and thus hampers efforts to internationalize both authority files and bibliographic files that carry the authoritative heading forms. Text strings may change over time to reflect changes in display or access forms. The more that data are used by different applications, the more important it is that they be clearly identified using language-neutral identification schema. Ideally, such schema should also provide contextual information as well as links to additional information about the data element and its meaning.

Consequences of Maintaining the Status Quo

Use of library data is limited to library systems and services. The data are not accessible in a form that integrates with Web applications.

Unless the library community confirms its role(s) in the evolving and expanding environment, and develops arrangements with new participants to take advantage of what each has to offer, library data will be isolated from the many non-library communities (such as publishers, authors, and information service providers) and end-users that are engaged in accessing and making use of bibliographic information.

Recommendations

3.1.1 Develop a More Flexible, Extensible Metadata Carrier

3.1.1.1 LC: Recognizing that Z39.2/MARC are no longer fit for the purpose, work with the library and other interested communities to specify and implement a carrier for bibliographic information that is capable of representing the full range of data of interest to libraries, and of facilitating the exchange of such data both within the library community and with related communities.

3.1.1.2 LC: Contribute resources to support the work of coordinating the definitions and linkages of data elements in nationally and internationally accepted bibliographic standards.

3.1.1.3 All: Work with vendors to raise awareness of the need to begin developing products that can accept input of data utilizing a variety of metadata formats.

3.1.2 Integrate Library Standards into Web Environment

3.1.2.1 All: Express library standards in machine-readable and machine-actionable formats, in particular those developed for use on the Web.

3.1.2.2 All: Provide access to standards through registries or Web sites so that the standards can be used by any and all Web applications.

3.1.2.3 LC: Begin transitioning LC-managed vocabularies to a platform that is both Web services-friendly and allows files to be downloaded for incorporation into other applications. These vocabularies include the many lists that are used in bibliographic records such as language and geographic codes, resource format codes, etc.

3.1.3 Extend Use of Standard Identifiers

3.1.3.1 LC: Generate standard Web-based identifiers for all data elements and vocabularies that LC maintains.

3.1.3.2 All: Work to include standard identifiers for individual data elements in bibliographic records, both prospectively and retrospectively, wherever such identifiers are defined, and work to identify changes in metadata carrier standards necessary to incorporate and use such identifiers.

Desired Outcomes

Library bibliographic data will move from the closed database model to the open Web-based model wherein records are addressable by programs and are in formats that can be easily integrated into Web services and computer applications. This will enable libraries to make better use of networked data resources and to take advantage of the relationships that exist (or could be made to exist) among various data sources on the Web.

In coordination with a broad group of interested parties, especially creators of bibliographic data outside of libraries, the library community will develop a record carrier that can interact seamlessly with library data and library systems, and that can be used both by libraries and by other communities that deal in bibliographic data. The carrier format will support a variety of bibliographic control practices and resource types.

The vocabularies developed by the library community will be available for Web discovery and easy reuse by applications developers. Vocabularies will be managed in registries or other structures to facilitate more rapid updates than are possible with centrally managed lists. Knowledge organization systems will facilitate multilingual versions of vocabularies and cross-walking between them.

All data points in the networked environment will be clearly identified, primarily with Uniform Resource Identifiers (URIs). Registration of data points will include information about meaning and usage. The library community will share identifiers of authors, works, and other controlled elements of bibliographic data to enable interchange of data between different communities of use, while still allowing display and indexing of data elements to vary according to the particular needs of the communities concerned.

3.2 Standards

Although usually cast in technical terms, the institution of standards for bibliographic data may also be viewed as a business issue. It is through the consistent application of standards that the full value of bibliographic data can be released across many potential use environments. Barriers to realizing this desired end exist when it is difficult to use or reuse data, either because standards do not exist, because they are not fit for the intended purpose, or because they are inconsistently applied. Two types of barriers are of particular importance: inefficiencies in performance, and processing costs. To work effectively, discovery, request, resolution, and delivery systems need to communicate effortlessly.

Standards are especially vital in the current environment wherein data must support a growing number and variety of applications. Data exchange between systems is increasing and systems are interacting with data from many different sources, including exchange with non-library partners. Library systems increasingly exchange data internationally and with non-library partners such as Google, Microsoft, and Amazon. Data are reused along publisher/bookseller/library/aggregator chains. Data are increasingly being used all along the discovery-to-delivery chain to facilitate more streamlined services. New discovery environments are emerging that extract and merge data from several library systems. The classic library standards "stack" (Z39.x/MARC/AACR2) may not provide the best means to interact with data from other information ecologies.

Today's metadata environment comprehends AACR2/RDA, MARC 21, MARC XML, the Metadata Object Description Schema (MODS), Dublin Core, and the Online Information Exchange format (ONIX), amongst others, while the retrieval protocol environment encompasses Z39.50, the Search and Retrieve services (SRW/U), the Metasearch XML Gateway (MXG), and the need to work with OpenSearch and other protocols. There has been a proliferation of

standards—both officially registered and *de facto*—prompted by the needs of digital materials and digitizing initiatives This standards proliferation is a distraction to national bodies, a confusion for practitioners, and a vexation for developers. While it is useful to continue the explorations embodied in such standards development, the library community needs to focus on identifying and addressing real needs with workable solutions and to guard against having un-validated assertions or professional ideology be the main drivers of development.

