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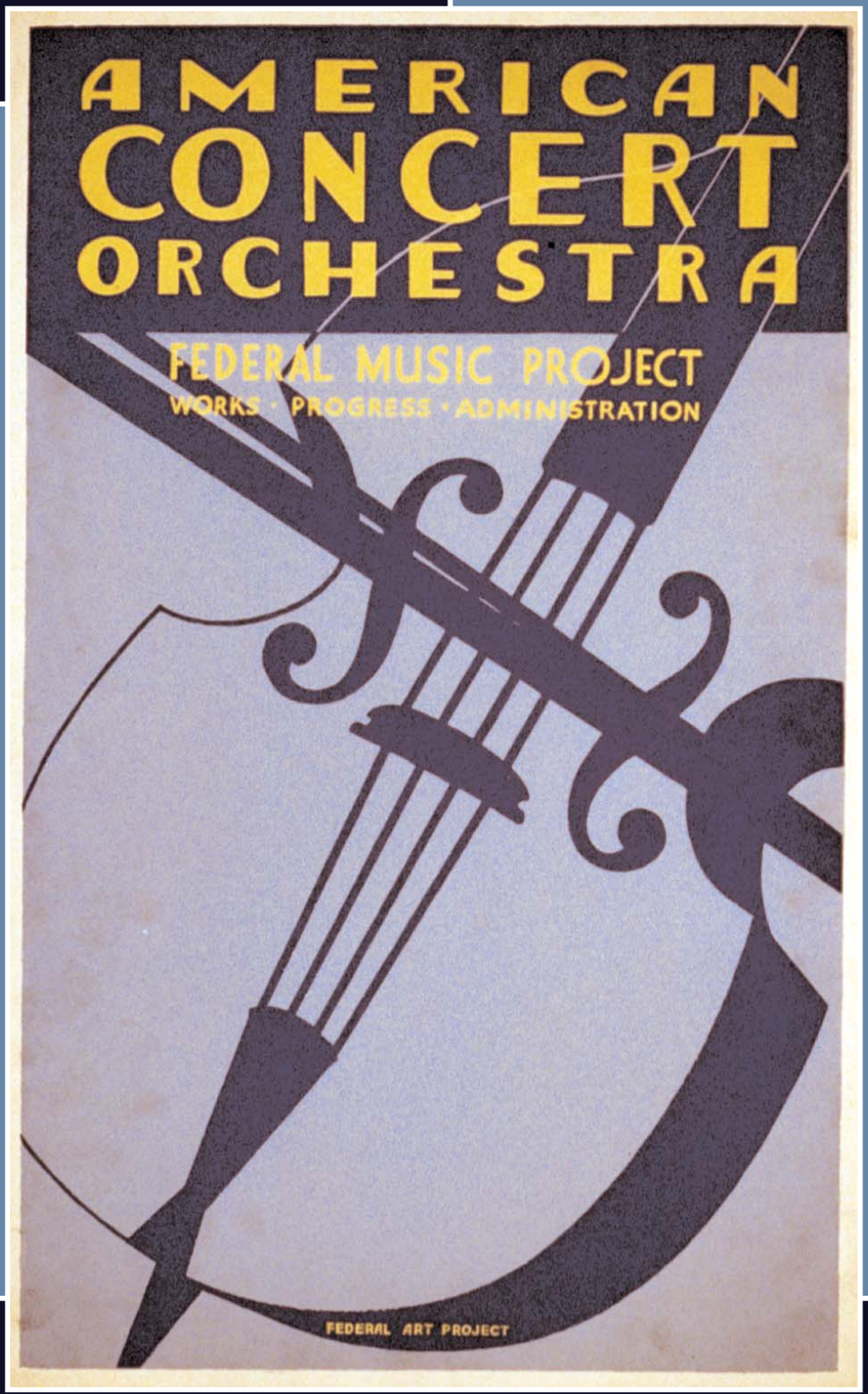

ALCTS

Contact Information

ALCTS Office

50 E Huron St.
Chicago, IL 60611-2795
1-800-545-2433, ext. 5038
fax: (312) 280-5033
www.ala.org/alcts
alcts@ala.org

Charles Wilt	Executive Director	1-800-545-2433, ext. 5030	cwilt@ala.org
Julie Reese	Continuing Education and Meetings	1-800-545-2433, ext. 5034	jreese@ala.org

ALCTS Advertising

ALCTS Advertising	1-800-545-2433, ext. 5038	alcts@ala.org

2004–2005 ALCTS Leaders

Carol Pitts Diedrichs	President	diedrichs@uky.edu
Rosann Bazirjian	President-Elect	Rosann_bazirjian@uncg.edu
Brian E.C. Schottlaender	Past-President	becs@ucsd.edu
Bruce Chr. Johnson	Division Councilor	bjoh@loc.gov
Mary Case	Director-at-Large	marycase@uic.edu
Karen Darling	Director-at-Large	DarlingK@Missouri.edu
John Duke	Director-at-Large	jkduke@vcu.edu
Lisa German	Acquisition Section Chair	lgerman@uiuc.edu
Sara Shatford Layne	Cataloging and Classification Section Chair	slayne@library.ucla.edu
Bonnie Cox	Collection Management and Development Section Chair	bjcox@uky.edu
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Lauren Corbett	Serials Section Chair	lcorbet@emory.edu
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M. Dina Giambi	Leadership Development Committee Chair	dinag@udel.edu
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Barbara Eden	Organization and Bylaws Committee Chair	beb1@cornell.edu
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Genevieve Owens	Program Committee Chair	gowens@wrl.org
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Miriam Palm	ALCTS Newsletter Online Editor	miriam.palm@stanford.edu
Peggy Johnson	*Library Resources & Technical Services* Editor	m-john@tc.umn.edu
Pamela Bluh	ALCTS Papers Series Editor	pbluh@umaryland.edu

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Association for Library Collections & Technical Services

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Editorial

Peggy Johnson

Library Resources & Technical Services is a stellar publication because of our contributing authors, the *LRTS* Editorial Board, and a group of dedicated reviewers. The Editorial Board is listed in each issue, but I would like to give special thanks to Stanley Wilder and Marty Kurth, who left the board in June 2004.

Reviewers, some of whom are or have been board members, do their work anonymously in a blind review process. Without their careful and thoughtful reading of submissions, this journal could not exist. I would like to acknowledge their contributions by listing those who reviewed papers in 2003 and 2004.

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Ajaye Bloomstone, Louisiana State University
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Association for Library Collections & Technical Services Annual Report 2003–2004

Brian E. C. Schottlaender, 2003–2004 ALCTS President

As articulated in its Strategic Plan for 2001–2005, the mission of the Association for Library Collections & Technical Services (ALCTS) is to provide leadership to the library and information communities in developing principles, standards, and best practices for creating, collecting, organizing, delivering, and preserving information resources in all forms. ALCTS strives to provide this leadership through its members by fostering educational, research, and professional service opportunities. Of the many objectives included in the ALCTS Strategic Plan, the division focused on three during 2003–2004: organization; publication; and education.

Organization

In spring 2003, the ALCTS membership passed a bylaw change enabling the development and use of a new category of ALCTS' organizational structure, the "Interest Group." The interest group category merges the programmatic and publication capabilities of a committee with the open forum and expanded membership characteristics of a discussion group.

At its 2003 annual meeting in Toronto, the ALCTS Board substantively addressed its own composition and its relationships with division- and section-level groups within ALCTS. One of the outcomes of these discussions was the notion of the "business committee," defined as one whose role is primarily management of the business of the division. It was agreed that such committees included Budget and Finance, Education, Fundraising, International Relations, Leadership Development, Membership, Nominating, Organization and Bylaws, Planning, Program, and Publications.

In addition, the board agreed that all other division-level committees were topical in nature and that their work would best be carried forward in the interest group format. Each was, therefore, offered the opportunity to reconstitute itself as an interest group or to disband. To date, three have chosen to reconstitute themselves as interest groups, three are considering the possibility, and one has decided to disband. While, as noted above, the International Relations Committee will continue to function as one of the division's business committees, the ALCTS Board has reconstituted the committee's membership and has revised its charge in order to expand the work of the committee in support of the division's goals in the international arena.

Brian E. C. Schottlaender (becs@ucsd@edu) is University Librarian, University of California, San Diego.

Publication

Under the dynamic leadership of Publications Committee chair Genevieve S. Owens, ALCTS reinvigorated its publications program virtually from top to bottom. Owens worked with executive director Charles Wilt to craft the division's publishing business plan. Within that framework, then, she systematized the calendar and editorial processes for the division's publications.

The period 2003–2004 saw turnover in two of the division's key editorial positions, namely, the editors of the scholarly journal *Library Research & Technical Services* (*LRTS*) and the monographic series *ALCTS Papers on Technical Services and Collections*. Search committees chaired by Jack Montgomery and Rosann Bazirjian facilitated, respectively, the appointments of Pamela Bluh as editor of the *ALCTS Papers* series and Peggy Johnson as editor of *LRTS*. Finally, Owens brought the *Library Materials Price Index* (*LMPI*) into line with this same editorial model by recommending to the ALCTS Board the dissolution of the Publications Committee's *LMPI* subcommittee and the creation, instead, of an *LMPI* editor position. Board approval of this recommendation completed the division's reimagination of its publications program.

The ALCTS publishing business plan includes the following among its objectives: "Create an electronic product that enables online access to all ALCTS publications on a fee basis utilizing PDF, e-commerce, and rights-management software." It has become abundantly clear that our dependence on the association's own e-commerce capabilities (or lack thereof) is hampering our ability to accomplish that objective. It is imperative that ALA further develop its e-commerce capabilities if ALCTS is to realize new revenue streams and more effectively reach a new, younger demographic of membership.

Education

Continuing education has long been a cornerstone of the service program provided by ALCTS to its members. For years, the division's mix of preconferences and institutes has been deservedly respected for its intellectual content and its financial success. In response to demographic changes in its membership base, constrained library resources that affect professional development and travel support, and new learning modalities emerging as a consequence of technology evolution, the division has been taking an increasingly holistic view of its educational mandate and of the organizational relationships needed to realize that mandate. In 2003–2004, ALCTS entered into agreements with both the Program for Cooperative Cataloging and the Library of Congress' Cataloging Distribution Service for the maintenance and delivery of continuing education content. The division also sought to capitalize on the work of other organizations—including, most recently, the Greater Western Library Alliance—to deliver continuing education content to ALCTS members, rather than having to develop that content in-house.

The progress made toward accomplishing the objectives identified in the 2001–2005 Strategic Plan is palpable and deliberate. The instantiation of strategic and tactical planning as the framework for demonstrating success is truly division-wide. ALCTS is now engaging in second-generation planning in concert with ALA's Ahead to 2010 Initiative and with an eye toward actively contributing to that initiative's realization.

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Genevieve Owens, Williamsburg Regional Library, Williamsburg, Va.
Linda L. Phillips, University of Tennessee
Anne Posega, Washington University
Tom Ray, Library of Virginia
Patricia Riva, McGill University
Carlen Ruschoff, University of Maryland
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Jean Weihs, Technical Services Group, Toronto, Canada
Scott Wicks, Cornell University
Stanley Wilder, University of Rochester

Finally, I want to tell you where to find the Library Materials Price Index (LMPI), published in *LRTS* in 2003 and *American Libraries* 1999 through 2002. The ALCTS Web site now provides access to LMPI 1999 through 2004 at www.ala.org/ala/alcts/alctspubs/pubsresources/resources.htm. Access to the current year is restricted to ALCTS members.

Identifying the Serial Work As a Bibliographic Entity

Kristin Antelman

A solid theoretical foundation has been built over the years exploring the bibliographic work and developing cataloging rules and practices to describe the work in the traditional catalog. With the increasing prevalence of multiple manifestations of serial titles, as well as tools that automate discovery and retrieval, bibliographic control of serials at a higher level of abstraction is more necessary than ever before. At the same time, models such as the International Federation of Library Associations and Institutions' Functional Requirements for Bibliographic Records offer new opportunities to control all bibliographic entities at this higher level and build more useful catalog displays. The bibliographic mechanisms that control the work for monographs—author, title, and uniform title—are weak identifiers for serials. New identifiers being adopted by the content industry are built on models and practices that are fundamentally different from those underlying the new bibliographic models. What is needed is a work identifier for serials that is both congruent with the new models and can enable us to meet the objective of providing work-level access to all resources in our catalogs.

> *Using the word "work" ambiguously . . . is bound to entail rather unpleasant practical consequences.*
>
> —Á. Domanovszky, *Functions and Objects of Author and Title Cataloguing: A Contribution to Cataloguing Theory*

Ever since Cutter's *Rules for a Printed Dictionary Catalog* was published in 1876, identifying the work has been a key objective of the library catalog.[1] A half-century ago, Lubetzky, building on Cutter and Anthony Panizzi, laid out the importance of the work in his second objective (the first being to facilitate the location of a particular edition of a work): "to relate and display together the editions which a library has of a given work and the works which it has of a given author."[2] Online catalogs, like card catalogs before them, have struggled with achieving the right balance between the finding and the collocating objectives, often at the expense of the latter. A solid theoretical foundation has been built over the years exploring the meaning of "work" and developing cataloging rules and practices to describe the work in the catalog. Theory and practice have been built almost exclusively around the monographic work; much less attention has been paid to the development of a conception of a serial work. We are now faced with a bibliographic universe in which such a concept is needed.

Serials (a term used throughout this article for simplicity) have always been complex bibliographic objects, "characterised by conceptual unity despite and over physical/temporal fragmentation."[3] Tillett outlined seven bibliographic relationships: equivalence, derivative, descriptive, whole-part, accompanying, sequential, and shared characteristic.[4] Serials exhibit two of these: derivative (in possessing multiple formats) and sequential (in changing over time). With the

Kristin Antelman (kristin_antelman@ncsu.edu) is Associate Director for Information Technology, North Carolina State University, Raleigh.

proliferation of electronic journals and their derivatives, these relationships become more complex. Serials are collected by libraries in a variety of versions, or editions, through which users must sort, knowing that each version is not similar enough in content or other attributes to be equally likely to meet their needs. The ubiquity of Web electronic journal (e-journal) lists, powered by databases separate from the integrated library system, makes clear that we have not yet arrived at the optimal solution for either bibliographic control or display of these materials. Serials are an increasingly important part of our library collections; we can no longer afford to allow them to be a second-class citizen bibliographically. Following Lubetzky's second principle, we have a responsibility to communicate to users all editions of a work, the full range of library holdings, and other information the user may need to identify and obtain the desired item. Gaining control over an abstract serial work is key to achieving that objective.

The mechanisms that control the work for monographs—the main entry heading and uniform title—are weak identifiers for serials. Nevertheless, the serial work is, in practice, closely linked to title. The equation of title with work in current cataloging practice has led to the creation of new works where neither the cataloger nor, more importantly, the library user, would see a new work. For a variety of reasons, controlling the serial work has not been a priority, and changes in cataloging codes over time have weakened that control. Thus, what we are facing now is a known problem with new—and serious—negative consequences.

A fresh approach to implementing the abstract work layer in bibliographic control is offered by the much-discussed model to guide catalog development, the International Federation of Library Associations and Institutions' (IFLA) *Functional Requirements for Bibliographic Records* (FRBR).[5] One opportunity presented by the FRBR reference model is a truly abstract conception of the work. FRBR itself, however, borrows familiar bibliographic concepts and structures, and views the problems from a familiar perspective. This, in part, reflects what is inevitably an evolutionary process of change. However, even were FRBR a more radical proposal or our scope for change broader, our approach to bibliographic description would continue to assert the importance of semantic control over data elements and of recording relationships between works, items, and other works. What is exciting about such entity-relationship data models as FRBR is the potential to apply more sophisticated tools to improve our ability to realize these longstanding objectives.

We find ourselves working now in the dynamic space at the intersection of bibliographic control and networked documents. Our collections extend beyond the library's walls, not only because most of our digital collections are remotely housed, but also conceptually, as people (including library users) no longer see libraries as having a monopoly over knowledge and information resources. Thus, the problems faced by architects of the Web are not divorced from practical problems in libraries. Documents do not need to be *described* to be referenced in a networked world; they must be *identified*. An inherently descriptive element, such as title, cannot meet the requirements of a network identifier. The new bibliographic identifiers, such as the Digital Object Identifier (DOI) and the proposed International Standard Text Code (ISTC), seek to fill the need "to automate discovery to delivery chains," but they are shaped by the business needs of those who publish and sell content.[6] As these new identifiers are being deployed rapidly, librarians must look critically at the question of whether they are compatible with our objectives for bibliographic control of works.

As experiments in converting existing MARC-based catalogs into FRBRized records have shown, libraries have the opportunity to test new bibliographic models within the constraints of existing systems.[7] A concept such as a serial work identifier could be explored within local electronic resource management (ERM) systems, for example, providing immediate benefits to library users. As the excitement surrounding FRBR has shown, new conceptual models can help us revisit classic questions of librarianship and increase our appreciation of the importance of adhering to well-understood principles as new technologies rapidly take hold.

Serial Work

The Bibliographic Work

The concept of the bibliographic work has been examined by many great minds in our profession since Cutter's rules first recognized the literary unit. What is meant by work is far from straightforward, Lubetzky explains, "because the material *book* embodies and represents the intellectual *work*, the two have come to be confused, and the terms are synonymously used not only by the layman but also by the cataloger himself."[8] This ambiguity has not been particularly problematic thus far because most works, in particular monographic works, are represented by only one physical item; thus the work and item can both be referenced by the same main entry.

At least three distinct points of view on the work were articulated by Wilson. He wrote, "The everyday notion of a work is correlated with that of an author."[9] A common notion of work would identify multiple editions of a novel as a work but not an anthology of works by multiple authors, for example. From the textual scholar's perspective, a work is a combination of a conceptual abstraction (such as ideational content) and a specific semantic representation of that abstraction (such as linguistic content). Finally, a librarian's conception of the work is both broader than the com-

mon and scholarly conceptions, in that we would consider the anthology also to be a work, and narrower, in that we do not analyze all works contained within such aggregations.

Bibliographic scholarship on the work reflects the tension between these three perspectives (author, textual scholar, librarian) in large part because of bibliographic theorists' adoption of the textual scholar perspective: "A *work,* at a basic level, is a deliberately created knowledge-record representing a coordinated set of ideas (i.e., ideational content) that is conveyed through text. . . . A document may contain one or more works."[10] While this conception is easily applied to monographic works, when extended to serials it implies that each article is a work and each issue is a document. Svenonius might characterize that issue as a "superwork."[11] Domanovszky proposed a conception of a literary unit that comprised bibliographic items linked by relationships that "preserve the identity" of the original.[12] While Domanovszky viewed a wide range of transformations (such as revisions, editions, translations) preserving work identity, Wilson pointed out that using the concept of identity in such a broad way is problematic because it diverges too greatly from the scholarly notion of textual identity, which emphasizes specific linguistic content. Wilson helps lead us away from the restriction of the textual scholar's view of a work by concluding that the broader concept of literary unit can be adopted as a conception of a work without reliance on identity.[13]

The FRBR model also reflects the tension between the three conceptions of work. The tension can be seen both in the FRBR text itself and in commentaries on the model. Even those who interpret the FRBR *work/expression* as an abstraction with relatively stricter identity requirements acknowledge the need for the work also to serve purposes of bibliographic control. The proposed collocating device, defined as a higher level of abstraction over work, has variously been termed "superwork," "superwork record set," "super records," or "package content."[14] At that level, this collocating device would bring together the movie version of a textual work, derivations, and so on. Whether this level is already represented by the existing work or is conceptually distinct, there is a practical need in bibliographic control for a level of abstraction that brings together related items that do not exhibit textual identity. Hagler reminds us that the work need not be supported by an unassailable theoretical underpinning to be useful for bibliographic control.[15] This perspective is useful to keep in mind as we look at the problems of identifying the serial work.