With standards occupying a position of such importance in the bibliographic control arena, it is necessary to consider how those standards are created. The library community has a long tradition of creating standards, and has over time built up a complex set of processes for standards development. These processes are frequently intricate and multi-layered, and may involve extensive collaboration and opportunities for review. They take place in a variety of organizations which sometimes have overlapping roles and participants. Individuals involved in the work are often unpaid volunteers drawn from the profession. Further, there is a pattern of creating "mega"-standards that cover whole facets of bibliographic control, and of not releasing any parts of those standards for use until the entire construct is completed. Accordingly, progress in standards creation is often stately rather than timely.

The Working Group recognizes that the bibliographic apparatus of standards, codes, and processes that the library community has been working with has grown up over many years and has served us well. At many points, however, strains are becoming evident as the apparatus needs to stretch to accommodate a changed environment. In particular, the Working Group has heard from many sources that accustomed patterns of operation and existing standards do not serve us well in a Web environment. Although some work has been devoted to modernizing the apparatus or standards and protocol development, there is a danger that continued piecemeal attention will poorly serve us in the long term. We are now at a stage where the absence of a shared frame of reference for how we proceed is an obstacle, leading to poorly focused work and reduced impact. The Working Group believes that LC and other major stakeholders cannot responsibly allow this situation to continue.

Two standards in particular illustrate some of the issues mentioned above: the FRBR and RDA initiatives are currently moving forward within different organizational structures[20] and at different rates. Because the Library of Congress is a major player in both efforts, it could well use its influence to help coordinate these initiatives more closely and to introduce a stronger cost/benefit perspective into the work.

The Working Group has a number of concerns about the current direction of RDA, concerns that have been echoed by many in the field. Indeed, many of the arguments received by the Working Group for continuing RDA development unabated took the form of "We've gone too far to stop" or "That horse has already left the barn," while very few asserted either improvements that RDA may bring or our need for it.

The business case for moving to RDA has not been made satisfactorily. The financial implications (both actual and opportunity) of RDA adoption and its consequent, potential impact on workflow and supporting systems may prove considerable. Meanwhile, the promised benefits of RDA—such as better accommodation of electronic materials, easier navigation, and more straightforward application—have not been discernible in the drafts seen to date. It is unclear how metadata created according to RDA will align with existing metadata, and how well library and related automation systems will or can handle metadata created according to the new standard. There is dissatisfaction at the apparent abandonment of the ISBD structure. There is distress over the

[20] IFLA for the former and the Joint Steering Committee for the Development of RDA (JSC) for the latter.

opaqueness of the language used, over the organization of the rules, over formatting decisions (such as appearance of examples), and with perceived difficulty in navigation. Many fear that RDA will be more difficult to use and understand than is the current code, and that this, in turn, will lead to problems with education and training, in addition to increasing the likelihood that the code will not be utilized by anyone outside the library community. Finally, although RDA is being based on FRBR principles, FRBR itself is still evolving.

Consequences of Maintaining the Status Quo

Data exchange and reuse are hindered by inconsistencies in the data, and by data encoding that is not designed for the current and emerging machine environment. Consequently, costs increase across all parts of the bibliographic control ecosystem, and service to users diminishes.

Standards development lags behind need. Standards created without adequate community input may not serve the purposes and communities for which they were developed.

Standards developed may not be supported by the communities for which they were developed, and will not be adopted beyond the library field.

Recommendations

3.2.1 Develop a Coherent Framework for the Greater Bibliographic Apparatus

3.2.1.1 LC: Convene a working group of participants in the bibliographic control arena to work together on a high priority basis to develop a shared frame of reference and common design goals for a coordinated renovation of the shared bibliographic apparatus. Identify interdependencies, and validate existing directions against desired outcomes. Matters to be included in these considerations should include but not necessarily be limited to: encoding (ISO 2709,[21] XML), content schematization (MARC, MODS, DCMI Abstract Model (DCAM)[22]), content guidelines (RDA, AACR), content models (FRBR), value lists (controlled vocabularies, authorities).

3.2.2 Improve the Standards Development Process

3.2.2.1 All bodies involved in standards development processes: Examine the processes and protocols used in the standards development process. Streamline them where possible, integrating or correlating them to processes in use by other bodies working on related standards to the extent feasible. Open the process to public scrutiny and participation to the extent that it does not unreasonably interfere with the goal of rapid development. Consider developing massive standards in segments so that parts can be put in use and tested before the whole is completed. Aid the work of volunteer developers by hiring more paid consultants and assistants.

3.2.3 Develop Standards with a Focus on Return on Investment

3.2.3.1 All: Design data standards with a view toward maximizing machine-processing of data.

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[21] *Information and Documentation – Format for Information Exchange* (ISO 2709) (Geneva: International Organization for Standardization, 1996).

[22] Andy Powell et al., *DCMI Abstract Model*. Issued 2007-06-04. http://dublincore.org/documents/abstract-model/

3.2.3.2 LC: Review record creation practices to ensure that as many data elements as possible are controlled.

3.2.3.3 All: Analyze and assess costs and benefits of proposed new or revised standards before undertaking a standards-development process.

3.2.3.4 LC: Take a systemwide perspective when moving into new areas of standards work, with a strong focus on improving the efficiencies of the library community generally.

3.2.3.5 All: Design data standards with data reuse as a goal, recognizing that all members of the supply chain must be considered during the standards development process.

3.2.4 Incorporate Lessons from Use into Standards Development

3.2.4.1 All: Incorporate testing and implementation plans as integral parts of the standards development process.

3.2.4.2 All: Include software engineers and user services experts in the development processes for all information technology standards.

3.2.4.3 All: Develop an evidence base that enables the community to validate the assertions that are being made about the need for a standard.

3.2.4.4 LC: Fund analysis to identify the descriptive practices that are needed to support emerging uses of bibliographic data, such as those seen in new discovery environments.

3.2.5 Suspend Work on RDA

3.2.5.1 JSC: Suspend further new developmental work on RDA until a) the use and business cases for moving to RDA have been satisfactorily articulated, b) the presumed benefits of RDA have been convincingly demonstrated, and c) more, large-scale, comprehensive testing of FRBR as it relates to proposed provisions of RDA has been carried out against real cataloging data, and the results of those tests have been analyzed (see 4.2.1 below)

3.2.5.2 JSC: Utilize the time afforded by the previous recommendation to revisit work already completed in light of the criticisms and concerns described above. Actions undertaken should include, but not necessarily be limited to: addressing issues of readability, including language, formatting of examples, and navigation; reconsidering variance from ISBD organization and conventions, articulating the case for variances retained; addressing issues of ease of use, including navigation;[23] and addressing concerns about usability, training, etc.[24]

3.2.5.3 LC, JSC, and DCMI: Work jointly to specify and commission exploratory work to model and represent a Bibliographic Description Vocabulary, drawing on the work of FRBR and RDA, the Dublin Core Abstract Model, and appropriate semantic Web technologies (e.g., SKOS). Some preparation for this work has already been done in joint discussion of JSC and DCMI.

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[23] It would be useful, for instance, to mount an operational prototype of Web-based rules for a segment of the code; solicit its widespread use and review; and use the results to inform possible modification of rules, formats, conventions, etc.

[24] Again, it would be useful, for instance, to conduct formal tests of segments of the code with a cross-section of practicing catalogers.

Desired Outcomes

The combined bibliographic apparatus of standards, codes, processes, and participants will have a coherent focus and a set of common design goals that will enhance future development of any part of the apparatus.

The processes by which bibliographic standards are developed and promulgated will be more effective and better coordinated.

Further development of standards will be based on evidence arising from changing use patterns. The library community will realize that bibliographic data need to support a variety of user, management, and machine needs. In particular, it will be recognized that human users and their needs for display and discovery do not represent the only use of bibliographic metadata; instead, to an increasing degree, machine applications are their primary users. Data will be designed and developed with this in mind.

Libraries will be mindful of the total life-cycle cost of using data, including the additional processing that may be required if the data are reused in other environments. They will also be aware of the costs of the proliferation of data types and search protocols, and will work to consolidate standards.

Assurance that RDA is based on practical realities as well as on theoretical constructs will improve support for the code in the bibliographic control community. The Joint Steering Committee will have an opportunity to address outstanding issues of language, organization, usability, etc.

4 POSITION OUR COMMUNITY FOR THE FUTURE

4.1 Design for Today's and Tomorrow's User

The metadata created by libraries' bibliographic control activities serve multiple types of users. These include the customers of our libraries and of our catalogs, other libraries, and the library service industry. In addition, "users" are not only people, but the systems and software that interact with metadata to provide services. Metadata are used within both a consumer environment and a management environment. Each of these groups has some specific requirements and poses different challenges.

Users of library materials are diverse, and a single individual will exhibit different needs, expectations, and behaviors as the purpose of his/her research changes. There is no "typical user." Library users can vary widely in their knowledge both of library systems and of the subject domains they are investigating. Studies indicate that over three-quarters of users have low knowledge of how to use the library catalog, as well as low subject knowledge of their immediate topic of interest.[25] By contrast, less than 1% of users have high skills in both using the catalog and subject domain knowledge. This disparity in user skills and needs makes it difficult for libraries to focus their bibliographic control efforts.

Users are making new demands on metadata. Thanks to rapid innovations in Web technology and to the ubiquity and utility of Web search engines, most users now conduct their research in multiple discovery environments: search engines, online booksellers, course management systems, specialized databases, library catalogs, and more.

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[25] Karen Markey, *Users and Uses of Bibliographic Data.* Presented to the Working Group on the Future of Bibliographic Control, Mountain View (March 2007). Unpublished.