Need for a Higher Level of Abstraction for Serials

Before a higher level of abstraction for serials is conceptualized, the practical need should be assessed. Library users looking for a given article do not care about the entire title history of the journal in which the article is contained. On the other hand, we can recognize today's serials in Lubetzky's characterization of a work: "a given work may be represented in a library in different forms or editions, under different names of the author or under different titles."[16] The reason for the second objective is that users are better served when they find together the various editions of the work so that they can select the most suitable edition for their own purposes. In the world of paper journals, version was a non-issue, except in the case of microforms, where, in fact, our multiple catalog records also confused users. Now, with libraries holding multiple electronic versions of journals (not all of which are equivalent in content or even have the same title), users have a need to see versions and holdings collocated. In this environment one does not want only holdings associated with manifestation-level catalog records; all holdings should be able to be collocated and presented at the work/expression level. Another reflection of this same problem is that as we build reference-linking solutions around either title or International Standard Serial Number (ISSN), we are creating links at the wrong level. The link should go to the work/expression and not to the multiple individual manifestations.

The work conception also could help with new title change challenges associated with electronic resources. Newspaper and journal Web sites can now exhibit the previously impossible behavior of changing title retroactively; for example, as Jones has pointed out, "If a publisher decides that Title B is, for whatever reason, a better title for such-and-such a serial than Title A, then it will be the better title for the whole *work,* not just for the parts issued after the decision has been reached."[17] Yee looked at this problem from the user's perspective: "now e-serials are continuously updated databases . . . extend across title changes. . . . Users surely consider both the database and the journal they seek (under any title it has held) to be different versions of the same work."[18] A complete picture of the serial work over time also would allow the cataloger (and catalog) to display the serial's complete bibliographic history and not just the pieces that happen to be owned by the library. Other uses are also imaginable. For instance, collection managers could take a bird's eye view of the evolution of disciplines across time. Unfortunately, catalogers and automated catalog systems currently lack the appropriate tools to manage these versions in a hierarchical structure.

The Serial Work in Practice

Uniform Titles

From the perspective of bibliographic control, a collected works would itself be considered a work. Analogously, an article in an issue of a journal is clearly a work, and the issue could possibly be considered an anthology work, but is the journal itself a work? Here a library user's common sense answer would be "Yes, *Atlantic* and *Atlantic Monthly* both refer to a

single work over time." Yet, from the textual scholar's perspective, since each issue of a journal is unique both ideationally and semantically, referring to a whole journal as a work makes no sense. As we turn to the bibliographic conception of the serial work, we find that the question has not been well explored in the cataloging literature. Lubetzky believed that there is neither a serial work nor the need for such a concept because "a serial does not have the organic unity of a monographic work, it is rather a source of various works, and both the one who cites and the one who looks for a serial is almost always concerned with the part identified by a particular title, not the history of the whole serial."[19] Delsey highlighted the conceptual difficulty of identifying the work for works of shared and mixed responsibility within the framework of AACR2, yet contended that the serial work is encompassed in the FRBR aggregate work.[20] Le Boeuf similarly believed that continuing resources, including serials, are regarded by FRBR as works, despite the considerable conceptual and practical challenges in applying the model.[21] So while applying the theory of a work to serials is difficult because serials as a class of materials must be defined primarily for bibliographic control purposes, the problem remains that library users' sense of a serial work diverges significantly from the way it is currently implemented in library systems.

The work is embodied in our cataloging code in the form of the name/title main entry heading and implemented through uniform title and authority records. The crux of the serial work problem is that neither name nor title are reliable identifiers of a serial work. In the past, this problem was ameliorated in our catalogs by two work-like devices: earliest or latest entry cataloging, which grouped all titles resulting from title changes together on a single record, and author main entry for serials that were the product of a corporate body and therefore susceptible to both title changes and having non-unique titles. The adoption with AACR2 of successive entry cataloging and title main entry for most serials undermined this work-like collocation and strengthened the association between title and work. Lubetzky acknowledged the cost of taking this practical course:

> The idea of entry under successive titles . . . may seem to be in violation of the second objective. A serial, however, is a constantly evolving thing, and there is here a practical problem. Often the cataloger can establish the complete history of a continuing serial only with time and trouble, and each change of title after that would mean recataloging.[22]

With the move to title main entry for most serials, authority control of the serial main entry disappeared and new problems arose that stem from the weakness of title as a work identifier.

Uniform titles are defined in AACR2 as "the means for bringing together all the catalogue entries for a work" (rule 25.1). Even leaving serials out of the picture, the role of the uniform title in work identification is not clear-cut. From the perspective of a developer of online catalog software, uniform titles suffer one major limitation as a device for controlling works: they are optional. In other words, in most cases (where the work only has one manifestation in the *local* catalog), no authority record is created, leaving the bibliographic record to serve the dual purpose of representing the *work* and *manifestation* in FRBR terms. FRBRization studies have quantified this problem and led some to suggest that authority records be created for all works.[23]

Of greater interest in the serials context is the fact that the uniform title serves an entirely different function for serials, one that does not assist with work identification. In 1981, the Library of Congress released a Rule Interpretation (codified in AACR2 in 1993) to address the problem of non-unique titles that had arisen as a result of AACR2 ending the practice of corporate main entry. The solution was to differentiate titles by using the uniform title to record a unique serial identifier, which would be created by adding a qualifier (under guidelines that have shifted over the years) to a non-unique title proper. Of course, collocation and differentiation are different, in fact contrary, objectives and, as Bloss pointed out, "calling unique identifiers for serials 'uniform titles' is a misnomer."[24] Thus, even if uniform titles were not optional but required, as has been proposed, they would not help with serial work identification.

The use of uniform title for two distinct purposes is more than a semantic problem. It is at best cumbersome and at worst impossible to program a catalog system that uses the same element (embodied in the same database record and designated MARC field) to serve two distinct purposes. A more serious consequence of the distinguishing use of uniform titles from the software developer's perspective is that serial authority records do not contain information about relationships between title variants; that information is in the bibliographic record. Systems developers (and therefore our catalogs) find it virtually impossible to properly represent the catalog's authority structure by taking advantage of the rich network of relationships coded in serial bibliographic records. One also may ask, what is the purpose of constructing a serial uniform title? The paper dictionary catalog needed one to serve as a main entry heading; in an automated system, information taken from the rest of the bibliographic record is available for the system to draw upon to distinguish between identical titles in an index display. Carpenter took this reasoning a step further in pointing out not only that "the establishment of a single 'official' form of name is meaningless in an online catalog," but that the uniform heading "mistake was canonized in the separation between the MARC authority and bibliographic formats," as a result "losing the

logical relationship" between the two.[25] As Bregzis noted, the ability to return a result set showing the form of name or title the user entered would be a conceptual return to Cutter's syndetic catalog.[26]

ISSN and Cataloging Practices

Because of the utility and widespread adoption of ISSNs, harmonization between cataloging practice and the rules for assigning ISSNs has been identified as a desirable goal. This also has helped to move the bibliographic conception of the serial work closer toward equivalence with title. In order to support "hook to holdings" and other data interchange based on ISSN, the goal is that each bibliographic record would correspond to a single ISSN. However, substantial conceptual challenges to harmonization exist. For instance, while similar, the identification objective of the ISSN key title and the distinguishing objective of the uniform title are different.[27] Integrating entry, while congenial to a more work-based display, is also a challenge to harmonization because the ISSN relies on successive entry. Although the ISSN explicitly does not identify a serial work, but is instead a precise identification of each form of the title (and this is well understood), harmonization of rules for title changes is a challenge when seeking to meet the objectives of both publisher and library constituencies. Another practical harmonization challenge is the ISSN policy that "when a publication is published in different media, with the same title or not, different ISSN and key titles shall be assigned."[28] Harmonization may well be achievable in practice, but it will come at the price of further compromising the already weak work-level control of serials in our catalogs.

New Models Bring New Opportunities

The MARC/AACR model has two entities, work and item, whose attributes and relationships to other works and items are described in AACR2 and coded in MARC bibliographic and authority records. The resulting records are themselves entities within the catalog. They are records that are related through filing relationships constructed by catalog developers using the available MARC data, cataloging rules, and proprietary programming. Thus, the linear catalog relies upon a mixed explicit and implicit authority structure, which is weak for serials, to meet the collocation objective.

The late 1970s witnessed a burst of creativity in reconceptualization of the catalog in light of automation. In 1977, Gorman proposed a model he termed the "developed record," in which there were three entities: the name package, the work package, and the subject package. The cataloger's work would focus on creating links between the packages. He later expanded on this model by describing HYPERMARC, a more relational successor to MARC, which would be "a complex structure expressive of all the bibliographic relationships between works and objects."[29] Tillett characterized an aspect of this model as an "access control record" and pointed out that Gorman's proposed record structure "would fit very well in today's FRBR conceptual model of the bibliographic universe."[30] Cataloging theorists, in struggling to define the work/item boundary, also have pointed out the need for a deeper hierarchy to support better catalog displays.[31] The new entity-relationship (or object-oriented) models, such as FRBR, represent a shift from the current commingling of access objectives, data structures, and rules, as manifested in MARC and AACR2, to a clearer focus on bibliographic description based on well-defined entity attributes and explicit relationships between entities.

Serials and the Functional Requirements for Bibliographic Records (FRBR)

The FRBR report proposes a new approach to bibliographic description, one that explicitly builds on existing theory about the work and modern data modeling techniques.[32] While FRBR may not be as radical a change as some say is needed, it does stand as a clear conceptual counterpoint to the current MARC/AACR model for the development of library catalogs. FRBR is a user-centered model, explicitly relating its organization of entities and attributes to the user tasks identified by the 1998 IFLA modification to the Paris Principles (find, identify, select, and obtain).[33] It serves as a "reaffirmation of the assistance library catalogs must provide to users" independent of specific catalog or data exchange technologies.[34] FRBR prompts us to refocus our attention on works and their manifestations rather than simply the manifestations themselves.

The FRBR model is built around the centrality of relationships in bibliographic description. In creating separate, abstract, top-level bibliographic entities (work and expression) within a relational structure, FRBR shows that explicit relationships between conceptually distinct entities are the highest priority in bibliographic description. In positing this, FRBR addresses a principal weakness of current practice, which, as Tillett pointed out, is that "we lack principles for consistent, logical treatment of relationships."[35] Smiraglia's research demonstrated that 63 percent of derivative bibliographic relationships are not expressed by catalog records at all.[36] Much information about relationships between records is conveyed only through proximity in an alphabetic catalog display. The interpretation of the meaning of the proximity of records is left to the human catalog user and relies on a conceptual framework that may not be understood by that user. Where the relationships are explicit, such as "see" references or preceding and succeeding titles, they are actionable only in

the context of the catalog. In an entity-relationship model, multiple relationships between entities—not bibliographic records—can be explicitly coded. Because entity description is separate from the relationship between entities, the meaning of the relationship is not dependent on, or affected by, any given format for storing the data or rules for its display. As Bennett wrote, "FRBR's primary benefits extend from its hierarchical structure, permitting the placement of bibliographic information at its appropriate level of abstraction and facilitating its inheritance."[37] Note that these benefits only accrue if the layers (entities) and associated attributes (such as title, author) are conceptually distinct and unambiguously defined, thereby preserving the meaning and potential uses of relationships between them. Attributes at the appropriate level are associated with the highest possible entity and are inherited—not repeated—by lower level entities. See figure 1, which is an XML-like hierarchical representation of a work record. By implication, assigning attributes to the wrong entity undermines the integrity of that entity, and therefore the overall coherence of the model.

The question of whether or not a serial can be a work carries forward into FRBR. The authors of the FRBR report avoid addressing the issue directly, as do most commentators on the model who tend to focus on monographs and music. Nevertheless, the introduction to the FRBR report states, "The study endeavours to be comprehensive in terms of the variety of materials that are covered . . . [covering] all formats (books, sheets, discs, cassettes, cartridges, etc.)."[38] While the report contains no serial examples, one can infer that serials fall under FRBR's scope because they are referenced in the document in sections 5.3.1.1 and 5.3.2.1. Delsey, and Hirons and Graham, believe that the FRBR work is applicable to serials. Delsey wrote, "At a conceptual level, the entity defined as *work* in FRBR is clearly applicable to works issued serially. In the FRBR model, the serial *work* would be viewed as an *aggregate work*."[39] The aggregate work in FRBR, an interpretation of work, supports Wilson's conception of the literary unit—that is, the work as defined for purposes of bibliographic control. FRBR appears to implement Smiraglia's and others' conception of the work through its two abstract layers—work for ideational content, and expression for semantic. The FRBR document states that the expression level is equivalent to a specific linguistic representation: "Strictly speaking, any change in intellectual or artistic content constitutes a change in *expression*. Thus, if a text is revised or modified, the resulting *expression* is considered to be a new *expression,* no matter how minor the modification may be."[40] If semantic content is equivalent to a single linguistic representation of a work, questions arise about the abstract nature and role of the expression entity. One can appreciate librarians' confusion in how to apply such a concept in practice, across many material types.

work
id=1
status=continuing resource
    expression 1
    content=full text
    title=New York Times
    […]
    id=1.1
        manifestation 1
        format=paper
        […]
        id=1.1.1
        manifestation 2
        format=microfilm
        […]
        id=1.1.2
    expression 2
    content=selected articles
    title=New York Times
    […]
    id=1.2
        manifestation 1
        format=digital
        […]
        id=1.2.1
        manifestation 2
        title=New York Times Upfront
        format=digital
        […]
        id=1.2.2

Figure 1. Simplified representation of a serial work

Hirons and Graham take a somewhat different approach to the abstract layer for serials and place publication status (ongoing or not) at the FRBR work level. At the expression level, they place differences in content and mode of expression, although they highlight the problem of where to draw the line between different expressions of the work.[41] The American Library Association's Machine-Readable Bibliographic Information Committee (MARBI) has proposed an approach more congenial to the operationalization of the abstract layers: "the entities work and expression are often only discovered by a process of extrapolation based upon comparing similar manifestations."[42] If implemented using FRBR, the serial work would be a bibliographic control device designed to achieve specific objectives; namely, to assist the catalog user in identifying relevant relationships, holdings, and characteristics of serial editions. Although subjecting serials to the full weight of the theoretical overhead of the work is not needed, explicit clarification of how serials fit within the FRBR model is needed before this work can begin.

Bibliographic Families

The concept of the bibliographic family is related to that of the work and is well suited to serials. The bibliographic

family was formulated in Wilson's definition of the work as "a group or family of texts."[43] Smiraglia proposed a definition of bibliographic family based on Tillett's derivative relationship: a "network of related works . . . constitutes a bibliographic family—the accumulation of works that deliberately share ideational and semantic content, and that are derived from a progenitor work."[44] The ability of bibliographic families, which also could be seen as superworks, to trace sequential relationships would better support a key attribute of serials—change over time—which our current catalogs do poorly. The model would have to be modified or adopted only at the broad conceptual level, however. To abide by the precept of the bibliographic family—that it is a collocating device of works related to a progenitor—one would have to stretch the bibliographic family concept of work to include a journal. One also would want to de-emphasize relation to a progenitor work in favor of relationships between titles over time. The bibliographic family model also could help address the challenge of defining the boundary between works by blurring that boundary. Users who seek to find and obtain a specific edition of a given serial are not making use of work boundary information. If all bibliographic relationships between works, expressions, and manifestations were codified, a big net would be created, encompassing not only changes in author and title, and splits and mergers, but even changes in scope (for example, in links between related works). See figure 2 for an example of a bibliographic family representation of related works. Individual manifestations would point back to the nearest expression or work relation within the bibliographic family. Families would grow over time, but would probably still remain distinguishable. This approach is congenial to data modeling (although it does not necessarily map easily onto the FRBR model) and, with current Web technologies, could be presented to users through a variety of illuminating displays that represented the relationships. While catalogers usually cannot examine each issue of a journal to judge when changes merit creation of a new work, perhaps experience would prove that most work-level changes announced themselves through changes in title, author, numeration, or a combination of these. The shift of cataloger effort would be toward the explicit recording of the numerous relationships characteristic of serials, work that is not only practical but is in large part already being done.

As valuable as a modified bibliographic family model might be for serials, converting our existing bibliographic data into bibliographic families would not be a simple matter. A number of studies have been conducted to evaluate the feasibility of converting existing bibliographic records into bibliographic families.[45] These studies all explicitly excluded serials; moreover, their findings are not easily extensible to serials because bibliographic families are currently identified primarily through the use of main entry. For serials, families most likely would be created using standard numbers. In a study done to test the use of the linking entry fields (780, 785), where OCLC, LCCN, and ISSN numbers are recorded for serials, Alan found that approximately 70 percent of the title-change record sets could be linked if the approach took into account the presence of any one of the three standard record control numbers.[46] In addition, in our current systems, not only are the serial family relationships recorded by the cataloger hidden within bibliographic records, not all members of the family are present. Yee looked at this problem from the user perspective:

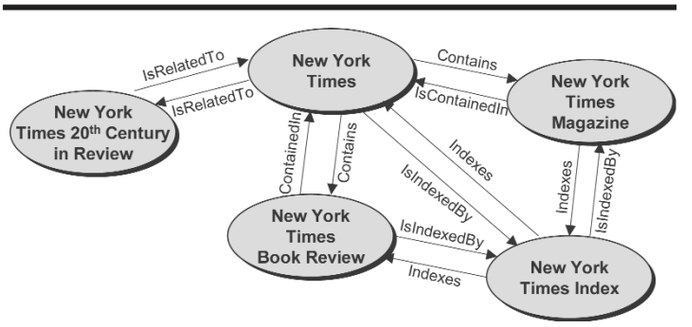

Figure 2. A bibliographic family of serial works

> The various related works that make up the history of a given serial can only be assembled by a user who happens to be in a library that holds issues entered under each title the serial has held. If there are any missing links, the run cannot be assembled.[47]

In a networked library that potentially offers a range of services to connect users with the desired full text, these practices send users into a needlessly constricted view of our library collections.

Identifiers

Title As an Identifier

Can a bibliographic entity, such as the FRBR work, be truly abstract if its description includes a literal (and changeable) attribute? Hagler noted that "titling straddles the venues of work and document" and asserts that the title can only exist at the manifestation level: "A natural-language title (title proper) can be counted upon to identify *only* the document bearing it."[48] While in archetypal cases (such as *Hamlet*) a creative work is known by a given title, there are many more examples, including most serials, where no such obvious linkage exists because no "progenitor work" exists in the

classic personal author sense. Yee has noted the problems with relying on serial uniform title to represent the work: "The title is a frail reed to bear the burden of displaying relationships between works in our catalog. . . . the title must be propped up with parenthetical additions completely invented by catalogers and difficult for users to predict."[49] She also proposed that we study changes in scope and content of serials independently of title changes.[50] If we accept that the serial can be an abstract entity at all, we see that title, author, both, or neither can change without a change in the underlying work as a user would perceive it. In a bibliographic world where the digital, mutable item is primary, and where the work is typically represented by multiple manifestations, the abstract work level is even more important. Inherently mutable attributes, such as serial title, cannot successfully fulfill the role of a work identifier. If we did not rely on title as an identifier, what would a work-level description look like? Jones echoed the image of the bibliographic family in proposing that at the work level there:

> would be no bibliographic description per se because there would be nothing physical to describe. Rather, a sort of extended abstract would describe the various relationships with other entities . . . beckoning the user down the various paths reflecting those relationships.[51]

But because the system must be able to follow that path, the only essential attribute of the work is an unambiguous, "dumb" number, work-level identifier.

Authority Record Identifiers

Substantial work has been done on the question of an authority record identifier, conceptually related to an identifier at the work level. The early work stemmed from the 1974 UNESCO and 1977 IFLA/UNESCO directives that "each bibliographic agency should maintain an authority control system for national names, personal and corporate, and uniform titles in accordance with international guidelines."[52] These efforts acknowledged the inevitable failure of any given language or culture's definition of a name to be satisfactory to all others. Tillett has been influential in making this argument: "When we equate a single form of name for the entity with the entity itself, we ignore the international perspective."[53] In the 1970s, an IFLA group led by Delsey proposed an International Standard Authority Number (later the International Standard Authority Data Number [ISADN]).[54] Implementation of such an initiative was judged to be cost prohibitive given the state of technology at the time and the associated administrative costs. IFLA, after publishing FRBR and recognizing that it did not address authority control, appointed a working group, Functional Requirements and Numbering of Authority Records (FRANAR). Patton, chair of the working group, put his finger on a key problem that had also emerged in the context of work on the ISADN: "Throughout these discussions, there remained the nagging question of 'what exactly were we attempting to number?'"[55] As a result, FRANAR is focusing on specifying functional requirements, much as FRBR did, rather than tackling linking mechanisms. The current IFLA Cataloging Section's Virtual International Authority File (VIAF) initiative builds on the long-standing idea of eliminating or de-emphasizing the authorized heading.[56] Recalling the access control record, the VIAF project would allow local customization ("my opac" based on browser cookie settings, for example) to identify the preferred language, script, and form of name for display.

Patton's question about what we are numbering bears repeating in the broader context. Any authority record identifier still will reflect the current model in which the abstract serial work is not well represented in the authority structure. It will also be tied to a bibliographic/authority structure that is only made manifest to users, and usable by systems, through online catalog software.

Identifiers in a Digital Environment

The usefulness of identifiers, which Schottlaender characterized as "a highly concentrated kind of descriptive metadata," is widely acknowledged.[57] In order to create intelligence in a system, an identifier linked both to functional metadata (such as bibliographic description) and formal relationships between structured entities (such as FRBR) is necessary. In 2001, Berners-Lee, the founder of the Web, set forth his vision of the "Semantic Web," a Web that would extend beyond links between pages to a Web where people issued queries that would retrieve semantically meaningful and contextualized information.[58] New technologies and protocols to advance the Semantic Web are rapidly being developed under the general leadership of the World Wide Web Consortium. The Semantic Web is based on machine-to-machine communication and, therefore, requires that actionable, persistent digital identifiers be associated with information objects or documents. Several such identifiers are in use or have been proposed to identify bibliographic works.

<in*d*ecs>-Based Models

<in*d*ecs> (Interoperability of Data in E-Commerce Systems) is a metadata framework for the exchange of bibliographic data to describe and manage intellectual property.[59] It is emerging as the dominant model for metadata and identifier systems used by publishers. It serves as the foundation for the EdItEUR ONIX data dictionary, the interna-

tional standard for representing and communicating serial and book industry product information, and is being carried forward in collaborative projects that bring together parties interested in intellectual property management.[60] Within this framework, the International DOI Foundation, which manages the DOI (Digital Object Identifier), is mapping its data elements to the <in*d*ecs> Data Dictionary.[61]

The <in*d*ecs> model is based on guiding principles, the first of which, "the principle of unique identification," recognizes the importance of the basic requirement of a universal resource name (URN): "every entity should be uniquely identified within an identified namespace."[62] (The implications of another key <in*d*ecs> principle, the "principle of functional granularity," will be discussed in more detail below.) Despite its primary purpose to manage intellectual property, <in*d*ecs> is not limited to administrative metadata supporting intellectual property transactions. It also recognizes the value and importance of descriptive metadata:

> <in*d*ecs> proposed that descriptions of content, transactions and descriptions of rights are all inextricably linked, and recognised that accurate descriptions of content are the core on which the rest is based.[63]

The <in*d*ecs> entities do not correspond to FRBR entities, however. <in*d*ecs> defines the work level, which it terms "abstraction," as "a creation which is a concept; an abstract creation whose existence and nature are inferred from one or more expressions or manifestations."[64] Although this recalls the FRBR work, Le Boeuf pointed out that the abstraction entity "actually corresponds to a subclass of Expression that might be labeled as Expression_in_notated_form."[65] Such an expression is hard to distinguish from the FRBR manifestation. He stated further, "This is an important difference to recognize, if we wish—and I think it is in our interest to do so—to keep the overall structure of our catalogues interoperable . . . in the perspective of the Semantic Web."[66] The benefits of extending interoperability between library and data suppliers' systems are indisputable, but <in*d*ecs> deserves more scrutiny before the library community embraces its model and assumptions about descriptive metadata.

DOI

The Digital Object Identifier (DOI) is an increasingly popular identifier that potentially could help with serial work identification. DOI grew out of publishers' need to manage their intellectual property, primarily journal articles, and to support persistent links to journal content. According to Norman Paskin, director of the International DOI Federation (IDF):

> A DOI persistently identifies an entity of relevance in an intellectual property transaction and associates the entity with relevant data and services. An entity can be identified at any arbitrary level of granularity.[67]

The DOI Federation, which administers the DOI, provides the full infrastructure to make the DOI an action able identifier.

Even though a DOI is typically assigned to what would be a FRBR manifestation-level document, the IDF has adopted the <in*d*ecs> principle of functional granularity ("it should be possible to identify an entity whenever it needs to be distinguished"): "a DOI can be assigned to any entity which is a Resource within the indecs context model."[68] The *DOI Handbook* explicitly includes abstractions (works) within DOI's scope:

> DOI can be assigned not only to manifestations of intellectual property (books, recordings, electronic files) but also to performances and to "abstractions"—the underlying concepts (often referred to as "works") that underlie all intellectual property.[69]

Paskin stated:

> The IDF's role in co-sponsoring, championing, and now implementing the <in*d*ecs> framework as a semantic tool for structured metadata [is] an essential step for treating content as information in Semantic-Web-like applications.[70]

There are a number of policy and practical issues for libraries to consider with DOI. Libraries can and have joined the International DOI Foundation, which is the requirement to be able to assign DOIs. The question remains, however, if publishers are assigning manifestation-level DOIs to objects, how can the abstract entities represented in those objects also be coded with work-level DOIs? The library community is not likely to have an interest in doing this at the article level, but conceivably will have an interest is doing so at the journal work level. In fact, since DOIs can be assigned at any level, CrossRef is encouraging publishers to assign one DOI to journal titles.[71] Paskin has written that "[in a] possible future evolution of the DOI system . . . a single DOI for the work could be resolved to multiple additional DOIs for versions of the work."[72] Publishers assigning work-level identifiers also raises the question about what they are really identifying. Without bibliographic control of the entities to which the identifiers are assigned, any so-called work-level DOIs that are created will remain tied to a title-based model that, if originating from publishers, is unlikely to correspond to current cataloging practice.

International Standard Text Code

The proposed International Standard Text Code (ISTC) is an identifier in development under the auspices of an International Organization for Standardization (ISO) working group.[73] A number of commentators on FRBR point to the ISTC as a possible solution to the work identifier problem.[74] The project is currently stalled over the business question of identifying an organization that is willing and able to serve as the registration authority, and the fate of this identifier is uncertain. ISTC was modeled after the successful International Standard Musical Work Code (ISWC) (although ISWCs do not identify a musical work in the FRBR sense because musical arrangements, adaptations of lyrics, and translations each receive their own ISWC). ISTC purports to identify a hybrid FRBR work/expression. It has been met with significant criticism—despite being ultimately endorsed—from the international library community over failing to adhere to the FRBR model.[75] Le Boeuf concluded that "'textual abstract entities' as defined in ISTC are considered as a sub-class of the FRBR 'Expression' entity."[76] The ISTC-required metadata, as the American National Standards Institute/National Information Standards Organization (ANSI/NISO) response to the ISTC proposal pointed out, draws from the work, expression, and manifestation levels.[77] This approach is a reflection of the business needs driving the creation of ISTC and its close association with the <in*d*ecs> model.

The Principle of Functional Granularity

DOI and ISTC reveal the underlying philosophy and motivations of the communities of interest that use (or hope to use) these identifiers in systems that exchange bibliographic data with associated expressions of intellectual property rights. These systems are not library systems, but administrative systems designed to meet the business needs of their stakeholders. Libraries' use of ISSN serves as a good example both of what can be gained by piggybacking on identifier systems designed around business processes (such as efficiencies in material acquisition) and what is sacrificed (such as principles of bibliographic control). Our experience with ISSN alone should alert us to the consequences of adopting identifiers that bring with them the baggage of both new descriptive metadata models and the interpretations and practices of their guiding organizations.

At the heart of the DOI and ISTC is adherence to the <in*d*ecs> so-called "principle of functional granularity," which states that "it should be possible to identify an entity whenever it needs to be distinguished."[78] In theory, this means that entities at all levels can be described and assigned an identifier and, by implication, that only the entities that needed to be described would be. In practice, a truly abstract work-level identifier rarely if ever would be assigned because it is not needed by the applications that use these identifiers. A more serious concern with the principle of functional granularity is that, while it responds to the immediate needs of the business community to manage objects with potentially complex associated intellectual property rights, it introduces ambiguity in entity definition and the boundaries between entities. Caplan has written:

> Because rights can be traded at any level of the IFLA model (works, expressions, manifestations, items), good descriptive metadata will not conflate these levels, and will provide for extensive, explicit linking between them.[79]

The principle of functional granularity leads to conflation because, with no requirement to define entities at any given level of abstraction, some descriptive metadata elements are repeated at all levels in order to accommodate selective entity description and enable identification at any level. Another consequence is that such identifiers as ISSN and DOI can be used to identify an entity at any level. Blurring the work/expression/manifestation hierarchy may appear to increase generalizability, but in fact compromises its value by introducing ambiguity into the meaning of the identifier because context must always be factored in. In a networked environment, the identifier associated with an object must not only be unique within the identifier namespace (a primary requirement of URNs), but also must operate within an unambiguous domain with unambiguous rules for identifier assignment. Lynch wrote:

> The assignment of identifiers to works is a very powerful act; it states that, within a given intellectual framework, two instances of a work that have been assigned the same identifier are the same, while two instances of a work with different identifiers are distinct.[80]

Two objects with different DOIs may be distinct, but nothing can be inferred about how they are distinct, whether they are two works or two manifestations of a work.

Assignment of an identifier only when a distinction needs to be made between entities (which themselves are incompatible with FRBR entities) implies that the assigner of the identifier is also the one determining the need. That need inevitably will be identified in the present and in the context of defined applications that use the identifier. Application developers seeking to refer to a specific bibliographic entity will find that identifiers assigned according to the principle of functional granularity are fundamentally ambiguous. The application will always need to ask, "for which data is it meta-?"[81] Paskin acknowledged this "shortcut"; for example,

in exchange for using a single identifier system at multiple levels of abstraction, one accepts that the difference between them is defined by qualification at the local, or application, level. He concedes that creation of a new identifier may be desirable rather than to accept this level of ambiguity in what is being identified:

> New identifiers may be needed and require the creation of a new namespace if the namespace currently being used cannot satisfactorily include a new type of entity without disrupting the existing business.[82]

He then cites the decision to create ISTCs as an unfortunate example.

Semantic convergence, that is, ensuring that the meaning of fields is not lost or changed when mapping between metadata schemes, is a broad challenge for metadata crosswalking. The principle of functional granularity, by associating the same identifier with entities at multiple levels that have overlapping attributes, as well as differently mapped entities, will make convergence of <in*d*ecs>-based schemes with schemes emerging from FRBR very difficult. The library community's response to the ISTC proposal pointed out that when ambiguity in the identification of fundamental entities such as the work exists, the identifier provided by the business model application for that entity is of little or no value for library systems. The Canadian response, for instance, noted:

> This fundamental difference as to the entities that are being identified and described . . . is a barrier to interoperability between ISTC applications and the library community. . . . As it stands, . . . the ISTC appears to be of limited use to libraries because of its incompatibility with *FRBR*.[83]

The principle of functional granularity also reveals the extent to which the intellectual framework that underlies <in*d*ecs>-based identifiers differs from what is needed by the library community. While both bibliographic control and intellectual property management require practical metadata schemes, they constitute different intellectual frameworks when it comes to descriptive metadata. Bibliographic control is concerned with describing intellectual works and manifestations in a manner that meets the anticipated needs of library users. Intellectual property managers are concerned with describing digital objects to meet the known and anticipated needs of rights holders. The divergence of audiences, goals, and time frames is not self-evident from the metadata itself, but is revealed by posing the question "When and for what purpose is the work described?" The economic incentives in intellectual property management are a strong driver of identifiers that adhere to the principle of functional granularity. As Hedberg said of ISTC:

> The strong connection to the publishing industry makes it evident that the ISTC is concerned only with those derivations where additional effort has been put into an existing work in order to publish it in a different format.[84]

A digital object described and labeled with an identifier for the purpose of an intellectual property transaction likely will not be adequately described as a bibliographic entity from the perspective of the cataloger.

The flexibility embodied in the principle of functional granularity ultimately reflects the priority of describing the attributes of a given object over its relationship to other, related objects. The <in*d*ecs> framework document spells this out:

> the point at which new abstract works or versions of works are identified is therefore imprecise, and subject to the principle of *functional granularity*. . . . Rights are one of the major drivers of functional granularity. For example, if a translation has different rights from the original work (which will almost certainly be the case), it must be identified as a distinct creation.[85]

The *DOI Handbook* restates the point: whether a publication is a new work or not "is a 'functional granularity' issue, and hence ultimately a decision for the publisher."[86] The group working on ISTC acknowledged that its objectives differ from those of libraries: "It might be necessary, for example, for the purposes of rights management, to identify something as a separate abstract entity when a bibliographer would not make that distinction."[87] The bottom line is that <in*d*ecs>-based identifier models are recording administrative—*not* bibliographic—metadata about the object, even where the attributes are descriptive in nature. In addition to being able to manage works across time, libraries must be able to do so across original and later publishers associated with a work. Publisher-centric administrative systems focus on relatively short-term business needs and reflect current relationships between the actors in the information distribution chain. A work identifier is needed that an author or libraries (particularly in the case of serials) could assign to a work and that would apply to all versions of a book, article, or journal independent of the current scholarly communication model and rights associated with each manifestation. If libraries again adopt an identifier with an administrative data model that is closely bound to the current business needs of publishers and distributors, the inevitable operational pressures will mean that, just as with

ISSN, interoperability will be advanced at the expense of basic principles of bibliographic control.

Possible Uses of the Work Identifier

Library Systems

In 1979 Gorman wrote, "The card catalogs in large libraries are a barrier to the use of the library."[88] The ensuing quarter century has seen card catalogs replaced by online catalogs that are still a barrier to the use of the library. This is particularly the case for users of our journal collections. Pinzelik pointed out that "[f]inding a serial in a large library can be an extraordinarily complex process, in which an inordinate number of decision points are met and opportunities for failure presented."[89] Our current automated linear catalogs, comprised of records cataloged principally at the manifestation level, favor the finding objective at the expense of the collocation objective. Despite the fact that we no longer need to choose one over the other, our online catalogs still support functions necessary only for card catalogs. At the same time, they do not support fundamental cataloging principles that support the second objective; for instance, main entry. Library users rightfully do not consider journal articles to be a lesser bibliographic class of intellectual work than books, and they have been confused by the seemingly artificial division of labor between catalogs and indexes. The quantity of journals and their share of library budgets have greatly expanded with the growth of postwar science and the serials pricing crisis. Their importance in teaching and research, particularly in the sciences, has grown as well. In addition, thanks to being available online and being aggregated in massive full-text databases, journals now are relatively more used by students than in the past. Although we have outsourced large parts of the bibliographic apparatus for journals, libraries still bear ultimate responsibility for making the whole package comprehensible to users. Our library users cannot yet come to the library's Web site with a citation in hand and easily find the full text, even when it is available there.

The potential of a serial work identifier can be explored without waiting for revolutionary changes to the cataloging code, to existing identifiers, or a new bibliographic data exchange format. Work can start where parallel, but more open and flexible, bibliographic systems already exist within our libraries. Separate electronic journal lists can be seen as an attempt to compensate for the weaknesses of providing access to journals from the catalog. The databases that drive these lists—often full-blown electronic resource management (ERM) systems—are potential sources of innovation because they are amenable to experimentation in ways that our current integrated library systems are not. These systems have the potential to improve upon typical OPAC displays, not just to include the paper versions (as some libraries already do), but to show users the bibliographic relationships among the journal manifestations. We must simultaneously use our displays to transmit the expertise of the librarian to help a user choose between available versions based on completeness of the text, file format, or other attributes.

The day when our catalogs can use the serial work concept may not be that far in the future. The integrated library system (ILS) itself becomes a possible realm for experimentation because many of the major systems ride on top of standard relational database management systems (RDBMS) such as Oracle. While the vendors may not store bibliographic data in a way that makes pulling it out for repurposing easy, given local programming support, doing so is still possible. The University of Buffalo has converted its catalog into XML using a MARC converter and the TextML indexer.[90] Several FRBRization tools now available from OCLC and the Library of Congress (LC) can help to open up a new realm for experimentation with the catalog.[91]

The work identifier also would have value for reference or citation linking. Populating OpenURLs with ISSNs does not work well for reference linking because, even if a match is found, the application can take the user to only one manifestation of a title. Reference-linking applications currently work around this problem by grouping the same titles using proprietary work-like keys based on title equivalency. This is another manifestation of the "appropriate copy" problem, which OpenURL systems were designed to address, in that users should be led to the appropriate copy of a work as well as the copy they are authorized to access. OpenURL metadata would benefit from the addition of a standard number for works. If a work identifier is associated with titles in the reference-linking database, the application could support either work-, expression-, or manifestation-level links, as well as appropriate data displays. Thus, the user would see the complete picture of library holdings and would or would not be offered services (such as catalog link, interlibrary loan) on the basis of those holdings. Applications such as jake, which shows which databases index a given journal and that must deal with sources representing that journal in any number of ways, also could use the work identifier behind the scenes to improve search results and displays.

Practical Issues

What would a serial identifier look like and how would it be assigned and used? While the specifics of a serial identifier is beyond the scope of this article, what it should look like and how it might be used can be envisioned in a general way. The work identifier should be a dumb number, unrelated to existing identifiers associated with the bibliographic entities that it describes, such as titles or ISSNs. To support systems

that link between manifestations using existing identifier schemes, the work identifier could be appended to existing identifiers, much like the options currently under review by the ISO review of ISSN, although the objective of the proposed ISSN extensions is to support being able to bring together all formats of a given *title*, not work.[92] Concern has been expressed about how such an identifier could be used in practice. Le Boeuf highlighted this concern, which stems from the abstract nature of the work and expression entities; he said of the work, "this entity hovers at such an abstract level that no standard numeric identifier in the world could ever grasp it. *Works* are just thoughts that have not yet been materialized, and thoughts are not numbered."[93] He is right. But in practice, as we have seen with the concept of bibliographic families, works would not be registered and assigned an identifier as they were created, but would receive one (assigned by the system, not the cataloger) only when they were embodied in a manifestation.

The availability within the FRBR model of two abstract layers, work and expression, is useful in modeling approaches to specific problems libraries currently face with serials. One problem is multiple copies of the same journal. The proposal for an aggregator-neutral record, which would include all issue-based electronic versions on a single record (and put article-based aggregator versions on a machine-derived record), can be seen to be a FRBR-like approach in creating different expressions of a journal.[94] In applying the identifier to serials under the FRBR model, the work identifier would bring together a collection of individual expressions and manifestations that were judged by the cataloger to be the same work. See figure 3 for an example of how a serial work might be modeled under FRBR. A change that did not constitute a new work would be one of these manifestations. A change that did constitute a new work would generate a work through the creation of its first expression and manifestation. Explicit relationships between the two works would then be recorded. Within the context of a library system, a work identifier could be used to bring together all manifestations held by the library, whether a "full serial" title or a title in an article database, in response to queries on title variants (including previous titles and abbreviations if the ERM was augmented with this data), ISSNs, or other access points. An interface could then be written to show the work once and display relationships between manifestations as well as associated holdings and other qualitative attributes that would assist the user in selecting the appropriate manifestation. See figure 4 for a potential outline of a catalog display for a serial work.