A significant change in the searching behavior of library users has occurred in the past decade, with users often bypassing library catalogs and going first to search engines and other Internet resources. The content of these discovery systems (including those managed by libraries) is becoming more blended and diverse; materials formerly managed through separate standards and practices (such as articles, archives, and images) are now being mixed in both general and domain-specific systems.

As experienced users of Internet search engines, library users expect increased capabilities in our online systems. They value features and data that help them make sense of results by ranking, organizing, and clustering. Library catalogs have consciously presented a neutral and authoritative view of the bibliographic universe. Evaluative information, such as reviews and reading lists, has not traditionally been part of the library catalog (although this information has its place in the reference department). Today, bibliographic Web sites like Amazon.com and LibraryThing provide users with information about resources, as well as information that help them evaluate those resources. They also allow users to share reading lists, add reviews and ratings, and supply their own subject tags. Both Amazon and LibraryThing embody a combination of bibliographic and social networking systems. LibraryThing, in fact, is largely based on library-produced data. Library systems are responding to changes in user expectations with new collocation and display methods, including clustering all versions of a work, and faceting retrieved results sets by subject, format, classification, and language. Few library systems, however, currently allow users to add or manipulate catalog data.

Libraries have tended to equate bibliographic control with the production of metadata for use solely within the library catalog. This narrow focus is no longer suitable in an environment wherein data from diverse sources are used to create new and interesting information views. Library data must be usable outside of the catalog, and the catalog must be able to ingest or interact with records from sources outside of the library cataloging workflow. The tightly controlled consistency designed into library standards thus far is unlikely to be realized or sustained in the future, even within the local environment.

Any given library will, of necessity, serve users with different levels of sophistication in library use and in subject knowledge. The challenge to libraries, then, is to produce metadata that will serve this broad range of users well. Many libraries have chosen to produce all their metadata to satisfy the needs of their most sophisticated users, despite the fact that such users are but a small percentage of their total user base. They do so on the unproven assumption that all users will benefit from the greatest detail in cataloging. The wisdom of this decision is particularly questionable for items that are retained for limited periods of time.

Consequences of Maintaining the Status Quo

Library users will continue to bypass catalogs in favor of search engines. Some studies have found that over three-quarters of library users start with a search engine and not the online catalog.[26]

The resources needed to catalog at a sophisticated level are increasingly difficult to sustain. Libraries continue to face a trade-off between doing detailed cataloging for regularly published materials, and doing less-detailed cataloging for non-print formats or unique materials.

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[26] Cathy De Rosa et al., *Perceptions of Libraries and Information Resources* (Dublin, OH: OCLC Online Computer Library Center, 2005). Available: http://www.oclc.org/reports/2005perceptions.htm.

Recommendations

4.1.1 Link Appropriate External Information with Library Catalogs

4.1.1.1 All: Encourage and support development of systems capable of relating evaluative data, such as reviews and ratings, to bibliographic records.

4.1.1.2 All: Encourage the enhancement of library systems to provide the capability to link to appropriate user-added data available via the Internet (e.g., Amazon.com, LibraryThing, Wikipedia). At the same time, explore opportunities for developing mutually beneficial partnerships with commercial entities that would stand to benefit from these arrangements.

4.1.2 Integrate User-Contributed Data into Library Catalogs

4.1.2.1 All: Develop library systems that can accept user input and other non-library data without interfering with the integrity of library-created data.

4.1.2.2 All: Investigate methods of categorizing creators of added data in order to enable informed use of user-contributed data without violating the privacy obligations of libraries.

4.1.2.3 All: Develop methods to guide user tagging through techniques that suggest entry vocabulary (e.g., term completion, tag clouds).

4.1.3 Conduct Research into the Use of Computationally Derived Data

4.1.3.1 All: Make use of holdings and circulation information to point users to items that are most used and that may potentially be of most interest.

4.1.3.2 All: Encourage investigation of computational techniques that can support bibliographic control, including those for creating bibliographic data and those for providing services to users.

Desired Outcomes

Library bibliographic data will be used in a wide variety of environments, and interoperability between library and non-library bibliographic applications will increase/improve.

Library catalogs will be seen as valuable components in an interlocking array of discovery tools.

Library resource discovery and evaluation will be enhanced by contributions from users.

4.2 Realization of FRBR

Since the 1998 publication of the final report of IFLA's Functional Requirements for Bibliographic Record study, the FRBR framework has served as an international catalyst for reconceptualizing bibliographic data and bibliographic relationships. FRBR suggests alternatives for analyzing intellectual content for bibliographic control.