The strength of the entity-relationship model lies in its separation of the logic and principles of description from display issues. The ultimate solution would require not simply imperfectly grafting FRBR onto the current MARC/AAACR model, but making substantial changes to the cataloging code. As Le Boeuf points out, this is not a job for the ILS vendors. "The impact of structural relationships on OPAC issues *must* be dealt with in cataloguing codes."[95]

The Broader Network Context

Leveraging existing systems, in combination with emerging Web services technologies that support automated query of systems and data sources, could meet some of these broader goals. Existing and emerging protocols, such as the Web-services-based Z39.50 ("Zing") or Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), as well as research being done at OCLC on bibliographic databases

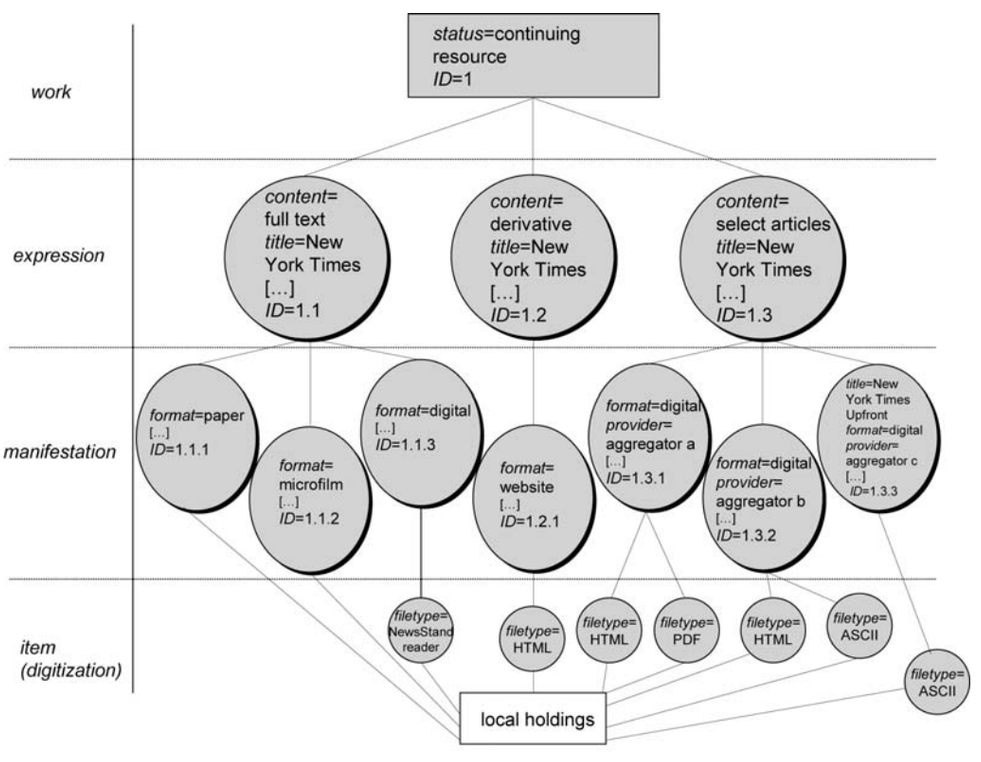

Figure 3. An example of a serial work within the FRBR model

and Web services, could also take advantage of a work identifier to achieve some of these goals.[96] The manifestation-level information in the ISSN database could potentially be FRBRized to create serial families or even a work-level identifier in much the same way that OCLC's experimental xISBN service collects individual records associated with a given ISBN to represent a work.[97] The ISSN Network has already piloted ISSN resolution services based on their metadata store. Because the Web URN infrastructure is not yet in place, a browser plug-in is needed, but the service is being built to use the URN framework. This direction has been made more promising with the arrival of a draft specification for an "info" universal resource identifier (URI) scheme, which would allow existing (legacy) identifiers to be coded using standard syntax that makes them usable by Web applications (for example, info:issn/03624331).[98]

Modeling uses of a work identifier in ways that would be helpful to users is important. Because our users are familiar and comfortable with the Internet, this means working within the framework of existing Web technologies and standards. We also should heed Cover's advice and not be "seduced or coerced into modeling parts of a problem domain in ways that are not natural or well-matched to the user's conceptual model of the problem space."[99] One such pitfall would be to limit our field of vision to the bibliographic record for the journal in isolation from the articles themselves and their lifecycle, the nature of which is changing as evolving scholarly communication practices provide user access to unpublished works and alternative sources for published works. In many ways, the simultaneous availability on the network of preprints, postprints, and publisher versions of articles parallels the availability within libraries of multiple versions of a given journal. The current world of networked information also should prompt us to take a broader view of the bibliographic record. Duke wrote of the "tripartite structure of the record," consisting of the document surrogate (the traditional bibliographic record), the document guide (a record enriched with content), and the document text itself.[100] Referencing the intellectual content of the work rather than, for instance, an authority record describing that work will support systems that could use the bibliographic and additional content information to provide the user with the context necessary to select the desired copy.

In the era of networked information resources, a library user's finding need extends beyond the domain of a catalog that represents a given library's collection. Catalogs, and by extension our collections, are underutilized as long as they exist only as self-contained systems that do not interoperate with nonlibrary systems and that require substantial understanding of arcane bibliographic practices. One conceptual model of the digital library is a distributed service. If digital library collections were made accessible via emerging Web services technology and supported actionable bibliographic identifiers, the valuable ontologies that libraries have developed and that are embodied in our authority files could be leveraged to advance the goals of the Semantic Web. We can take the lead from the development of the OpenURL and the OAI-PMH in two respects: first, in recognizing the importance of providing simple, easy-to-implement models to exchange bibliographic data on the network; and second, in prompting us to envision new user services that take advantage of explicit relationships between bibliographic works; for instance, to connect users with full text or additional information about a work or author.[101]

New York Times, 1851-present

Full Text online:
New York Times (via NewsStand)
2001- present *format*: NewsStand viewer

Selected Articles online:
New York Times (via aggregator x)
1999- present *formats*: PDF, HTML
New York Times (via aggregator y)
2002- present *formats*: HTML, ASCII
New York Times Upfront (via aggregator z)
1980- present *format*: ASCII
New York Times on the Web
past week *format*: HTML

Paper and Other Formats:
New York Times
latest 6 months *location*: Current Periodicals

New York Times
1851-2003
AN2 .N49 *location*: Microforms

Figure 4. Sample public catalog display of a serial work

Conclusion

The current catalog favors Lubetzky's first objective, finding a known item, over the second, finding works. If our catalogs are to become more work-based, we must revisit the question of what is meant by work for all bibliographic entities. Study of the bibliographic work has not yet confronted the challenge of conceptualizing and defining a serial work. The serial work is a bibliographic construct, a misfit in models such as FRBR, which strive for theoretical consistency across material types. Our current catalogs and Web title lists confuse users with multiple versions of the same serial, multiple access points to those titles, and absent statements about each version's important attributes. In order to make our bibliographic data valuable to scholars and others who seek works, asserting bibliographic control over a higher level of abstraction than has been our practice is necessary. We need to put a greater

emphasis on relationships between abstract entities and less on identification of the physical item. We need to better manage changes over time. The mutability we are accustomed to seeing in print serial titles we now also see in content, location, file format, holdings, and other attributes of online publications. If one accepts the proposition that value exists in controlling the serial at an abstract level and rejects the status quo premise that the "frail reed" of the serial title—or uniform title—can identify a serial work, other conceptual models, such as a modified bibliographic family, can be used in conjunction with FRBR to support a conception of a serial work.

In a networked information environment where the full-text item is a click away, links and hooks that increase access are relatively more important than description. Those links can only be supported by nonsemantic, nontextual identifiers for bibliographic works across domains. A number of such identifiers exist or are on the horizon, but they bring with them a very different model of bibliographic description than that held by librarians. Differently defined bibliographic entities, relationships between entities, and rules for assigning identifiers introduce a degree of ambiguity that poses significant challenges to library use of these metadata and identifier systems. Library catalogs describe and need to be able to refer to both intellectual works and manifestations of those works. They cannot, in an ad hoc way, describe one level and not another.

At this fluid time, we must continue to experiment, to whatever extent we can within the significant constraints we face, while focusing on the goal of improving the quality of bibliographic information we present to users. Bibliographic systems require persistence in human, not Internet, time. Library collections and, by extension, the bibliographic apparatus that supports them persist thanks to institutional commitment. This commitment is ultimately earned only through continued demonstration of value to library users.

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A Circulation Analysis of Print Books and E-Books in an Academic Research Library

Justin Littman and Lynn Silipigni Connaway

In order for collection development librarians to justify the adoption of electronic books (e-books), they need to determine if e-books satisfy the information needs of patrons. One method to determine this is to measure e-book usage. This study compared the usage of 7,880 titles that were available in both print and e-book format at the Duke University Libraries. Although the results of this study cannot be generalized, it does provide information on the use of e-books in one academic research library and implications for e-book collection development.

Over the past several years, a large number of libraries have begun to offer electronic books (e-books) to their patrons.[1] The e-books provided to patrons are generally digital versions of books that also appear in print. They provide the same content as the print books, but are delivered in a different format. E-books offer a number of advantages over their print counterparts for both the patron and the library. For the patron, e-books offer 24/7 availability, remote access outside the physical library, full-text searching, and copying and pasting of text and images. For the library, e-books require no shelf space or reshelving, and are never lost, damaged, stolen, or overdue.

Despite these advantages, e-books still must prove their value to collection development librarians in one key respect—do patrons use them? Understanding whether patrons use e-books is important because collection development librarians generally take the usage of materials in the collection as an indication that the library is satisfying patron information needs. Thus, a complete assessment of the value of e-books in libraries requires examining the usage of e-books. However, evaluation of e-book usage is most likely to be useful when placed in the context of print book use, as print book usage provides something against which to measure e-book use. Comparing print book and e-book usage is appropriate when they provide the same content in both formats, particularly because librarians are increasingly faced with deciding whether to supplement or supplant new print book purchases with e-book purchases.

Assuming the data indicate that patrons do use e-books, then integrating them into a library's collection development strategy requires understanding how they are used relative to their print counterparts. Relevant questions for collection development include: Are the same titles used in e-book format as in print? Does the overlap in usage vary by subject, or is it consistent across all subjects? Does the availability of e-books affect the use of print books? Addressing these questions about the use of e-books and print books will suggest implications for e-book collection development.

Justin Littman (jlit@loc.gov) is Information Technology Specialist, Office of Strategic Initiatives, Library of Congress, and formerly Systems Analyst, netLibrary, a division of OCLC Online Computer Library Center, Inc. **Lynn Silipigni Connaway** (connawal@oclc.org) is Consulting Research Scientist III, Office of Research, OCLC Online Computer Library Center, Inc., and formerly Vice President, Research and Library Services, netLibrary, a division of OCLC Online Computer Library Center, Inc.

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The purpose of this study was to perform a circulation analysis of e-book and print versions of the same titles at an academic research library. For example, the hardcover version of MIT Press's *The Radiance of France* is compared against the e-book version of *The Radiance of France*. This study analyzed the use of netLibrary e-books and print books by the patrons of Duke University Libraries during an average study period of sixteen months per title. Duke University Libraries is an academic research library housing 4.5 million volumes and serving approximately 10,800 undergraduate and graduate students. Since 2001, Duke University Libraries has been offering e-books to patrons using the services of netLibrary, a division of OCLC Online Computer Library Center. At the time of this study, the netLibrary is an e-book service provider that serves the institutional market. At the time of this study, the netLibrary collection of e-books contained approximately 50,000 titles from more than 300 publishers. Individual institutions or consortia purchase e-books from netLibrary. netLibrary hosts the e-books on behalf of the institutions, making them available to those institutions' patrons.

Previous Research

Circulation analysis is one of the traditional approaches taken to use studies and collection evaluation in libraries.[2] The results of circulation analyses have been applied to a number of important issues, including evaluating collection acquisition policies, guiding such management decisions as allocating physical space for materials, identifying materials for offsite storage, allocating funding for materials, and suggesting approaches to deselection.[3]

In the past, libraries collected circulation data by manually harvesting the circulation history from a book card or date label from a sample of books. The advent of library automation systems greatly simplified data collection.[4] In these studies, a circulation represents an instance of a patron checking out a book for use outside the library. Circulations are generally for several weeks, but circulations can last several months in academic libraries. Two methods have been used to measure circulations: the length of time since last circulation and the frequency of circulation.[5]

Circulation analysis assumes that the circulation of materials in a collection is an indicator of a library's effectiveness.[6] Or, as Wiemers Jr. et al. explain, high usage indicates that a collection is "good" since circulation is taken as evidence that a patron's need is being met.[7] In addition, practical applications of the results of circulation analyses assume that historical usage can be used to predict future usage.[8]

One important weakness of circulation studies, as noted by Lancaster and Summerfield, Mandel, and Kantor, is that the methodology only reflects external circulations.[9] That is, these studies do not account for in-library use of materials that does not result in a circulation. In comparing the circulation of print books and e-books, the California State University Electronic Access to Information Resources Committee and e-Book Coordinating Team accounted for in-library use of print books by determining the ratio of print book circulations to print books that were reshelved after in-library use.[10] In the case of Henry Madden Library of Fresno State University, they found 1.03 in-library reshelvings for every circulation, prompting a doubling of print circulations to account for in-library use. However, since no widely accepted method for accounting for in-library use exists, in-library use is not corrected for in this study and represents a shortcoming in the methodology.

Circulation analysis generally is used to compare usage based on such variables as material age and subject area. Circulation analysis studies generally do not involve comparison of materials based on differences in formats—in particular, print versus electronic formats—as is being done in this study. An example of a study that does compare print and electronic formats is a 1998–2000 longitudinal study performed by Rogers at Ohio State University.[11] The Rogers study used a survey to gather data on the frequency of use of print journals and electronic journals. The study only looked at journal usage in the aggregate, rather than the relative usage of individual journal titles (for example, the use of *College and Research Libraries* in print against its use in electronic format). Rogers concluded that electronic journal usage had increased, while print journal usage decreased. By the end of the study period, usage of both formats was roughly equal.

Several recent studies have compared usage of print and e-book versions of the same title. They use the traditional measure of circulations for print usage, and they use the measure of accesses for e-book usage. In general, an access is a single episode of a patron viewing an e-book.

One of the most comprehensive studies was the Columbia University Online Books Evaluation Project. As part of the study, 105 nonreference e-books and six reference e-books that were available in print format were made available to Columbia University patrons.[12] (Not all of the titles were available in e-book format for the entire four-year study.) Data were collected on circulations of the print books and accesses of the e-books between winter 1995 and autumn 1999. Summerfield, Mandel, and Kantor concluded that for both the reference and nonreference titles, the e-books were used more than the print versions of the same titles. For example, "In spring 1999, nearly three times as many scholars clicked on the average online monograph book as circulated its print version."[13] While the Columbia University Online Books Evaluation Project covered a longer time period for some titles, the number of titles was much smaller than in the current study.

Four recent studies have been performed at the California State University Libraries, the University of Rochester, the University of Pittsburgh, and Wayne State University using data for netLibrary e-books. The netLibrary collection is a unique candidate for study because it is the largest collection of recent scholarly e-books available, with usage data from more libraries and covering a longer period of time than is obtainable from other e-book service providers.

The most comprehensive study using data for netLibrary e-books was completed by the California State University Libraries Electronic Access to Information Resources Committee and Coordinating Team.[14] The Coordinating Team determined that 897 (60.1 percent) of the 1,492 e-book titles in the study were also available in print. In 2001, these print titles circulated 741 times. Between March 2001 and December 2001, e-books were accessed 1,039 times, which was annualized to 1,385 e-book accesses. By dividing the total number of accesses and circulations by the study set size, the e-Book coordinating team concluded that e-books had a 92.8 percent usage rate, whereas print books had a nearly identical usage rate of 92.4 percent, leading them to conclude that "the primary finding of this study is that when titles were available in both electronic and print formats, both formats were used."[15] The e-Book coordinating team noted:

> . . . the Fresno campus has traditionally been print-oriented. Since the eBooks are not only new to the Fresno community but a new concept for most members of that community, there may be a lag time between introduction of the resources and their use. As more members of the community become familiar with eBooks, their rate of use is likely to rise.[16]

However, the e-Book coordinating team also noted that given the incongruity between e-book accesses and print book circulations, "the use of eBooks is most likely over-represented and the use of print books is under-represented," and "in-house use raises the use level of the print books beyond that of the eBooks."[17]

The e-Book coordinating team's study has several weaknesses. First, the study set includes all e-books that were available to Fresno patrons, not just e-books that were available in both print and e-book. Since a committee representing the entire California State University library system selected the e-book collection, it is likely to contain titles that are not appropriate for Fresno patrons (and hence are unlikely to be accessed by Fresno patrons). Second, concluding that e-books had a 92.8 percent usage rate and print books had a 92.4 percent usage rate is misleading. This suggests that 92.8 percent of e-book titles were accessed, and 92.4 percent of print books circulated. It is entirely possible, however, that the accesses and circulations were accounted for by a small number of titles. The appropriate conclusion is that e-books were accessed .928 times per title and print books were circulated .924 times per title. This weakens the justification for concluding that there was heavy use of both e-books and print books.

In a much smaller 2001 study of e-book usage, Gibbons found that of the ten netLibrary e-book titles most frequently accessed by University of Rochester patrons, the University of Rochester libraries only owned one of those titles in print.[18] This title circulated thirteen times over its lifetime in paper and was accessed 310 times in spring 2001 as an e-book.

Also in 2001, Connaway conducted a pilot study with the University of Pittsburgh using the same general methodology as the study repeated here.[19] During a four-month study period, each netLibrary e-book title was accessed 3.7 times on average, while each print book circulated 1.4 times on average. Thirty percent of e-book titles were accessed at least once, while 10 percent of print titles circulated. While demonstrating that a study comparing the usage of print and e-book versions of the same title could address some interesting questions, the short time frame of this pilot study prevents drawing strong conclusions.

Though not a circulation study, Sutton's recent report on Wayne State University Libraries' experience using netLibrary's Patron Driven Access (PDA) model for e-book acquisition has obvious implications for e-book collection development.[20] In the PDA model, a library's patrons have access to a large collection of e-books. However, the library only purchases e-book titles that have been accessed a certain number of times by the library's patrons. (This differs from the standard purchase model in which a library purchases copies of e-book titles prior to any patron use.) According to Sutton, during the study period e-book titles purchased via PDA averaged 4.12 accesses per title versus .43 accesses per title for traditionally selected e-books. In addition, collection development coordinators at Wayne State concluded that 92 percent of the e-book titles purchased via PDA were appropriate for the collection.

Method

The first step in this study was to match print books to e-books. MARC records for netLibrary e-books were extracted from the Duke University Libraries' online catalog. The Duke University Libraries' online catalog contained records for 14,398 e-books. Using Z39.50 queries against the catalog, e-book MARC records were matched with print book MARC records. Matches were made based on the International Standard Book Numbers (ISBNs) con-

tained in the 020$a subfield of the print book MARC records and the canceled ISBNs contained in the 020$z subfield of e-book MARC records. At the time of this study, cataloging practice for netLibrary e-books was to move the print book ISBN from 020$a to 020$z when creating an e-book MARC record from a print book MARC record. A small number of records were excluded when there was a single print book MARC record for a multivolume set, but there was a separate e-book record for each volume. In addition, records were excluded when the print record was added to the Duke University Libraries' online catalog after the corresponding e-book record was added. After exclusions, 7,880 e-book and print book matches were used in the study.

After print books and e-books were matched, the second step was to obtain usage data for the print books and e-books. Circulation statistics were extracted from log files from the Duke University Libraries' circulation system based on the local control number in the 001 field of the print book MARC records. Access statistics were extracted from netLibrary's usage tracking system based on the netLibrary book identifier in the 035 field of the e-book MARC records. The measure of usage for netLibrary e-books is an "access." In the netLibrary system, an access takes two forms. First is a "browse," in which an e-book is in circulation as long as the patron is using the e-book. Once the patron stops using the e-book, it becomes available to another patron. Second is a "checkout," in which an e-book is in circulation to a patron for a designated period of time. Compared to typical print book circulation periods, both browses and checkouts are for relatively short periods of time—from minutes to several days.

Once access statistics were extracted, the third step was to perform an analysis on the usage data. Previous studies involved a direct comparison of the frequency of print circulations and e-book accesses. While in some ways similar measures, print circulations and e-book accesses are also fairly incongruous. Circulations tend to cover long periods of time, whereas accesses cover short periods of time.[21] In a single print circulation, a patron may use that book multiple times, whereas comparable use of a netLibrary e-book might involve multiple browses or checkouts. Also, e-book accesses include use both inside and outside the library, whereas circulations include only external use. Given these considerations and the relatively short time frame of the study period, this study adopted a different method from earlier studies by comparing whether e-books or print books had circulated or been accessed during the study period rather than the frequency of circulations and accesses.[22] The study period was defined as the period between the e-book MARC record being added to the Duke University Libraries' online catalog and August 2002. Thus, each title had a different study period. The first records were added in February 2001, though the average study period was sixteen months. This method partly, though not entirely, accounted for the incongruity between print circulations and e-book accesses.

To analyze usage by subject area, each title was assigned to one of thirty subject categories based on its Dewey Decimal classification. Subject areas include literature, philosophy, psychology, computers, arts, technology, engineering, and manufacturing. This approach was used to identify accesses of both the print books and the e-books by subject areas.

To analyze the effect of the availability of e-books on print book circulation, the circulation of print titles was compared for the year prior to the availability of the e-book against the year following the availability of the e-book. This was accomplished by identifying the set of print books that were available for at least one year prior to the addition of the corresponding e-book's MARC record to the Duke University Libraries' online catalog. This data set included 7,456 print books. Comparisons were then performed between the circulations in the year prior to the addition of the e-book MARC record and the circulations in the year after the addition of the e-book MARC record.

Results

Of the 7,880 titles that were available in print and e-book, 3,158 e-book titles were accessed and 2,799 print titles were circulated during the study period. In print and e-book format, 1,688 titles were used. In e-book format, but not in print, 1,484 titles were used. In print, but not e-book format, 1,125 titles were used. In either format, 3,597 titles were unused. The results for the titles that were used in either format are represented in figure 1.

Though not appropriate for direct comparison for the reasons given earlier, total and average circulations and accesses were computed. During the study period, print

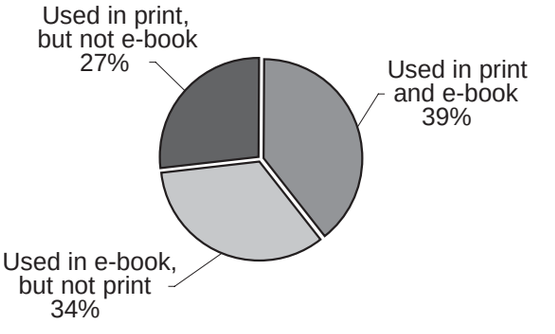

Figure 1. Titles used in print or e-book format

books circulated 6,998 times, averaging 0.88 circulations per print title or 2.48 circulations per print title that circulated. E-books were accessed 10,821 times, averaging 1.37 accesses per title or 3.43 accesses per e-book title that circulated.

Results by subject were computed in two different ways. First, for each of the top subjects represented in the study set, the percentage of the titles in the overall study set by subject, the percentage of the titles used in e-book by subject, and the percentage of the titles used in print by subject were determined. These results are given in table 1.

Second, for each of the top subjects represented in the study set, the percentage of the titles in that subject used in e-book and the percentage of the titles in that subject used in print were determined. These results are given in table 2.

Results also were computed to permit the evaluation of the impact of the availability of e-books on the circulation of print books. There were 6,139 circulations of print books in the year prior to the introduction of the e-book. This decreased to 4,738 circulations of print books in the year after the introduction of the e-book. This represents a decline of 22 percent in print circulations. By contrast, total circulations at Duke University Libraries increased by 5.2 percent between the 2000–2001 academic year and the 2002–2003 academic year.[23]

Of the 7,490 print titles available in the year prior to the introduction of the e-book, 1,571 titles circulated in the year before and the year after the introduction of the e-book. In the year before, but not the year after the introduction of the e-book, 1,149 titles circulated. In the year after, but not the year before the introduction of the e-book, 820 titles circulated, and 3,932 titles did not circulate in the year before or the year after the introduction of the e-book. The results for titles that did circulate are represented in figure 2.

Table 1. Results by subject as percentage of study set (N=7,880)

Subject	% of titles in study set	% of titles used in e-book	% of titles used in print
Social Sciences: General	16	17	18
Business, Economics and Management	16	15	14
Literature	13	11	13
History: World and General	7	7	7
Philosophy	6	6	6
Religion	5	6	6
History: United States	4	3	3
Political Science	4	4	5
Arts	4	4	4
Education	4	4	3
Medicine	3	4	4
Law	3	2	2
Psychology	2	2	2
Computers	2	3	2
Other subjects	12	11	9

Table 2. Results by subject as percentage of subject (N=7,880)

Subject	% of titles used in e-book	% of titles used in print
Social Sciences: General	42	40
Business, Economics and Management	36	31
Literature	36	36
History: World and General	41	38
Philosophy	39	34
Religion	46	43
History: United States	27	28
Political Science	43	43
Arts	46	42
Education	38	31
Medicine	51	42
Law	34	34
Psychology	57	49
Computers	66	53

Discussion

Based on this method of evaluation, e-books received 11 percent more use than comparable print books. Given their recent introduction to patrons at Duke, this suggests rapid growth in the adoption of e-books. The high usage of e-books relative to comparable print books at Duke supports the general findings of the Columbia University Online Books Evaluation Project study, the Gibbons study, and the Connaway study, which found heavier usage for e-books. In addition, the popularity of e-books may increase as patrons become more familiar with e-books and as Duke Libraries expand the collection of e-books available to patrons. Note, however, that any conclusions reached from this study should be tempered by taking into account the incongruity

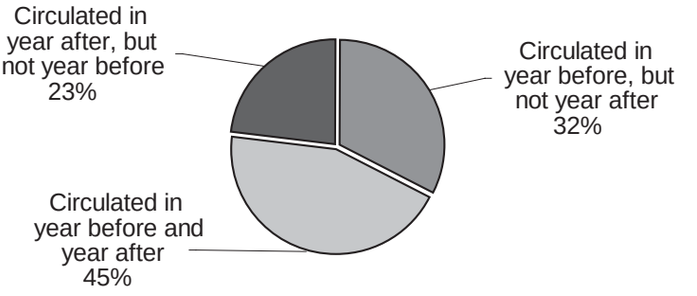

Figure 2. Circulating print titles, before and after introduction of e-book titles

between print circulations and e-book accesses previously discussed.

The titles that circulated in print overlap somewhat with the titles accessed in e-book format. Of the titles that were used in print or e-book, 39 percent were used in both formats. Thirty-four percent were used in e-book only, and 27 percent were used in print only, suggesting that some patrons may be using e-books and print books for different purposes; for example, an e-book for quick reference but a print book for intensive reading.

A fair amount of overlap also occurred between the titles that did not circulate in print and were not accessed in e-book format. Seventy-one percent of titles that did not circulate in print were not accessed in e-book format. This suggests that the same titles that were unpopular in print were also unpopular in e-book format.

While initially the high rate of titles not used in print (64 percent) and e-book format (60 percent) might seem alarming, one should remember that this study covers a short time frame. If this study was conducted over a time frame of at least several years, these rates can be expected to drop substantially.

When analyzed by subject, both e-books and print books were used relatively in proportion to their subject representation in the entire study set. So, for example, business, economics, and management represented 16 percent of the entire study set, 15 percent of the titles used in e-book, and 14 percent of the titles used in print. This suggests that from a subject standpoint, the study set was well suited for the information needs of Duke's patrons since no subject received significantly more or less use than its representation in the collection. It also suggests that patron e-book usage may be dictated by the availability in electronic format of titles and subject areas.

This study indicates that most of the top subjects (social sciences, business, and literature) were used approximately as much in print as in e-book format. Titles in education, medicine, psychology, and computers were used more in e-book format than in print. An e-book collection development strategy that focused on these subjects of higher usage may provide maximum benefit.

Anecdotal evidence suggests that the availability of e-books increases the usage of print books, since some patrons use e-books for "sampling" prior to acquiring the print book.[24] Similarly, the National Academy Press claims that making its e-books freely available has driven print sales.[25] This study suggests that the availability of e-books leads to a decrease in the usage of print books. One likely explanation for this trend may be that e-books are satisfying the information needs of patrons, in some cases obviating the need to utilize the print book. Other possible explanations for this trend include the continued aging of the print collection or a general decrease in print circulations. One implication of this trend is that collection development librarians consider e-books for additional copies when the existing print copies receive heavy usage.

Conclusion

If, as was suggested earlier, proving the value of e-books requires demonstrating that patrons use e-books, then the preliminary evidence provided in this study suggests that e-books do provide value. Despite the recent introduction of e-books at Duke University Libraries, the use of e-books is already substantial relative to their print counterparts. Although this could be attributed to the incongruity between print circulations and e-book accesses, expanding the size and prominence of e-book collections in academic research libraries seems justified, combined with continuing study and usage comparison of the two formats.

In addition to demonstrating the usage of e-books, this study suggests some approaches to e-book collection development. Attention should be paid to titles that particularly benefit from additional functionality offered by an electronic format, such as reference books. In certain subject areas, such as the social sciences, e-books may provide more benefit (assuming usage is an indicator of benefit) than other subject areas. Lastly, e-books are excellent candidates for additional copy purchases when print copies of titles are receiving heavy use.

Generalizing the conclusions of this study requires performing e-book circulation studies in other comparable academic research libraries, in other types of libraries (such as small academic libraries and public libraries), for longer time frames, and with different types of e-book content (such as trade content). As librarians continue to acquire e-books, circulation analyses will become increasingly important to identify a more complete understanding of e-book usage patterns. Collection development librarians also can use these data to create e-book collection strategies and policies that better meet user needs.

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Surveying the Stacks

Collecting Data and Analyzing Results with SPSS

Mary Ellen Starmer and Dea Miller Rice

In fall 2002, the University of Tennessee Preservation Office conducted a condition survey of circulating materials in the school's John C. Hodges main library. The objective of the collection condition survey was to evaluate the physical condition of the collection and the effect of human and environmental factors in order to develop a long-range preservation plan. The project used a random sampling method, and a database and online survey form created with SPSS software. The results of the survey contribute an understanding of the national preservation picture. Locally, the results indicate action should be taken in several areas, including environmental conditions, staff and patron education, and reformatting. Other libraries in the early stages of establishing a preservation program can employ the techniques used in Hodges Library to develop their own preservation plans.

Over the last twenty-five years, the challenges of preserving libraries' collections have been well documented, and techniques for preserving library materials have been put to the test, improved, and shared with librarians around the world. In major university libraries, preservation programs that once concentrated on binding and book repair operations have advanced to include state-of-the-art conservation facilities and digital reformatting expertise. Those involved with preservation in the last two decades developed techniques and solutions for dealing with everything from torn pages to brittle books. Preservation professionals can prevent many types of damage and apply treatments with confidence, but the resources to do everything needed are seldom available. Therefore, libraries have developed long-range preservation plans with strategies for identifying and organizing priorities. As Matthews states, "Preservation activity needs to be planned and managed like any other library activity."[1] A collection condition survey is a logical and relevant starting point for preservation planning in any library. Walker writes, "A condition survey of the collections will provide the most significant information relative to the development of a preservation program."[2] Although large libraries have led the way in developing condition surveys, such studies have become feasible even for small libraries. New technologies have increased the flexibility of the traditional process for surveying collection condition.

In the 1970s and early 1980s, several libraries with pioneering preservation programs conducted surveys of their collections in an attempt to determine the overall condition of those collections and to prioritize preservation problems. In 1979, Stanford University conducted a landmark study of the Green Library, which determined that 32.8 percent of its collection was in good condition, 40.8 percent was in moderate condition, and 26.5 percent was in poor condition.[3] For this survey, Stanford developed a methodology that could be applied elsewhere, and that has proven useful to other libraries. The following year, Yale began a large-scale, comprehensive survey of its collections. The Yale survey found 82.6

Mary Ellen Starmer (starmer@utk.edu) is Preservation Coordinator and Assistant Professor, University of Tennessee. Dea Miller Rice (dmiller3@utk.edu) is a graduate student, University of Tennessee.

percent of the collection to be acidic; however, only 12.8 percent of the collection was found to need immediate attention.[4] A few years later, a Syracuse University Libraries survey revealed a similar percentage of acidic volumes, finding 87 percent of the collections to be acidic.[5]

Libraries continue to adapt and build upon the methodologies developed in these early collection condition surveys. In 1996, the University of Kansas Libraries conducted a survey using methodologies similar to the Yale and Stanford surveys, incorporating modern computer software technology for collecting and analyzing the data.[6] Some libraries, such as the University of Illinois at Urbana-Champaign, have completed two collection condition surveys of the same collection, comparing the results of the first survey to a second set of data collected several years later. The results of the second survey at the University of Illinois at Urbana-Champaign provided insights into the consequences of deferred collections care.[7] At the conclusion of these and other surveys, the researchers often shared their methodology, results, and conclusions through published articles.

An important benefit of publishing collection condition survey results is that the information gives other preservationists the opportunity to compare the outcome to their own institution, an exercise that both validates local results and highlights telling differences among institutions. In 1992, Nickerson published an article comparing surveys at Brigham Young, Yale, and Syracuse Universities.[8] Nickerson focused on pH and brittleness of the surveyed collections, finding some striking similarities and differences. While the acidity levels at the three collections are quite similar, Brigham Young University found far fewer brittle materials in its survey, leading Nickerson to surmise environmental factors were very different for the collections in the three institutions. Nickerson also observed that comparing data across institutions is difficult when different protocols are employed. Yet, sharing the information with colleagues at other institutions is an important contribution to the advancement of preservation. Each new study includes additional aspects, such as the use of computer hardware and software. Sharing new methodologies and information about the use of new software with colleagues is essential to the continued development of preservation practices. Often, specifics about methodologies are what other libraries need when beginning to develop their own surveys. In his recently published book, Baird described a methodology for collection condition assessments in small academic and public libraries.[9] Such publications provide important practical direction.

The University of Tennessee

The University of Tennessee conducted a collection condition survey in 2002 as the basis for developing a long-range preservation plan. Results of the study have contributed to determining strategic priorities. The University of Tennessee has a graduate and undergraduate population of approximately 27,000 students. The library holds a mid-sized research collection of approximately 2.2 million volumes. While the surveys at Stanford, Yale, and Kansas were being conducted, the University of Tennessee preservation program was in its infancy. Similar to the University of Illinois experience described by Teper and Atkins, the University of Tennessee Libraries made attempts to lay the groundwork for a centralized preservation program throughout the 1980s and 1990s.[10] Committees in the library conducted studies, initiated a disaster preparedness program, and developed a preservation plan, yet the preservation program made little progress in fifteen years. A binding unit had been in place for decades and continued to operate throughout that time. The library started a minor book repair program in the mid-1990s, but structured preservation took a backseat to other library initiatives. Little progress was made until 2000, when the library hired its first preservation librarian with a mandate to develop a coordinated preservation program. Although Tennessee's preservation program began years after those at Yale and Stanford, published collection condition survey results were helpful in planning and developing a local study.

The Preservation Office of the University of Tennessee Libraries surveyed the circulating materials in the stacks of the John C. Hodges Library, the campus main library, in the fall of 2002. The survey team consisted of the preservation librarian, an information sciences graduate student, two full-time preservation staff, and three undergraduate student assistants. All participants in the survey team were experienced in conservation work. Once underway, the survey took approximately two months to complete, running from October through November 2002. During each phase of the project, the survey team consulted with the Preservation Advisory Group (a committee of library faculty and staff who help establish priorities for the preservation program) to set and meet the survey's objectives. The primary objective was to evaluate the physical condition of the library's holdings and the effect of environmental and human factors on the collection. A secondary objective was to develop a methodology that could be used to repeat the survey at the branch libraries. The results of the survey are being used to develop and implement a long-range preservation plan for the library.

Hypotheses

Before beginning the study, the surveyors had some general expectations about what the results would be, based on personal experience and anecdotal evidence. A major consideration was the architectural design of the library.

Hodges Library was built in 1987 with little design consideration given to the preservation of the materials it would house. Hodges Library is an unusual structure of modern design, and the building floor plan reflects greater emphasis on esthetics than on function. Designed in a geometric series of open terraces, the building has fifty-three flat roofs and a labyrinthine stacks layout. Flat roofs collect more water than pitched roofs, and leakage is a recurrent problem throughout the building. Heavily used study areas, shelves, walkways, and windows compete for space in the stacks. Large tables that students use for studying and socializing are adjacent to some bookshelves. The survey team observed that materials facing walkways exhibited increased wear and stacks were subjected to litter and contained misshelved volumes. Four hundred and fifty windows in the stacks allow ample natural light to penetrate the interior. While pleasant for people, the ultraviolet (UV) light from the sun is very damaging to library materials.[11] There are no UV filters or covers on the windows in the stacks, and no buffer area exists between the windows and the shelving. Considering the numerous windows in the library's stacks, the survey team expected to find a high rate of UV-damaged volumes.

The survey team and library employees alike had noticed a large number of volumes in the stacks were shelved poorly. Limited numbers of circulation staff cannot keep all of the books shelved neatly and correctly; some heavily used sections of the stacks have a reputation for being in constant disarray. The surveyors, therefore, hypothesized that a high percentage of volumes would be out of order or shelved improperly. Another general belief held by the surveyors was that a high number of books would have pictures and pages cut out, especially in the photography and art sections. Every library struggles with this dilemma, and the surveyors hypothesized that a high number of volumes would be deliberately mutilated.

The surveyors also had assumptions about environmental damage in addition to UV. Because the library has devoted very little time in recent years to dusting or vacuuming the books in the stacks, the group expected a high number of books with considerable dust. Despite the flat roofs, the survey team anticipated relatively little water damage or mold. Everyone in the library, especially the stacks and maintenance crews, is extremely vigilant in protecting the materials and bringing out rolls of plastic sheeting when the library's collections are threatened. When books are water-damaged, which is surprisingly seldom, they are usually found and treated or replaced immediately, leaving little time for mold to grow.

Connecting the issues of shelving and environment, the group wondered if any correlation would be seen among shelf height, environment, and incorrect shelving. The group hypothesized that books on the bottom and top shelves would be more likely to have environmental damage, be poorly shelved, or both.

Methodology and Procedures

The collection to be assessed consisted of 1,594,652 volumes, the entire circulating collection in Hodges, including bound periodicals, serials, and monographs. With the assistance of a systems librarian and a university statistician, the survey team determined that a survey of 700 volumes would provide a statistically significant sample. The team discussed two methodologies for selecting a random sample from the stacks. The first option was to count ranges, shelves, and books in the stacks, essentially pulling every nth book. The second option was to draw a random sample from the catalog. Because the time required to count books in the stacks would have been formidable, the surveyors selected the second option. A systems librarian generated a random sample of 700 volumes from the catalog's database. The survey group solved the potential problem of missing volumes by deciding to pull the book directly to the left of where the missing volume should be shelved, thus neutralizing the issue of whether a book was checked out, missing, or lost.

One initial concern when planning the survey was the choice of appropriate database software. The surveyors consulted the university's Statistical Consulting Center for advice on both survey methodology and survey form creation. The survey planners considered using Microsoft Access due to its availability and its use in similar surveys, but decided to use the Statistical Package for the Social Sciences (SPSS), a statistics and graphics software package designed for statistical research. The SPSS suite of survey design software better met the needs of the preservation survey with its advanced analysis capabilities and adaptability to online use. An important advantage of the SPSS software is the ability to control the accuracy of responses with a tool called "Rule Wizard," which can be set to prevent illogical answers and reduce mistakes. For example, Rule Wizard, as used in this survey, did not allow more than one digit to be entered in response to the shelf-height question or more than four digits for publication year. The form was designed to skip unnecessary questions based on responses to earlier questions. If a surveyor responded that the item was shelved correctly, the form skipped the question about *how* the item was incorrectly shelved. The survey form incorporated different types of response options based on appropriateness to the needed data. Questions for which more than one response was possible allowed the surveyor to check as many answers as applied, while questions for which only one response was needed permitted only one selection, a feature that reduced errors.

Surveyors could use any computer with Internet access to complete the form without having to download any

software. Another advantage of using an online form was that all the data entered was collected and stored centrally in a university computer server. Data gathered online was downloaded into SPSS for analysis of the results. Being able to access the survey online gave participants the option to carry a laptop with wireless Internet access into the stacks and enter findings as they located randomly designated books. Laptop use made the entire process more convenient for some of the survey team and circulation staff. Surveyors were not restricted to the Preservation Office hours of operation or computer availability, and circulation was not burdened with the sudden displacement of 700 volumes. Survey team members reshelved their target books after entering data. Transporting a laptop and survey implements through the stacks was more cumbersome than expected, but time constraints made it the only solution for some student surveyors who needed to access the form after the Preservation Office's business hours. However, many of the participants opted to load their assigned books onto a cart and return to the office and the relative comfort of a desktop computer, where they could use a mouse, barcode scanner, and number pad. Those who chose this option took notes about the location (such as shelf height, proximity to window) as they pulled the books.