Recent data modeling exercises in library and other arenas (FRBR, CIDOC Conceptual Reference Model,[27] <indecs> Metadata Framework[28]) have provided sophisticated models that highlight important areas for attention. At the same time, the emergence of resource-oriented architectures in the Web environment has made the bibliographic community alert to the benefits of providing

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[27] *The CIDOC Conceptual Reference Model.* International Council of Museums. http://cidoc.ics.forth.gr/

[28] Godfrey Rust and Mark Bide, *The <indecs> Metadata Framework: Principles, Model, and Data Dictionary* (June, 2000) http://www.doi.org/topics/indecs/indecs_framework_2000.pdf

access to data resources using simple Web-based protocols and schemas. The combination of these two strands suggests an important future direction for the Library of Congress and for Web-based, network-level bibliographic control. The Working Group envisions a bibliographic infrastructure wherein data about entities of interest (e.g., works, places, people, concepts, chronological periods) are encoded in agreed-upon ways and made available through agreed-upon Web protocols for ready and efficient use by other applications and services. LC and the library community need to find ways of "releasing the value" of their rich historic investment in semantic data onto the Web.

System implementations experimenting with the FRBR "Work" concept to cluster materials in the user interface are proving the value of the model at the Work definition level. Clustering at the Work level, however, exercises only a minor part of the FRBR model that redefines the full range of bibliographic entities and their relationships (e.g., creators, producers, subjects). At the same time, the impact of the FRBR model on cataloging practice and on the machine-readable bibliographic record has not been extensively explored. There is no standard way to exchange Work-based data, and no cataloging rules that yet support the creation of records using the FRBR model.

Consequences of Maintaining the Status Quo

The library community is basing its future cataloging rules on a framework that it has only barely begun to explore. Until carefully tested as a model for bibliographic data formation for all formats, FRBR must be seen as a theoretical model whose practical implementation and its attendant costs are still unknown.

Recommendations

4.2.1 Develop Test Plan for FRBR

4.2.1.1 LC, OCLC, IFLA Working Group, and Representative System Vendors: Identify what agreements are necessary to support FRBR in bibliographic systems, including the full range of entity relationships defined in the FRBR model.

4.2.1.2 LC, OCLC, IFLA Working Group, and Representative System Vendors: Develop and agree upon a schema for the exchange of Work-based data.

4.2.1.3 LC, OCLC, IFLA Working Group, and Representative System Vendors: Verify the need to provide distinct metadata at the Expression level and, if appropriate, carry out work similar to that described in 4.2.1.1 and 4.2.1.2 for that entity.

4.2.1.4 LC, OCLC, IFLA Working Group, and Representative System Vendors: Use the results of the above activity as the basis for promulgating and evaluating FRBR implementations.

Desired Outcomes

The study, refinement, and validation of FRBR will provide a more robust framework for the creation of the resource description and access rules that will be used in the future to support a broad range of relational searching options. The final product will be a bibliographic environment with clearly defined elements and relationships that can be used in a variety of bibliographic control situations.

4.3 Optimize LCSH for Use and Reuse

Subject analysis is a core function of cataloging, and Library of Congress Subject Headings[29] have great value in providing controlled subject access to works. LCSH is used widely in the community and is often the only searchable subject term set in library catalogs. While it is recognized as a powerful tool for collocating topical information, LSCH suffers, however, from a structure that is cumbersome from both administrative and automation points of view. Many of the perceived flaws of LCSH are inherent in any subject vocabulary that must encompass the entire range of intellectual creation, rather than a more discrete subject area. New subject terms are based on literary warrant. In the past, if LC did not own material on a topic, that subject did not get into the vocabulary. With the implementation of SACO, this problem has been somewhat mitigated, as other libraries have an opportunity to submit suggested subject terms.

Other problems arise because LCSH has evolved over a long period of time. The vocabulary was not originally conceived as a thesaurus. While thesaural relationships (equivalent, associative, and hierarchical) are now included as headings are established, the relationships are inconsistent and may not exist at all on older terms. Terminology is sometimes outdated or not intuitive to the inexperienced user. LC does update its subject terms, but from outside LC the results often appear to be arbitrary and unexpected.[30]

The creation of pre-coordinated subject strings, combining the topical, geographical, chronological, and genre aspects of a work into a single subject heading, can be a time-consuming and complex process. Rules for proper creation of subject strings fill four print volumes of instructions in the Subject Cataloging Manual or SCM[31] (also available online in Catalogers' Desktop). While pre-coordination can offer users an implicit indication of the relationship between subject terms, the carefully crafted subject strings created by catalogers are often misunderstood or incomprehensible to users and reference librarians.[32]

Subject specificity benefits both expert and novice user by collocating items with the specific topics of which they are examples. However, as Karen Markey noted in her paper for the Working Group's February meeting, the novice user—especially the "double novice"[33] —may benefit additionally from (and, indeed, may require) more general subject access to overcome his/her lack of knowledge of the subject matter s/he is researching. The rules for subject heading assignment appropriately instruct catalogers to use the most specific term available, although they place some restrictions on the number of specific terms in the same hierarchy that can be assigned. It is assumed that the LCSH reference structure will lead users from a broader term they are likely to search to the appropriate narrow term. Unfortunately, because LCSH is not set up in a truly hierarchical thesaurus-like structure, in addition to the fact that few systems make full use of the references that may be contained in a subject authority record, users are often unable to find the proper controlled heading for the subject they seek. Subject authority records only contain explicit links to broader headings, and do not display the narrower terms. More thorough correlation between LCSH and the Library of Congress Classification (LCC) and the Dewey Decimal

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[29] *Library of Congress Subject Headings*. 30th ed. (Washington, D.C.: Library of Congress Cataloging Distribution Service, 2007).