Once the survey form was designed and online, three members of the survey team conducted a trial survey to identify and address problems with the procedures or the online form. A pilot sample of one hundred volumes was drawn from the catalog, and the surveyors entered the information for these volumes onto the form. Overall, the trial went smoothly, but it did alert the team to some issues. For example, a question regarding brittleness of the text block was inadvertently omitted from the form on the pilot survey. The test run allowed the surveyors to spot this problem and insert the question before the survey. The results from the pilot survey were erased from the database before the actual survey took place and were not included in the results.

When the pilot was completed, the survey leaders, a graduate student, and the preservation librarian held a training session for the rest of the survey team (two full-time preservation staff and three undergraduate student assistants). During the training session, the group completed the survey form together for several books that had been pulled from the stacks. In this way, the group developed a common understanding of the range of answers for each question and the specific meaning of the terms used in the survey form. The team developed two documents as a result of the training session. The first (appendix A) provided definitions of terms used on the survey form, with guidelines for potentially ambiguous questions. For example, a volume not completely perpendicular to the shelf constituted a book that was not shelved straight. The second document (appendix B) explained and defined condition rankings. Because the survey included a question about the overall condition of the volume, surveyors were to provide a ranking of excellent, good, fair, or poor for each volume. A list of potential problems indicated the highest ranking that a volume could receive if it had any one of those problems. For example, a volume with acidic paper could never be any higher than "good," although it could be lower if there were other problems such as a broken text block, brittle paper, or water damage.

Survey Results

Each surveyor entered data for the volumes surveyed into an SPSS template via the online form. Data sets showed responses to each question, such as number of volumes shelved correctly. The software also allowed crosstab queries to compare answers to two questions, such as percent of books shelved correctly on the top shelves. To prove or refute initial hypotheses, surveyors generated reports that included both numbers and percentages for each question, along with the results from some crosstab queries. Data addressed physical conditions, such as binding and paper quality, and environmental factors, such as UV or water damage, as well as human factors, including shelving conditions and mutilation. Tables in the following sections reflect the condition factors assessed for each question.

Shelving

The manner in which a book is shelved not only affects access to it, but also its longevity. When a volume is shelved too loosely or tightly, on its foredge or on its spine, damage to the binding will occur. As shown in table 1, the survey found that 21.6 percent of the volumes in the stacks were shelved incorrectly. While that percentage translates to 151 volumes with shelving problems, some of these volumes had multiple problems. Thus, table 1 shows 162 shelving problems found in a total of 151 volumes. A breakdown of the problems shows that 5.4 percent of the volumes were shelved in the wrong location, 0.1 percent of the volumes were shelved on their spines, 0.8 percent were shelved on their foredge, and 3.7 percent were shelved too tightly. The most striking finding was that 13 percent were not shelved straight. In spite of the strict survey guidelines that may have caused this result, it confirms the hypothesis about poorly shelved volumes, along with the need for more shelving staff and training for those staff.

Damage to Binding and Text Block

The condition of a volume's binding and text block is often the reason it needs preservation treatment. Broken text blocks, damaged spines, and loose hinges all indicate the type of treatment a book will require and the resources it

will take to repair. With empirical data about the collection, librarians can wisely calculate the resources needed for binding and repair operations. Table 2 illustrates that 41.1 percent of the volumes in the survey had damage to the binding or text block. Some of the damaged volumes can be fixed in-house, with varying levels of conservation repairs. Other volumes cannot be cost-effectively treated in-house and must either be sent to the commercial bindery or to a conservation center if the content is to be preserved.

Environmental Damage

An important component to any preservation program is environmental control, which is preventive in nature. Often environmental control is limited to monitoring the temperature and relative humidity in the building, but other factors, such as ultraviolet rays, dust, water damage, and pest infestations, also threaten library materials. According to the survey, 30.3 percent of the volumes have some environmental damage, including damage inflicted by ultraviolet light, dust, and water. See table 3 for analysis of environmental damage. The surveyors considered a book to have UV damage if all or part of the volume's covering was faded. Frequently surveyors recorded that the spine of the book was lighter than its sides or boards, and, in some instances, the dark outline of a bookend was evident when the rest of the book covering was faded.

Proving the surveyors' initial hypotheses about windows and dust in the stacks, the most prevalent type of damage was due to ultraviolet light, found in 18.1 percent of the volumes. UV damage was followed closely by dust, which was found on 16.4 percent of the volumes sampled. No instances of mold or insect damage were found. With the right precautions, such as vacuuming the stacks and purchasing ultraviolet light filters, these types of damage can be prevented, saving the library considerable time and expense in the future.

pH of Text Block and Brittleness

The pH level of the paper in a volume is perhaps the single most important factor in determining the condition of a volume. If the pH is acidic, the paper will deteriorate and become brittle over time, eventually becoming unusable.[12] Good environmental conditions, including safe, stable levels of temperature and relative humidity, and minimal ultraviolet light, can slow the deterioration rate, but if left untreated, the paper will still turn brittle. The data (table 4) show that 68 percent of the volumes in Hodges stacks are acidic and are either already brittle or doomed to become so if they not deacidified.

Even when deacidified, the process by which paper is made brittle cannot be reversed once it has taken place.

Table 1. Shelving

	No. of occurrences	% of sample (n=700)
Location incorrect	38	5.4
Not shelved straight	91	13.0
Shelved on spine	1	0.1
Shelved on fore-edge	6	0.8
Shelved too tightly	26	3.7
Total shelving problems	162	--
Total volumes with shelving problems*	151	21.6

*Because several volumes had more than one shelving problem, total volumes with shelving problems is less than total shelving problems.

Table 2. Damage to binding and text block

	No. of occurrences	% of sample (n=700)
Broken text block	50	7.1
Missing covers	0	0.0
Red-rot leather	6	0.9
Damaged spine	128	18.3
Loose hinge(s)	177	25.3
Damaged cover(s)	73	10.4
Missing pages (not mutilation)	1	0.1
Damaged pages (not mutilation)	37	5.3
Loose pages	17	2.4
Torn endsheets	40	5.7
Loose cover(s)	7	1.0
Total occurrences	536	--
Total volumes with damage*	288	41.1

*Because several volumes had more than one binding and text block problem, total volumes with binding and text block problems is less than total problems.

Table 3. Environmental damage

	No. of occurrences	% of sample (n=700)
Mold	0	0.0
Ultraviolet light	127	18.1
Dust	115	16.4
Insect	0	0.0
Water	15	2.1
Total occurrences	257	--
Total volumes with damage*	212	30.3

*Because several volumes had more than one form of environmental damage, total volumes with environmental damage is less than total volumes with damage.

Brittle volumes are very fragile and often unusable, and must be either reformatted (microfilmed, photocopied, or digitized) or replaced with reprints if the information they contain is to be available for future use. The surveys tested the paper for brittleness using the double-fold method, creasing the corner of a page four times. If the paper breaks before or at the last crease, it is considered brittle. Of the

volumes surveyed, 16.6 percent are already brittle (see table 4). As with the information about damage to the binding and text block, this data about pH levels and brittle paper will help the library prioritize resources for possible deacidification and reformatting projects.

Table 4. pH of text block and brittleness

	No. of occurrences	% of sample (n=700)
Acidic vols.	476	68.0
Brittle vols.	116	16.6

Patron Damage and Mutilation

In order to distinguish between normal wear and tear on volumes, the survey designers created a separate question for damage caused by users through deliberate mutilation, ignorance, or neglect. While some patron damage is deliberate and malicious, much of it is done by those who are unaware that they are creating any damage or that the damage they are causing is time-consuming and expensive to fix. The data collected with this question (see table 5) will assist the library in determining what should be emphasized in user education programs. The types of damage and mutilation included in the questionnaire were pencil, ink, highlighter markings, paper clips, dog-ears, post-it notes, bookmarks or other papers left in the volume, pages torn or cut out, apparent animal damage, food or drink stains, and adhesive damage. Pencil markings ranked the highest (12.9 percent) of these in the results, followed by ink (8.1 percent). Perhaps the biggest surprise in this category for the surveyors was the low rate of deliberately torn or removed pages. Only one volume in the sample was recorded as having deliberately mutilated pages.

Table 5. Patron damage and mutilation

	No. of occurrences	% of sample (n=700)
Pencil	90	12.9
Ink	57	8.1
Highlighter	17	2.4
Paper clips	5	0.7
Dog-ears	47	6.7
Post-it notes	2	0.3
Bookmarks and other papers	21	3.0
Pages torn or removed	8	1.1
Animal damage	1	0.1
Food or drink stains	28	4.0
Adhesive	12	1.7
Other	17	2.4
Total patron damages	305	
Total volumes with patron damage*	182	26.0

*Because several volumes had more than one type of damage or mutilation, total volumes with damage and mutilation is less than total damage and mutilation problems.

Correct Shelving and Shelf Number

Using a crosstab query, the results of the survey were analyzed to compare shelving conditions and the shelf height. When pulling the sample volumes off the shelf during the survey, the surveyors noted the shelf height, with shelf number one being the bottom shelf and number nine the top shelf. During the analysis, the shelves were grouped together; table 6 shows that the uppermost shelves are more likely to be incorrectly shelved than the middle and lower shelves. Of the volumes on the bottom two shelves, 21 percent were shelved incorrectly, and similarly, 18.5 percent were shelved incorrectly on the middle three shelves. However, 29.2 percent of the volumes on the top three shelves were incorrectly shelved, a significant difference showing that the harder to reach shelves are more likely to be in disarray and need more attention from shelvers. This data support the original hypothesis that a correlation may exist between shelf height and the condition of the shelving. This finding will be helpful in training shelving staff.

Table 6. Incorrect shelving and shelf number

Shelf no.	Total volumes on shelves	No. Incorrect	% Incorrect
Shelves 1–2*	157	33	21.0
Shelves 3–6	389	72	18.5
Shelves 7–9	154	45	29.2

* Shelves 1–2 are the lowest two shelves.

Environmental Damage and Shelf Height

Shelf numbers were compared to the environmental damage (see table 7). The survey found no significant environmental damage difference among the shelf heights, arguing against the hypothesis that the shelf height may be a contributing factor to environmental damage. This may negate concerns about ultraviolet light damage from the ceiling lighting, but more investigation is required.

Overall Condition

One of the last questions on the survey form asked about the overall condition of the volume. One of four categories was checked for each volume, and the rankings were based on the condition rankings guidelines found in appendix B. Results are presented in table 8. "Good" was the most common condition, with 48.6 percent of the volumes. The sec-

Table 7. Environmental damage and shelf number

Shelf no.	Total volumes on shelves	No. damaged	% damaged
Shelves 1–2*	157	50	31.8
Shelves 3–6	389	115	29.5
Shelves 7–9	154	47	30.5

* Shelves 1–2 are the lowest two shelves.

Table 8. Overall condition of volume

	No. of volumes	% of sample (n=700)
Excellent	193	27.5
Good	340	48.6
Fair	118	16.9
Poor	49	7.0

ond highest ranking was "excellent," followed by "fair," and then "poor."

Discussion

Overall, the results of the survey support many of the initial hypotheses. A high percentage of volumes have UV light damage: 18.1 percent of the volumes showed damage from UV light, a very large number when compared to the data from the Yale survey, in which only 3.9 percent of the volumes had any environmental damage at all.[13] The data from Hodges also showed that 16.4 percent of the collection was dusty, a number that reinforces the hypothesis that a significant percentage of the volumes in the stacks were dusty. Another hypothesis (low occurrence of water damage and mold) received confirmation in the survey. A mere 2.1 percent of the volumes surveyed were damaged by water, and no volumes had any sign of mold. The hypothesis that shelf height and shelving condition were correlated was also supported by the data. While 78.6 percent of all volumes were shelved correctly, only 70.8 percent of the volumes on the top three shelves were shelved correctly. The middle four shelves ranked the best, with 81.5 percent shelved correctly, and 79.0 percent of the volumes on the bottom two shelves were correctly placed.

Some results were surprising. Data did not support the hypothesis that shelf height would correlate with environmental damage. The survey did not record a high percentage of mutilated volumes. While 26.0 percent of the volumes had patron damage, most was pencil and ink markings, which deface the volumes but do not typically prevent access to the information they contain. Only 1.1 percent of the volumes in the survey had pages deliberately torn or removed.

With empirical data in hand to either support or refute hypotheses, the library is now able to decide what steps are necessary to combat the problems indicated by the data. The results suggest the need for two groups of desirable actions: preventative and restorative. Preventive actions should address shelving practices, patron damage, environmental conditions, and the paper's pH level. Staff and user education programs help prevent damage to books caused by improper shelving and careless patrons. The major resource needed in staff and user education programs is time. Making education a priority will prevent some of the avoidable damage to the library's holdings. Improving the environmental conditions of the library's stacks requires funds to purchase ultraviolet light filters for the numerous windows in the stacks. In addition, more time must be devoted to cleaning the stacks in order to reduce the dust.

More funding is necessary to prevent acidic volumes from becoming brittle. Unlike educating staff and users or improving environmental conditions, which benefit the entire collection, deacidification involves handling each item. Thus, the expense is greater than addressing training or environment. Before a deacidification program is begun, librarians must develop and prioritize lists of collections or subject areas where deacidification would be most beneficial. Such a project will require additional funding.

Actions taken to address damaged and brittle volumes are restorative. These actions are item-level preservation work, with each volume requiring individual attention. Damaged volumes that are not brittle can be repaired in the library's conservation lab or sent to a commercial bindery for rebinding. The volumes that are brittle will require replacements or reformatting through microfilming, preservation photocopying, or possibly digitization. Another option for the brittle volumes is to withdraw them from the collection when they are no longer usable. All of these options require resources, so the library must determine priorities for funding and staff time to accomplish these restorative activities.

After completing the Hodges Library survey, the team leaders presented the results to colleagues. To put the results into context, presentations included comparisons of the Hodges survey data to results from other libraries. For example, the Hodges survey found 16.6 percent of the volumes in the survey to be brittle, considerably less than the data from the Yale survey, which showed 37.1 percent brittle, but more than in the Kansas survey, in which 9.7 percent of the volumes were brittle.[14] The data from these surveys do not point to any reason for the differences, but, as environmental conditions play an important role in the deterioration of paper, the comparative data aids local understanding about the severity of the problem. Given the wide variation between the

Kansas and Yale data, the University of Tennessee could not have estimated the percentage of brittle volumes in Hodges Library simply by studying survey results from other libraries.

UT's preservation survey team has applied the same methodology and analysis to assess collections in the Agriculture-Veterinary Medicine Library and the Music Library, small branch libraries with some 100,000 volumes. Because the methodology and analysis tools were exactly the same, precise comparisons can be made among the three locations. Whereas one library may have a higher rate of brittle materials because of environmental conditions, another library has more volumes that are shelved poorly. The common methodology assures funding agents that a uniform and reliable methodology produced credible results, and resource allocation can address the different problems.

Summary

As UT's survey team has demonstrated in branch library surveys, their methodology is adaptable. Nearly any library can apply this survey methodology, relying on staff from all over the library to help. Most staff do not have to have extensive experience in preservation. By stressing meticulous attention to detail, providing training, and using survey and analysis software, such as SPSS, large and small libraries alike can complete a collection condition survey in an efficient and effective manner.

The survey team leaders agree with Nickerson's observation about the difficulty of comparing data across institutions. Yet, Nickerson also asserts, "at the same time it is important to remember that the data being gathered are also a vital portion of the growing picture of book deterioration and preservation nationwide."[15] In order to understand more fully the larger picture of deterioration and the effectiveness of measures taken to counteract that deterioration, preservationists must be able to compare data from numerous collections of different sizes, environments, and histories. The John C. Hodges Library survey is one more piece of a worldwide puzzle.

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Appendix 1. Definitions for Collections Survey

Brittle Paper: Double Fold Test

Fold a corner of a page back and forth and back and forth again, creasing in the same place with each fold.

Paper pH

With the pH test pen, make a small mark on the lower inside margin of a page in the middle of the book. Chose a page with the same composition as most of the book; for example, if most of the pages are not coated, do not choose a coated page to test. If the paper is acidic, the mark will be yellow or clear. If the paper is acid-free, the mark will be purple.

Note Shelf

Count from the bottom shelf up and give the number of the shelf on which the book was located.

Extreme versus Mild/Moderate Damage

Pencil, Ink, and Highlighter

Extreme: The majority of the book is marked up and/or the writing interferes with the patron's ability to read the text.
Mild: A section of a few pages is underlined or there are a few scattered pages with underlining or notes and the writing does not interfere with the patron's ability to read the text.

Pages Torn or Removed

Extreme: More than ten leaves.
Mild: Less than ten leaves.

UV

Extreme: The cover is very faded and pages may be yellow.
Mild: The cover is slightly faded.

Animal Damage

Extreme: The damage is throughout the book and it must be replaced.
Mild: The damage is contained and the book can either be rebound or repaired in-house.

Food or Drink Stains

Extreme: The damage is throughout the book, and it should be replaced.
Mild: The damage is contained to a few pages or the cover.

Adhesive

Extreme: The damage is throughout the book, and it should be replaced.
Mild: The damage is contained to a few pages or the cover.

Mold

Extreme: Live mold is found in more than one small area of the book.
Mild: Mold is not live and found in only one small area of the book.

Dust

Extreme: A thick coat of dust is found on any part of the book.
Mild: A thin coat of dust is found on part of the book.

Insect

Extreme: The book must be replaced because of insect damage and/or there are still live insects in the book.
Mild: The damage is contained to a small area of the book, and the book can be rebound or repaired in house. There are no live insects still in the book.

Paper Clips, Dog-Ears, Post-It Notes, and Bookmarks

Extreme: Problem is found throughout book and has misshapened the binding, discolored pages, or caused other irreversible damage.
Mild: Problem only affects a small section of the book or there are only a few scattered through the book. Some pages may be discolored, but the problem is not significant.

Water

Extreme: The book is misshapen and cannot close properly.
Mild: The book has some pages or a cover that is stained or warped, but closes properly

Appendix 2. Condition Rankings

Excellent = no damage
Good = can be fixed or cleaned in-house in fifteen minutes or less
Poor = has to be reformatted or replaced

	Excellent	Good	Fair	Poor
Broken text block			X	
Missing covers			X	
Red-rot leather			X	
Damaged spine		X		
Loose hinges		X		
Damaged covers		X		
Missing pages (not mutilation)			X	
Damaged pages (not mutilation)		X		
Loose pages		X		
Torn endsheets			X	
Loose covers			X	
Mold				X
UV (minor)		X		
UV (major)			X	
Dust			X	
Insect				X
Water (minor)		X		
Water (major)				X
Pencil (minor)		X		
Pencil (major)			X	
Ink (minor)			X	
Ink (major)				X
Highlighter (minor)		X		
Highlighter (major)			X	
Paper clips		X	X	
Dog-ears			X	X
Post-it notes		X		
Bookmarks or other papers left in volume	X	X		
Pages torn or removed		X	X	X
Animal damage		X	X	X
Food or drink stains			X	X
Adhesive damage			X	X
Acidic			X	

Index to Advertisers

Collection Development Embraces the Digital Age

A Review of the Literature, 1997–2003

Linda L. Phillips and Sara R. Williams

Collection development and management literature of the past seven years reveals distinct trends among issues, philosophy, and practice. Digital age themes reflect the increasingly networked nature of the profession, with new attention focused on scholarly communications and publishing, digital collection building, consortial collaboration, and quantitative assessment. Some issues that dominated the library literature a few years ago, such as access versus ownership and organizational structure, have been eclipsed by other challenges, such as the serials crisis, finance and budgeting, and licensing. Neither solved nor forgotten, they have taken backstage to trendier subjects. Publications on organization, training, professional development, management of print collections, and subject-oriented collection development from 1997 through 2003 generally indicate reliance on traditional skills and knowledge even though practitioners are applying practical approaches to new formats and types of media. More theoretical commentary on fundamental changes emanating from an increasingly networked environment comes from authors who explore the implications of collection building in the digital age and challenge readers to imagine a vastly different future for collection development practice.

Collection development and management literature of the past seven years reveals distinct trends among issues, philosophy, and practice. Issues confronting collection development librarians prior to 1997, such as allocation formulas, dual roles for subject librarians, and access versus ownership, diminished in importance as more complex and critical challenges emerged from the vast expansion of information technology. New concerns—changes in scholarly communications and publishing, building digital collections, consortial collaboration, and quantitative assessment—have eclipsed previous topics, moving well beyond some of the traditional aspects of collection development practice.

Librarians continue to publish on organization, liaison, training, orientation, and the application of collection development to individual subject areas, yet even the more conventional collection development literature reflects the transforming nature of developments in information technology and consumer behavior. The last "Year's Work in Collection Development" published in *Library Resources and Technical Services* (*LRTS*) was in 1993.[1] Lehmann and Spohrer highlighted key topics of collection building, selection policies, cooperative activities, collection evaluation, organization, and staffing. In addition to citing 179 publications, they provided instructions for signing on to COLLDV-L. Johnson

Linda L. Phillips (llphillips@utk.edu) is Head, Collection Development and Management, and **Sara R. Williams** (swill16@utk.edu) is Collection Management Coordinator, University of Tennessee Libraries, Knoxville.

compiled the collection management chapter in her *Guide to Technical Services Resources*.[2] The annotated bibliography is classified by collection management topics, including materials selection, collection policies, collection maintenance, budget and finance, assessment, evaluation, cooperation, resource sharing, and organization. Johnson's extensive bibliography was supplemented by Owens, whose literature review covers 1993 through 1995.[3] Owens notes that a new theme was the introduction of electronic resources, which she includes in the "Nonprint Media" section of the bibliography. She also observes that the collection management literature is stretching its traditional boundaries, moving into cultural issues, such as women's studies and diversity.

A working definition of "collection development" or "collection management" frames the scope of this review. The use of either expression as search terms produces an enormous number of hits in any bibliographic database that covers library and information science. Johnson, in her most recent text, writes:

> The tasks, functions, and responsibilities now understood to be the portfolio of collection development librarians include selection of materials in all formats, collection policies, collection maintenance (selection for weeding and storage, preservation, and serials cancellations), budget and finance, assessment of needs of users and potential users, liaison and outreach activities related to the collection and its users, collection use studies, collection assessment and evaluation, and planning for cooperation and resource sharing.[4]

By this definition, almost any collection-based activity can be defined as "collection development."

Given the long time span covered by this review and the large quantity of material published, the authors have (reluctantly) been selective among items discussed. With a few exceptions, this paper focuses on works describing collection development and management theory and practice in North American libraries. Works on school libraries and most special libraries have been excluded, as have publications presented as narrowly focused case studies. Topics that will be covered in other reviews in this series (such as acquisitions and serials) are also excluded. Although most publications included in the bibliography appeared in print (or in print and electronic format simultaneously), the authors note the significance of information that percolated in electronic discussion lists. Many important issues about journal pricing, electronic resource licensing, scholarly communications, and numerous other topics were posted to such electronic discussion lists as LIBLICENSE-L and COLLDV-L with some resolution online. While these issues have also made their way into standard research publications, future collection development literature reviewers may elect to give more attention to the online "popular press."

The discussion that follows highlights publications that illustrate trends in the literature during the review period. Length of the subsections tends to parallel the extent of activity in various topics, with publications about electronic resources management topping the scale. A separate bibliography, appearing at the end of this article, lists the more than 300 titles examined for the review. While we have tried to be comprehensive, we have almost inevitably overlooked some publications of value, and we regret such omissions.

A seminal article by Branin, Groen, and Thorin published during the period of this literature review, "The Changing Nature of Collection Management in Research Libraries," describes the challenges for librarians in managing the transition to a new and uncharted environment.[5] Economic constraints and digital information systems are driving forces toward the goals of gaining economies of scale and providing clientele with more information at less cost. Issues of ownership and control must be resolved. The authors observe that librarians are becoming knowledge managers (within limitations of staff and budgets), exploring the creation of scholarly publications, and asserting professional principles for free and unbiased access to knowledge. By exploiting networked digital information systems to deliver resources and services online, collection development librarians are synthesizing and aggregating electronic resources, helping to create new publications, and coordinating onsite print collection management with numerous access options, all in a highly distributed, coordinated way. Another Branin article contains four predictions pertinent to collection development librarians.[6] He suggests that the structure of scholarly communications will change, local print collections will become less important than access to global resources, document delivery services will flourish, and librarians will manage resources in a global context.

Three other articles that provide a timely and accurate context for reviewing the published literature of the past seven years offer insightful commentary on collection development and management at the macro level. In a theoretical piece, Fyffe observes that librarians should make scholars aware of economics and other issues changing the culture of scholarly publishing.[7] Making a case for the high risk to information stability in the technical age, he suggests that scholarly work is hanging by a thread with respect to the potential for loss of information. Fyffe urges librarians to increase faculty participation in making collection management choices so that they will be aware of the risks involved.

Casserly's insightful exploration of the emerging hybrid collection integrates a thorough literature review into a discussion of the values and activities that defined collection development in the print era—selection, evaluation, collection policies, management, ownership, control, permanence,

and place.[8] Drawing on the emerging literature of digital collection building, Casserly poses five questions to demonstrate how librarians are beginning to incorporate the concept of hybrid collection development and management into practice: (1) What are appropriate and useful metaphors for your "library" and "collection" in the digital age? (2) How will your library achieve effectiveness as it builds and manages the hybrid collection? (3) How will your library define efficiency in acquiring and managing the hybrid collection? (4) How will your library establish and maintain a focus on collection content in the changing landscape of scholarly communications? and (5) What commitment will your library make to collection permanence? Lougee observes that as libraries become more involved with creating and disseminating knowledge, their nature is changing.[9] New roles include emphasizing the value of library expertise over value of collections, taking responsibility for greater information analysis beyond traditional description and access, serving as a collaborator rather than simply a support agency, and promoting the library as a campuswide rather than facility-based enterprise. The works of Branin et al, Fyffe, Casserly, and Lougee characterize collection development as rapidly evolving in the twenty-first century. These themes are apparent in the literature published during the review period.

Several book-length works delve into the issues and trends discussed by the profession's visionaries. In the second edition of *Collection Management in Academic Libraries,* Jenkins and Morley provide a useful distinction between the more traditional term, collection development, and the focus of the book, collection management, which the authors define as more demanding and inclusive of policies related to acquisition, housing, preservation, storage, weeding, and discard of library materials.[10] Gorman and Miller, in a collection of essays written at the beginning of the period covered in this review, also observe a shift in collection work from development to management.[11] The opening chapter on collection development and scholarly communication by Budd and Harloe predicts that the practice of collection management will evolve away from management of artifacts toward content management in the form of mediation.[12] Special issues of *Library Trends* and *Collection Management* focused entirely on collection development.[13] In 1998, *Collection Management* (23, no.4) and *Information Technology and Libraries* (17, no. 1) published special issues on cooperative collection development.[14] The Center for Research Libraries (CRL) emerged as a cooperative collection development leader during the period of this review, cosponsoring with the Association of Research Libraries (ARL) conferences in 1999 and 2001. Papers from these conferences reflect major themes in the cooperative collection development literature of this period.[15] Additional work on collection development is found in conference proceedings of the Association of College and Research Libraries (ACRL) national conferences held in 1999, 2001, and 2003.[16] Our bibliography contains citations for many of the items within these collected works, and we discuss selected articles in appropriate sections of this review.

Three articles published during this period suggest that the collection development community resolved the issue of access versus ownership. Kane advocates collections that provide both access and ownership, observing that achieving a balance between the two will require "continual, extensive studies on the use of materials owned, as well as the demand for access materials in order to ensure that user needs are being met in a sufficient and timely manner."[17] Blagden presents data that demonstrate the good value users receive through unmediated access to a document delivery service.[18] Exon and Punch replicated correlational analyses conducted by Paustian on interlibrary loan borrowing statistics and collection size, concluding that the concept of the self-sufficient library is a fallacy.[19]

Growth of Electronic Resources

Everything electronic dominated the collection development scene from 1997 onward. The literature reflects the impact of electronic resources on all dimensions of building and managing collections. Miller's literature review looks at the changes to collection development brought about by decreasing purchasing power and the growing importance of electronic resources during the two decades 1980 to 2000.[20] In a period with emergence of the Web as its most significant trend, collection development emphasis shifted from building strong, locally owned collections for the long term to accessing remote materials for current use. Articles published early in the period grappled with perceived competition between print and electronic materials in library collections. Norman's 1996 survey now seems dated; his respondents were concerned that the library would deliver electronic resources directly to end users, a concept that then seemed radical.[21] Still relevant, however, are his comments about resource identification and selection, budgeting, policy development and licensing as well as his checklist comparing traditional and emerging criteria for selection. Galbreath likens collection management in the electronic era to nailing Jell-O to the wall, noting the complexity of processes for electronic resources budgeting, selection, and management.[22] A few more recent publications continue the comparison of the relative values of print and electronic formats. Schaffner acknowledges several positive effects of electronic technology on libraries and scholarship, citing ease of access, raised expectations, expense, and research time saved.[23] But, he notes, students are not learning print bibliographic skills, and it is difficult to assess authority or longevity of many online sources. Younger concludes that electronic resources have overtaken print in

their importance to research library collections.[24] She discusses ways that electronic resources are changing information access, why scholars use them, and how they can be archived.

Atkinson defines values for collection management in the online environment, where the goal is a synthesis of traditional and digital formats.[25] He suggests that future collections will be viewed as online and offline. Offline collections will be made up of physical objects on library shelves or in storage, and will consist of low-use materials, objects with artifactual value, and those either unsuitable or legally excluded from digitization. Librarians will provide enduring information service by adding value through manipulating text and defining relationships among objects.

Several practical articles address building collections of Internet or commercial resources or both. Kovacs and Elkordy present a lengthy but well-documented and thorough guide to developing and implementing a collection plan for a Web-based electronic library.[26] They provide definitions, a literature review, and steps to create the plan, including a Web site evaluation matrix. Walters, Demas, Stewart, and Weintraub focus on collecting aggregations of Web resources.[27] Along with standards for selection, the authors advocate cataloging the individual contents of the aggregation for access without assistance from a librarian. Weber's article delves further into evolving practices for cataloging electronic resources, beginning with a useful list of selection factors.[28] She identifies decision points, such as determining what to catalog, adapting metadata and MARC to the item, selecting type and quantify of information to include in the record, and resolving the format and level of cataloging.

Building Sustainable Collections of Free Third-Party Web Resources was commissioned by the Digital Library Federation (DLF) to explore questions and recommend practices for adding Internet resources to library collections.[29] Pitschmann argues that such collections can be planned best within the context of mainstream collection development guidelines and principles. He offers detailed sets of criteria for selection, access, content management, user support, and staffing for sustainability. Nisonger recognizes challenges in revising policy statements to include electronic resources.[30] He recommends that updated collection policies include selection criteria for electronic formats and statements addressing such issues as duplication of formats, access, archiving, and preservation.

Stielow's *Creating a Virtual Library: A How-To-Do-It Manual for Librarians* is a conceptual bridge between the realm of print collection development and the organization of a completely digital library.[31] The book provides a wealth of practical details for creating, maintaining, and managing a Web collection that can serve as a library. Alsmeyer and Smith describe the evolution from conventional library services to a networked collection at the British Telecommunications Labs, a special library in the United Kingdom.[32] They chose to replace print journals with electronic access, a kind of integration that came later in university libraries. Their most important conclusion is that because the digital library effectively replaces the human mediator, its design must be well structured and organized.

The many articles published about electronic journals from 1997 through 2003 reflect the complex and stimulating issues that confront librarians, their organizations, and publishers. Some publications help the profession envision an all-electronic future. Montgomery describes the background and implementation of a project to purchase only electronic journals for the Drexel University Library.[33] The purchase of electronic journal collections is more complex than a simple annual subscription. Besides the cost of journal aggregations, librarians must consider image quality, completeness of content, license requirements, reliability of use statistics, linking capabilities, availability of backfiles, cost basis, and choice of vendor, if more than one exists. Workflow now involves more of the library director's time, the services of a webmaster, numerous changes in technical services processes, and the addition of an electronic resources librarian. Given the large increase in access to numbers of titles, the cost per title is lower for electronic journals than for print. Users like the format. A two-year research project funded by the Mellon Foundation is comparing the provision of print and electronic journals in the University of California library system.[34] Librarians are studying user behavior and attitudes, designing and testing procedures for selection and relocation, documenting costs and use, assessing institutional implications, and evaluating institutional archiving strategies.

A recurrent theme within the literature of electronic journals is how best to manage a hybrid collection of multiple formats. Gyeszly observes that costs will soon force librarians to choose between print and electronic formats.[35] Ashcroft and Langdon investigated benefits of and barriers to purchasing electronic journals in university library collections in the United Kingdom and North America.[36] They cite archiving and licensing as primary barriers to building electronic journal collections. Alan and Butkovich identify several steps in the transition from print to electronic journal access, including the development of digital archiving systems such as LOCKSS (Lots of Copies Keep Stuff Safe), and the significance of data management systems for journal collections.[37] Managing print journal collections in an environment where users prefer electronic formats is of growing importance. In a special issue of *Against the Grain* devoted to retention of print, McDonald presents considerations for making decisions about print retention—money, time, space, archival responsibilities, personnel needs, reputability, and restorability.[38] Rowse describes factors affecting the ratio of print to electronic holdings in the hybrid collection with associated issues concerning duplication, storage, binding, and space costs.[39]

Several pieces focus on developing electronic book collections. Ramirez and Gyeszly analyze netLibrary use data in subject categories and user turnaways to suggest subject areas and types of books that users prefer in electronic format.[40] A 2002 publication synthesizes three surveys on the provision of e-books in United Kingdom academic libraries, concluding that there has been little use of netLibrary titles due to lack of perceived demand, ignorance of the potential qualities of e-books, licensing and economic models, and problems with bibliographic access.[41] An increase in e-book publishing activity among independent publishers and aggregators may change this situation. A yearlong study of the use of netLibrary titles in the California State University Libraries included analysis of use statistics, number of turnaways, and user surveys to support a decision to triple the number of e-books in their collection.[42]

As collection management practice expands to accommodate electronic resources, librarians welcome publications that contain principles, best practices, selection tools, and other guides for managing electronic collections. Metz connects past and future, observing that the primary responsibility of collection management is to match user needs with available content.[43] Although the basic principles of collection development apply to electronic formats, additional factors of pricing, licensing, functionality, and archiving have particular significance. Jewell documents the practices of several research libraries with regard to selection, licensing, presentation, and support for use of commercial online materials, encouraging libraries to collaborate on developing systems to manage and present commercial products.[44] The International Coalition of Library Consortia's *Statement of Current Perspective and Preferred Practices for the Selection and Purchase of Electronic Information* offers a de facto standard in spite of the acknowledged rapidly changing technology and information environments.[45] The document presents in outline format a brief description of problems and needs for the future followed by preferred practices with regard to contract negotiations, pricing, access, archiving, systems, licenses, content, management data, and authentication.

An article describing experiences at Brown University Library tells a nearly universal story of the influx of electronic resources at large academic libraries, touching on organizational structure, processes for decision making about resource allocations, leveraging funds allocated to journal subscriptions, cancellation of print, and negotiation with vendors about pricing.[46] Colleagues who have experienced similar situations will sympathize with the authors' conclusions about competition between print and electronic acquisitions, lack of sustainability, lack of archiving, and the staff time required to attend to all these issues. With a unique perspective on public libraries, Barreau describes twelve library systems in Maryland, the tasks they perform, and the sources they use for collection development.[47] She identifies commonalities and differences in collection development processes, concluding that integrated library systems are playing a greater role in the ways selectors perform their tasks and in the sources they use. Terry's paper provides a snapshot of professional opinion in the year 2000. She posed five questions to five librarians and one programmer/analyst about the ways technology affects product choices and changes in collection development practices.[48] Top issues among respondents were the preference of users for electronic resources over print, the need for publishers to have more user-friendly license agreements, support for open access when it is economically viable, and a desire to know more about copyright.

From the theoretical to the practical, the extensive collection development literature on electronic resources clearly demonstrates that librarians are not only adapting collection-building methods to incorporate new formats, but are also creating a new vision for the meaning of collection.

Change in Scholarly Communications

Information technology advances and the proliferation of electronic resources have only begun their transformation of the scholarly communications system. Awareness of the dynamics and economics of scholarly publishing is an emerging trend in the research community, inevitably making its way into the library literature and into the general academic press as well. Bachrach maintains that publications resulting from projects funded with federal money should be in the public domain.[49] Bergstrom, an economics professor who analyzed the price differential between journals published by commercial and scholarly society presses, determined that the high prices charged by commercial publishers have been draining resources away from universities.[50] He provides evidence that the scholarly societies are publishing high-quality articles. Bergstrom recommends that faculty think twice before serving as reviewers and editors for overpriced journals. In an address at the 1999 Association of College and Research Libraries conference, Rosenzweig tells the story of reclaiming a journal in the life sciences from a commercial publisher.[51]

The complex interaction among peer review, other manifestations of scholarly quality or intellectual prestige, publishing economics, and dissemination of research results for the common good have politicized relationships among scholars, librarians, and publishers. Libraries and their parent organizations are examining ways to strengthen ties with scholarly societies to sustain access to research information for the future. The Association for Research Libraries (ARL) has been a leader in stimulating the exploration of these issues. The ARL Office of Scholarly Communications Web

site and ARL's *Bimonthly Report* series provide a wealth of information about scholarly communications trends and events.[52] In March 2000, ARL and the Merrill Advanced Studies Center of the University of Kansas sponsored a meeting in Tempe, Arizona, to engage academic stakeholders in a discussion about the scholarly publishing process and to build consensus on a set of principles for the future of scholarly publishing. Case provides background information as a context for what have come to be known as the Tempe Principles, quoting the principles in their entirety, and giving an explication of each.[53] This article is a must read for every academic librarian and a logical starting place for collection development librarians who wish to keep their constituents informed about the evolution of scholarly publishing. An article and a monograph by Guédon trace the history and function of scientific journals from 1665, when professional societies controlled the intellectual property of scholarship, to the present, when much content is within the grip of commercial publishers.[54] Guédon reports on library response to the current dilemma. Digital technology has the potential to change existing patterns, including such economic aspects as negotiation for access to electronic content. Scholarly societies will have to take a more dominant role in the evaluation process if they are to weaken the commercial publishers' role. Guédon recommends that librarians embrace the Open Archives Initiative and negotiate long-term archiving of commercial journals.

Shulenburger, an economist and provost at the University of Kansas, has been an articulate and tireless spokesperson about the need to transform publishing if the academic community is to sustain its access to scholarly work. Fyffe and Shulenburger describe how *BioOne,* a digital collection of scholarly journals in the biological and ecological sciences, was conceived and established "in the belief that broad and enduring access to scholarly literature is essential not just to the health of the scientific enterprise, but also to the health of the wider society in which science is practiced."[55] They observe that the current model of profit-based journal publishing (where high prices restrict access) harms the interests of those who create and need the content. The *BioOne* business model supports scholarly societies by providing a digital service and dissemination of content at an affordable price, thus sustaining access to a wide community. Elsewhere, Edwards and Shulenburger provide many specifics about the commercial sector's monopoly on scholarly publishing, describing how increases in journals' prices have created a crisis in scholarly communications.[56] Put in economic terms, commercial publishers understood the relative inelasticity of both supply and demand of scholarly content, acquired top-quality journals, and then dramatically raised prices. The authors elaborate on several partial solutions to the problem, but conclude that copyright ownership is the key to a system in which scholarly work is available for the common good. They advocate the creation of a federal law that would require any communication arising from publicly funded research to be placed by the publisher in a freely accessible electronic archive shortly (six months or so) after publication in a scholarly journal. Prosser also advocates open access to scholarly information, but proposes a slightly different route. He envisions a transitional hybrid journal with different pricing models at the article level.[57] Acknowledging that scholars want to disseminate their work widely and that there are expenses with journal production, Prosser proposes that authors have an option to pay a fee to publish their work once it has cleared the peer review process.