[30] For example, the recent change eliminating the heading for Scottish Literature.

[31] *Subject Cataloging Manual: Subject Headings*. 5th ed. (Washington, D.C.: Library of Congress Cataloging Distribution Service, 2005).

[32] Lori Franz et al., "End User Understanding of Subdivided Subject Headings." *LRTS*, Vol. 38, No. 3, (1994): 213-223 and Karen M. Drabenstott, Schelle Simcox, and Eileen G. Fenton, "End User Understanding of Subject Headings in Library Catalogs." *LRTS*, Vol. 43, No. 3, (July 1999): 140-160.

[33] Markey defines a "double novice" as a library user who is neither familiar with the subject matter being sought nor familiar with the use of the library catalog.

Classification[34] (DDC) might alleviate some of these problems, since classification schemes are specifically designed to lead users from broad concepts to narrower ones.

LC subject authority records are available online only in MARC format, which inhibits their use outside the library community.

Consequences of Maintaining the Status Quo

The complexity of LCSH, in combination with its seemingly arbitrary updates and the complex limitations on its application, have negative consequences for both catalogers and catalog users, and mitigate against its use by stakeholders outside the library community.

The non-topical, non-hierarchical organization of LCSH makes systematic, coordinated updating of the vocabulary difficult.

The complexity of rules that guide the creation of subject strings leads to errors in string construction, which in turn create inconsistencies in the controlled vocabulary, interfere with retrieval of relevant materials, and ultimately defeat the purpose of a controlled vocabulary.

LCSH headings are utilized by information seekers who have prior subject knowledge, while subject novices turn to other tools such as Internet search engines that may be less effective, but do not appear to penalize them for their lack of subject expertise.

Recommendations

4.3.1 Transform LCSH

4.3.1.1 LC: Transform LCSH into a tool that provides a more flexible means to create and modify subject authority data.

4.3.1.2 LC: Make LCSH openly available for use by library and non-library stakeholders.

4.3.1.3 LC: Provide LCSH in its current alphabetical arrangement, and enable its customized assembly into topical thesauri.

4.3.1.4 LC: Increase explicit correlation and referencing between LCSH terms and LCC and DDC numbers.

4.3.2 Pursue De-Coupling of Subject Strings

4.3.2.1 LC: Work with appropriate partners on ways to take advantage of the power of the controlled vocabulary in LCSH, LCC, and DDC. Describe or identify products or schemes that could take advantage of those terminologies in a more accessible environment with broader audiences.

4.3.2.2 All: Evaluate the ability of LCSH to support faceted browsing and discovery.

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[34] Joan S. Mitchell et al., eds. *Dewey Decimal Classification and Relative Index* 22nd ed. (Dublin, OH: OCLC Online Computer Library Center, 2003).

4.3.3 Encourage Application of, and Cross-Referencing with, Other Controlled Subject Vocabularies

4.3.3.1 LC and providers of subject vocabularies: Provide references within LCSH, where appropriate, and between LCSH and other established sources of controlled subject headings, such as MeSH,[35] the National Agricultural Libraries Thesaurus,[36] *Sears List of Subject Headings,*[37] and the Getty *Art & Architecture Thesaurus.*[38] Make vocabularies cross-searchable and interoperable.

4.3.3.2 All: Make use of any systems of controlled subject headings that are appropriate to augment subject access for one's collections and users.

4.3.3.3 All: Explore mechanisms to exploit cross-vocabulary linkages to enhance retrieval, without limiting to the headings explicitly provided in individual bibliographic records.

4.3.3.4 LC and OCLC: Explore ways of reducing creation costs and improving effectiveness by synchronizing work more closely between DDC, LCSH, and LCC, the main 'universal' library approaches to subject analysis.

4.3.4 Recognize the Potential of Computational Indexing in the Practice of Subject Analysis

4.3.4.1 All: For works where full text is available in digital form, study the extent to which computational analysis and indexing of the digital text can assist catalogers in subject analysis or can supplement or substitute for traditional intellectual subject analysis. (Note: this may vary by genre of work, audience, or access scenarios.)

4.3.4.2 LC: Based on the results of the previous recommendation, examine the tradeoffs and potential resource savings of using computational analysis and indexing to substitute for some subject analysis.

4.3.4.3 All: Initiate a standards process that allows the various results of computational analysis and indexing to be interchanged and shared as part of bibliographic records, in order to permit sharing of metadata without necessarily sharing the underlying resource.

Desired Outcomes

LCSH will be easier to update and to apply. Terminology will be more current and consistent. The subject cataloging process will be more straightforward. An easier, more intuitive application of subject terminology will save time and free catalogers for other work.

Restructuring LCSH will make it useful to a wider range of users, as well as facilitate navigation and manipulation in user interfaces.

The addition to bibliographic records of subject terms from other thesauri will provide more varied subject access to resources.

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[35] *Medical Subject Headings* (National Library of Medicine, National Institutes of Health). http://www.nlm.nih.gov/mesh/

[36] *NAL Thesaurus (*National Agricultural Libraries, United States Department of Agriculture). http://agclass.nal.usda.gov/agt.shtml

[37] *Sears List of Subject Headings* 19th ed. (New York: H.W. Wilson, 2007).

[38] *Art & Architecture Thesaurus* (Los Angeles: The J. Paul Getty Trust, 2000).

5 STRENGTHEN THE LIBRARY AND INFORMATION SCIENCE PROFESSION

5.1 Build an Evidence Base

Bibliographic control occurs in a complex system of participants (contributors and users), information resources products and services, and technological capabilities. There are increasing numbers of participants, information formats and media, and information technologies. Contributors of bibliographic data and services may have different and sometimes conflicting agendas. Multiple user communities may have changing and expanding needs and expectations. In this increasingly complex environment, the actions taken by key players can have downstream impacts on others. Unfortunately, there are still inadequate measures of the costs, benefits, and value of bibliographic information and almost no information on the interdependencies within the broader bibliographic control environment, including the impact of internationalization.

Although the use of cost-benefit analysis for service organizations such as libraries is problematic, all organizations must achieve goals and provide value. Bibliographic control may be considered by many to be a public good, but it has real costs attached to it, just as, presumably, it has real value.

The Library of Congress currently does not have sufficient quantitative data about its bibliographic control operations to present a business case for the actions that it wishes to undertake to modify its operations. Too often, decisions appear to be made based on simple cost comparisons, without apparently adequate consideration of the tangible and intangible benefits of various options.

Consequences of Maintaining the Status Quo

With more participants in the bibliographic control environment, decisions are often made independent of any reliable data. These decisions can perturb the system in unanticipated and undesirable ways. Duplications and gaps may arise. Finite resources—especially human resources—may not be optimally applied from the perspective of the overall system.

Recommendations

5.1.1 Develop Key Measures

5.1.1.1 LC: Bring key participants together to agree to implement a set of measures of (a) costs, benefits, and value of bibliographic control for each group of participants, and (b) interdependencies among participants.

5.1.1.2 LC: Develop a statement of value of LC's services that includes benefits to libraries and to the market sectors that provide services to libraries.

5.1.1.3 LC: Analyze changes in LC service levels in terms of costs and savings within LC and potential effects on the larger community.

5.1.2 Support Ongoing Research

5.1.2.1 All: Encourage ongoing qualitative and quantitative research (and its publication) about bibliographic control, for various types of libraries and over a protracted period of time.

5.1.2.2 All: Through library and information science (LIS) and continuing education, foster a greater understanding of the need for research, both quantitative and qualitative, into issues of bibliographic control.

5.1.2.3 All: Work to develop a stronger and more rigorous culture of formal evaluation, critique, and validation, and build a cumulative research agenda and evidence base. Encourage, highlight, reward, and share best research practices and results.

5.1.2.4 All: Promote collaboration among academics, the practicing library community, and related communities, as appropriate, in the development of research agendas and research design, in order to assess research needs, profit from diverse perspectives, and foster acceptance from the broader information community.

5.1.2.5 All: Improve mechanisms to publicize and distribute research efforts and results.

Desired Outcomes

The community will have an improved understanding of the real costs and benefits of various aspects of, and choices to be made within, today's system of bibliographic control.

A business case will be articulated that includes data points to be used over time to assess the consequences of change.

A statement of goals for LC will be developed that includes a broad vision of the value of its services. (Included in this should be all of the types of organizations that benefit from the Library's data services, including those in the for-profit sector.)

A growing evidence base will be created that can be used to monitor performance and effectiveness of the system and its component parts and inform future decision making by system participants.

5.2 Design LIS Education for Present and Future Needs

The educational preparation for catalogers, indexers, and other librarians and information professionals is not standardized across programs or curricula. Many LIS programs have shifted from teaching cataloging to teaching organization of information, although some programs continue to offer both.

There is an impending and critical shortage of catalogers, indexers, etc. as these positions are affected by retirements, resource reductions, and a dearth of qualified faculty to teach them. For almost three decades, it has been assumed that the demand for professionals in these positions will decline as more libraries rely on acquiring bibliographic control data from others. In actuality, there has been a shift in demand for these skills from libraries to the information industry, but LIS programs tend to focus on the former, rather than the latter. As in so many things, education will prove key to the profession's capability to address new challenges in bibliographic control. As changes take place in policies, standards, processes, and practices for bibliographic control, these need to be incorporated into the educational system for LIS professionals—both in library schools and continuing education programs—in a timely manner.

Consequences of Maintaining the Status Quo

If the educational programs do not stay up to date, they will further stress the system by producing professional librarians whose skill sets do not match the needs of the marketplace they will enter.

Recommendations

5.2.1 Communicate with LIS Educators

5.2.1.1 ALA: Convene a biennial meeting with LIS educators and trainers to discuss new and changing policies, procedures, processes, and practices in bibliographic control.

5.2.1.2 ALA and all information communities: Assess and communicate to LIS programs the levels of demand for qualified professionals in the field of bibliographic control, as well as the knowledge and skills needed by such professionals.

5.2.1.3 ALA Committee on Accreditation: Seriously consider the inclusion of specific language in the Curriculum standards that recognizes the central importance of bibliographic control to information and knowledge discovery and management.

5.2.1.4 LIS programs: Require core levels of knowledge for all information professionals in the fundamentals of knowledge organization theory and practice, including application not only in libraries, but also in the broader range of related communities and information activities.

5.2.1.5 LIS programs: Make available curricula covering advanced knowledge and skills to those who intend to specialize in bibliographic control, as well as to promote and support doctoral students interested in principles of bibliographic control.

5.2.2 Share Educational Materials Broadly via the Internet

5.2.2.1 All: Make educational materials available over the Internet, free or at reasonable cost.

5.2.2.2 All: Use network capabilities and other distance learning technologies to increase the availability of education for all library staff. In particular, encourage the creation of courses that can be taken at the learners' convenience.

5.2.3 Develop Continuing Education for U.S. Library Profession

5.2.3.1 ALA and ALA Allied Professional Association (ALA-APA): Consider development of a U.S.-wide continuing education program in bibliographic control that could be hosted by a professional association or academic institution.

5.2.3.2 ALA and ALA-APA: Develop an economic model that can ensure sustainability of the continuing education program developed in the recommendation above.

Desired Outcomes

There will be sufficient numbers of qualified professionals to participate actively in today's environment and to help shape the future bibliographic control environment. They will have a thorough understanding of current practices and upcoming challenges. These librarians will be productive and effective professionals while remaining open and adaptive to change.

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Z39.50 International Standard Maintenance Agency. Washington, D.C.: Network Development and MARC Standards Office, Library of Congress. http://www.loc.gov/z3950/agency/

ACRONYMS AND INITIALISMS USED IN THE REPORT

AACR	Anglo-American Cataloguing Rules
AACR2	Anglo-American Cataloguing Rules, 2nd edition
ALA	American Library Association http://www.ala.org/
ALA-APA	ALA Allied Professional Association http://ala-apa.org/
ARL	Association of Research Libraries http://www.arl.org/
ANSI	American National Standards Institute http://www.ansi.org/
BIBCO	Monographic Bibliographic Record Program of the PCC
CIP	Cataloging in Publication
CIDOC	Le comité international pour la documentation des musées; The International Committee for Museum Documentation http://cidoc.mediahost.org/
CIDOC CRM	CIDOC Conceptual Reference Model
CONSER	Cooperative Online Serials Program of the PCC
DACS	Describing Archives: A Content Standard
DCRM	Descriptive Cataloging of Rare Materials
DCRM(B)	Descriptive Cataloging of Rare Materials (Books)
DDC	Dewey Decimal Classification
DCAM	DCMI Abstract Model
DCMI	Dublin Core Metadata Initiative http://dublincore.org/
FAST	Faceted Application of Subject Terminology
FRBR	Functional Requirements for Bibliographic Records
IFLA	International Federation of Library Associations and Institutions http://www.ifla.org/
IMDb	Internet Movie Database http://www.imdb.com
<indecs>	Interoperability of Data in E-commerce Systems
JSC	Joint Steering Committee for Development of RDA http://www.collectionscanada.gc.ca/jsc/rda.html
LC	Library of Congress http://www.loc.gov

LCC	Library of Congress Classification
LCSH	Library of Congress Subject Headings
LIS	Library and Information Science
MARC	Machine-Readable Cataloging
MARC21	The MARC format version used in the U.S., Great Britain, and Canada http://www.loc.gov/marc
MeSH	Medical Subject Headings
METS	Metadata Encoding and Transmission Standard http://www.loc.gov/standards/mets/
MODS	Metadata Object Description Schema http://www.loc.gov/standards/mods
MXG	Metasearch XML Gateway
NACO	Name Authority Cooperative Program of the PCC
NAL	National Agricultural Library http://www.nal.usda.gov/
NISO	National Information Standards Organization http://www.niso.org/
OAI-PMH	Open Archives Initiative. Protocol for Metadata Harvesting
ONIX	Online Information Exchange http://www.editeur.org/
PCC	Program for Cooperative Cataloging
RDA	Resource Description and Access
SACO	Subject Authority Cooperative Program of the PCC
SCM	Subject Cataloging Manual
SRU/SRW	Search and Retrieve via URL or Web Service
SRW/U	Search and Retrieve via URL or Web Service
URI	Uniform Resource Identifier
XML	eXtensible Markup Language
Z39.2	Information Interchange Format (ANSI/NISO Z39.2)
Z39.50	Information Retrieval (ANSI/NISO Z39.50): Application Service Definition and Protocol Specification