The Scholarly Publishing and Academic Resources Coalition (SPARC) (www.arl.org/sparc) is pursuing strategies to foster competition in scholarly publishing and to promote open access.[58] SPARC published a brochure, *Create Change,* for adaptation and use in disseminating information locally about scholarly communications issues.[59] A special issue of the *ARL Bimonthly Report* features an article by Case and Adler about open access.[60] The authors define the Budapest Open Access Initiative:

> Open access is generally understood to mean free availability of literature on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself.[61]

One way to promote open access is for universities to develop digital institutional repositories that assure the availability of published research for the common good. Crow defines institutional repositories as "digital collections that capture and preserve the intellectual output of university communities."[62] He examines institutional repositories from these perspectives and considers their role and impact in the scholarly communications process. Institutional repositories offer the potential to transform the distribution of scholarly communications in a way that separates components of the current structure. For example, scholarly societies could provide peer review while the university manages publication. Such repositories would be "tangible indicators of an institution's quality."[63] Lynch defines institutional repositories as:

> a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members . . . essentially an organizational commitment to the stewardship of these digital materials, including

> long-term preservation where appropriate, as well as organization and access or distribution.[64]

He discusses the strategic importance of institutional repositories and offers some cautions about development strategies. Atkinson describes a model for scholarly communication in the digital environment in which all academic institutions support open access to the intellectual capital of their faculty.[65] Faculty would submit their work to a trusted group of scholars in their discipline for peer review, and the academic library community would assure open access to the work in perpetuity. Usage statistics might convince faculty that expanded access provides more visibility for their work than traditional publication in prestigious journals.

The increasingly complex world of scholarly publishing poses new ethical dilemmas for librarians and scholars. Frazier wrote an extended essay on professional ethics in the digital world, using recent examples such as the lawsuit by publisher Gordon and Breach against Henry H. Barschall, the attempt by the editorial board of *The History of European Ideas* to transfer their journal away from a commercial publisher, and various efforts to limit interlibrary lending in license agreements for electronic products.[66]

Building Digital Collections

Evolving relationships among libraries, scholars, and publishing communities discussed in the previous section, along with capabilities in a networked environment, naturally offer new opportunities for librarians to apply the values of their profession to the creation of new knowledge. Libraries are expanding their roles to encompass some publishing activities that traditionally were reserved for university presses, scholarly societies, and the commercial sector. The collection development literature contains several examples of librarians building digital collections. After years of experience in selecting and managing commercially produced electronic resources, librarians also are selecting materials for digitization and creating production operations. Such efforts often began as special projects in special collections, but are moving into the collection development mainstream.

One of the earliest works about selecting materials to digitize was written by three Harvard University librarians, Hazen, Horrell, and Merrill-Oldham.[67] Their excellent guide is still relevant for librarians making decisions about priorities for digitization. The monograph includes a section on cost/benefit analysis and a decision-making matrix to ensure that the products will be of enduring value to libraries, students, and scholars. Brancolini applied the Harvard Model to a digitization project at Indiana University.[68] She finds the process more applicable to planning than selection, because implementation requires both a simpler and more complex version with a graphical flowchart representation. Demas explores criteria, methods, and processes for deciding which parts of the print universe will be converted to digital format for preservation and access.[69] Among his selection criteria are use, condition, and local priorities. He recommends that projects focus on great collections rather than on everything in a subject category, and on specific genres of material. DeStefano explores other rationales for making selections.[70] She rejects the criteria that have been used conventionally to select materials for preservation—subject area, physical condition, date range—in favor of materials that have high use. This approach would probably appeal to large numbers of library users, and it also targets materials that may have suffered considerable physical dilapidation. Since titles with these characteristics are often duplicated in many library collections, this strategy suggests opportunities for collaboration.

Affiliated with the Council on Library and Information Resources, DLF is a group of libraries leading the development of standards and best practices to extend digital collections and services. Greenstein surveyed DLF members to identify key challenges for the future, since definitions of the digital library are still in their infancy.[71] Architecture and systems, standards and best practices, collection development, penetrating and mobilizing user communities, and preservation or creating long-term access to digital information were identified as the most significant areas in need of development. In another report, Smith documents examples of the many projects based on rare and special collections.[72] She recommends that research libraries refocus priorities to select important holdings from their general collections for digitization.

The Digital Library: A Biography by Greenstein and Thorin describes the maturation process of digital libraries in a readable and entertaining style.[73] Many have moved from initial project-based efforts (the University of Michigan dubbed a research laboratory the "Skunk Works," where staff could both experiment and gain experience) to more mature programs integrated with other library units as core service elements.

Cooperative Collection Development

Cooperative collection development has taken on new vitality in the digital age. Published literature on cooperative collection development abounds. Although publications from 1997 to 2003 reflect mixed opinions about the costs and benefits of collaboration, the networked environment has permitted libraries to share electronic resources through consortial agreements without having to compromise access. Developments in the scholarly communications arena have reinforced appreciation that a single library will never build

a fully comprehensive collection. Cooperative collection development has become an accepted component of collection building, even though writers continue to question whether the benefits are worth the costs.

A good literature review and summary of cooperative collection development in academic libraries appears in Porter's unpublished dissertation. She compares three networks as case studies of the essential elements for effective resource sharing—bibliographic access, physical access, and coordinated collection development.[74] Evans takes a somewhat pessimistic view, suggesting that the barriers will likely overpower the benefits.[75] Shreeves asks, "Is there a future for cooperative collection development in the digital age?" and suggests that the most likely resource to be shared in the future is librarians' expertise.[76] Hazen describes conditions for cooperative success: opportunity, visionary and committed leaders, supportive organizational structures, staff participation, bibliographic and physical accessibility to collections, outside funding, and previous successful experience with cooperation.[77] The context for his discussion is a project cosponsored by the Association of American Universities (AAU) and ARL to enlarge the national collection of Latin American studies collections. Allen explores several factors driving change in the collection development landscape: societal attitudes toward higher education, increasing budget and service pressures, intellectual property issues, preservation, and archiving.[78] She sees collaboration among multitype libraries as a way to improve information access during a period of metamorphosis. Branin's brief history of collection development concludes with the prediction that the changing structure of scholarly communications, access to global collections, and creation of document delivery centers will converge, shifting librarians' attention from building local collections to providing local access.[79]

In the late 1980s and early 1990s, a convergence of technological development, weakened purchasing power, and organizational change contributed to a resurgence of library consortia. Potter notes a trend among consortia to address common needs beyond sharing physical resources, particularly access to commercial databases.[80] Electronic resource sharing enabled libraries to expand their collections vastly by pooling purchasing power. Mahoney describes electronic resource sharing in community colleges through networks in Florida (Florida Distance Library Network), Wisconsin (BadgerLink, WISCAT), Texas (TexShare), and Louisiana (Louisiana Online University Information System, Louisiana Library Network).[81]

Technology also has enabled other types of electronic collaboration, such as sharing of approval plans. Wicks, Bartolo, and Swords describe a project among Kent State University Libraries, Kent State School of Library and Information Science, and Yankee Book Peddler (YBP) as the library prepared to participate in OhioLINK's statewide approval plan experiment with YBP.[82] This article makes a nice companion piece to the Gammon and Zeoli paper that describes the project at the macro level.[83] Another collaborative approval project sought to involve a third partner (Swarthmore College) in a shared approval plan that had been in existence for thirty years between Bryn Mawr and Haverford Colleges.[84] The author describes the existing plan and a proposed new process that would keep duplication to a minimum among all three libraries.

Introducing the *Information Technology and Libraries* special issue on library consortia, Helmer acknowledges that "library consortia are undeniably hot, and new consortia seem constantly to be forming."[85] Characterizing survival as the driving force behind the development and expansion of library consortia, Allen and Hirshon explore emerging models for consortial operation. These include the loosely knit federation at the local or regional level, the multitype/multistate network, and the centrally funded statewide consortium.[86] Weingand's image of the library as a "node in a global information network and a window to the world of information" has become increasingly feasible as library consortia flourish.[87] OhioLINK typifies a thriving statewide consortium, the subject of numerous articles. A ten-year retrospective article contains a useful summary of OhioLINK's genesis, growth, and plans for expansion.[88] The Washington Library Consortium (WLC) of seven libraries in the D.C. area combines a union catalog and cooperative purchasing in an integrated approach that shares book collections, a library automation system with online union catalog and several electronic resources, an offsite storage facility, and a separately staffed administrative group.[89] Among WLC's secrets for success are geographic proximity, face-to-face meetings, longstanding relationships, and an infrastructure with the mechanics to assure that member investments are secure, contributions recognized, and service needs met. On a larger scale, the Illinois Library Computer Systems Organization (ILSCO) offers a similar breadth of service to the WLC, but with a larger constituency of forty-five participants. Sloan uses ILSCO as a case study for testing assumptions about resource sharing such as: (1) Do smaller libraries raid the collections of larger libraries? (2) Are smaller libraries deluged by requests from larger libraries? and (3) How does volume of resource sharing compare to other factors such as library holdings?[90]

The expansion of electronic access and the continued need to house print resources within finite library space has stimulated collaboration in the development of print archives. Bridegam describes advantages and disadvantages of a depository collection shared and administered by Amherst College, Hampshire College, Mount Holyoke College, Smith College, and the University of Massachusetts, at Amherst.[91] This is an example of the regional production center that Branin envisioned in his 1998 article. The Five-College collaborative storage plan calls for deaccessioning duplicates among the

libraries with single copies held by the depository. The case study generalizes to the larger community as libraries consider the extent to which they provide access to materials not owned and as they decide which materials must be preserved for future generations.

Kisling, Haas, and Cenzer advocate print repositories with archival copies to reduce dependence on publishers and stimulate the development of last copy policies.[92] License negotiation should include a provision for paper or microform archival copies. Payne views library storage facilities as a catalyst for developing comprehensive collection management strategies that include ongoing review of the collection.[93] The storage facility represents an additional stage in the life cycle of the library's collections. Four liberal arts college libraries in Ohio received funding in 2001 to create a shared storage service that included personnel and collection analysis.[94] A companion article describes the collection assessment process followed by the participants.[95] Peters describes collaborative print retention pilot pro-jects among the Committee on Institutional Cooperation, Center for Research Libraries, and the University of California system, noting that the challenge is to manage a large body of printed information of declining value to the user population.[96]

Global collaboration has held long-standing appeal for research librarians, and today's networked environment holds more promise than ever to achieve goals for creating access to specialized and obscure publications of potential value to researchers. The Farmington Plan, often cited both as an unsuccessful global cooperative collection development venture and a visionary endeavor that simply lacked effective marketing, is now thoroughly documented and analyzed in Wagner's expansion of his doctoral dissertation.[97] Organized by ARL, the Farmington Plan sought to acquire globally and cooperatively all scholarly works—to create a national scholarly collection. The work provides a fascinating and readable account of a landmark effort in library cooperation. In a sense, the AAU/ARL Global Resources Program continues the mission of the Farmington Plan. Case and Jakubs describe the events and trends leading to the creation of the Global Resources Program (now called the Global Resources Network).[98] Its goal is to expand access to international resources using available technology. Areas of focus include Latin America, Japan, Germany, South Asia, Southeast Asia, and Africa. The framework for this project has the potential to serve as a model in other collection areas.

Organization, Training, and Professional Development

The radical changes that have taken place in the information environment have affected the way collection development is organized and managed in libraries. Many of the changes in collection development organization are related to the shift to flatter organizational models in libraries in general. Jakubs points out as early as 1999 that the traditional structures for academic library organization (public services, technical services, and collection development) are clearly inadequate, given the hybrid character of the work bibliographers do in an electronic environment.[99] A flatter, more service-oriented library organization is outlined by Stoffle, Fore, and Allen, describing the reorganization of the University of Arizona library.[100] While novel at the time the article was written, elements of the team-based organizational model have since been adopted in many academic libraries. Biery points out that most of the published literature on team-based organization is written from an administrative viewpoint.[101] Her paper describes an experiment in team-based collection development at the University of Nevada Las Vegas Libraries from the viewpoint of a participant, including some issues (such as personality conflicts) usually omitted from such accounts.

Surprisingly little literature has been published on how to train collection development librarians to work effectively in the present environment. Blake and Surprenant call for more intensive and wide-ranging education in collection development issues than the present library and information science curriculum provides, as well as extensive professional development support for practitioners.[102] Much training is provided in-house and on the job. Forte et al. describe an exceptionally well-organized training initiative at the University of California, Santa Barbara library.[103] The authors recommend that training and orientation need to be ongoing efforts if collection managers are to keep current.

Collection Assessment and Evaluation

Empirical measures of the adequacy of collections, services, or a bibliographer's performance seem to be of perpetual interest in the literature. A single method will not answer all questions, and new works on evaluation technique will usually find an audience. Remarkably, only four papers on the Conspectus, one of the best-known assessment tools, appeared during this period, and one of those questioned its utility in a digital environment.[104] Clayton and Gorman call for a revision of the Conspectus to make it resource access focused, rather than merely collection-focused.[105] Attention seems to be focused less on description of collections than on smaller-scale studies designed to answer specific local questions. Grover titled his paper "Large Scale Collection Assessment," but the project he describes used the North American Title Count to verify whether collecting levels in a specific area (foreign languages) were appropriate for an individual library.[106] The Reference and User Services Association (RUSA) published a bibliography in 1999 of

assessment and evaluation methods, while the Association for Library Collections and Technical Services (ALCTS) brought out a work by Biblarz, Bosch, and Sugnet in 2001 as part of its Collection Management and Development Guides series.[107] The two works can be used to supplement one another, since the first is a bibliography and the second a planning guide for designing projects.

Since journals are a high-cost center in most libraries, several studies appeared aimed at finding ways to measure their utility to a local library community. Black's 1997 paper describes a project undertaken at a liberal arts college where the journal collection is chosen to provide curriculum support for undergraduates.[108] Black's goal was to design a simple, low-cost analysis method based on reshelving counts. This is a far different scholarly community from that described in Lascar and Mendelsohn's paper on journal use by structural biologists, and their methodology is correspondingly more complex.[109] Citation analysis is a popular method of assessing the adequacy of local journal collections, although papers describing other methods also were published during this period. For example, Dilevko and Atkinson discuss methods of evaluating journals without impact factors in ISI's Journal Citation Reports.[110] Johnson uses citation analysis as a method of assessing a library's ability to support a new program, as well as to guide future collection decisions.[111] The search for reliable ways to develop core journal lists continues. Black's 2001 paper describes a project in which citation analysis was used to establish a core journal list for communications disorders and serves as a good, brief introduction to the methodology.[112] Kushkowski, Gerhard, and Dobson discuss a method of developing such lists in interdisciplinary fields.[113] Corby reviews the literature published on core lists in an effort to identify sound practices and methodology.[114] Her use of the term "alchemy" in the title of her paper illustrates the inevitable degree of subjectivity involved in creation of such lists, and she also discusses the pitfalls inherent in the approach.

The literature on evaluation of monograph collections is less extensive. Kushkowski asked faculty members to rank one hundred subject areas in business administration based on importance to their programs of study and discusses the implications of the results for supporting book selection.[115] Anderson et al. describe the results of an innovative program at Purdue University Libraries.[116] When books were requested from interlibrary loan, the requested title was purchased rather than borrowed. Kraemer discusses a pilot project to identify a reliable way to extract use data for monograph circulation.[117] He is cautious about too much reliance on circulation data to justify changes in collecting policy for monographs, but finds the information useful for identifying weaknesses in collecting patterns.

Since the literature contains remarkably little on collection evaluation for public libraries, a paper by Senkevitch and Sweetland on adult fiction collections is especially interesting and useful.[118] The authors use the OCLC database to identify a core list of adult fiction and found it to be surprisingly stable over time.

Studies of ways to measure the costs and benefits of electronic information sources have been slow to appear, perhaps because of the difficulty in deciding what is to be measured and how. At the first Aberdeen Woods Conference (a meeting cosponsored by the Center for Research Libraries and ARL), a Working Group on Quantitative Evaluation Tools for Cooperative Collection Development was formed and charged with development of appropriate metrics and methodologies. The group presented a report at the second conference and is now seeking participants to test an assessment toolkit.[119] Whisler et al. produced an early work on evaluating full-text databases for depth of coverage and overlap.[120] Blecic, Fiscella, and Wiberley examine vendor data as a source of information on usage of Web-based resources.[121] Given the comparative ease of extracting use data from online sources, one hopes that more research will fill this gap in the literature in the near future.

Weeding and Storage

Weeding and storage are unglamorous, but necessary, functions in collection development. Whether the availability of electronic formats will make retention and relegation decisions easier or more complex remains to be seen.

Stanley Slote brought out a fourth edition of his standard work on library weeding in 1997.[122] Williams summarizes practices and decision-making criteria current as of 1999.[123] Banks describes a circulation study undertaken as part of a general weeding program.[124] She infers that increasing use of electronic resources is cutting into circulation of printed books, although many other variables also affect circulation, including the level at which the book is shelved. Remote storage, the alternative to weeding often preferred for research collections, is no longer controversial—the issue is no longer whether libraries should move books into storage facilities, but rather how to select books appropriately. Hazen's article on selection for storage gives a good overview of the issues to consider in making appropriate (and politically defensible) storage decisions.[125] Ackerson studied citations to physics literature by chemistry faculty; her results challenge previous findings that scientists are more likely to cite older research when referring to literature outside their main field.[126] Ackerson found no relation between use and age and concluded that it is unnecessary to defer sending older journals to storage to accommodate researchers in secondary fields. Altmann and Gorman explore the advantages and disadvantages of density of use as a decision-making criterion in determining

what journal runs to eliminate or store.[127] Austin tackles the politically touchy issue of how to set numerical goals for numbers of volumes to be transferred to storage and describes an objective methodology for doing so.[128]

In an important article in *Library Trends,* Jaguszewski and Probst explore questions of journal cancellation and storage in integrated collections of both print and electronic resources.[129] Decisions about cancellation and storage of collections must now include interface quality, licensing considerations, and the availability of alternate vendors. The authors describe criteria for making retention, cancellation, and storage decisions in an environment where electronic resources are becoming increasingly available, yet resource budgets and storage space are limited.

Subject-Specific Collection Development

In keeping with the applied character of most collection development literature, the period from 1997 to 2003 saw publication of many articles intended to provide practical guidance for bibliographers. Many of these titles described how to build collections in specific subjects or formats or provided counsel on working with particular client groups. Articles concerning collection building in the humanities and in interdisciplinary subjects were most common. A new edition of Blazek and Aversa's *The Humanities: A Selective Guide to Information Resources* appeared in 2000.[130]

Foreign language collection building is an area with an extensive support literature. Gutierrez-Witt, Astroff, and Martin all published papers designed to advise selectors working with a limited knowledge of Spanish.[131] Allen discusses building a collection of contemporary German literature using a list of modern authors.[132] Cooperative efforts to build foreign language collections were described by Holzner, Filstrup et al., Nye and Magier, and Schaffner.[133] The papers describe creative ways in which libraries use collaboration to leverage scarce resources in Slavic and South Asian languages, fields in which local expertise is often rare.

Growing interest in diversity as a professional obligation has led to several explorations of collection building in literatures serving special client populations. Kranich examines the role of libraries in the collection of alternatives to mainstream media, while Rothbauer and McKechnie examine how reviewing media treat gay and lesbian fiction for young adult readers.[134] Lee's paper on women's studies at Rutgers University and Warner's on "Moving Beyond Whiteness in North American Academic Libraries" call into question some basic assumptions about collection development.[135] Both authors question whether objectivity is possible or even desirable in fields outside the academic mainstream, since "objective" criteria for selection usually privilege majority groups and interests at the expense of minorities.

Most of these papers assume essential continuity in the methods and criteria of collection development, even when they argue for changes in emphasis or a broader view of subject matter. Case, on the other hand, directly challenges the adequacy of traditional criteria and policies to guide the selection of electronic texts for the humanities.[136] Case is one of the few authors to assert that the advent and adoption of electronic formats must fundamentally change how collection development librarians approach their work.

Conclusion

In a digital world, libraries and universities can be publishers, scholars can build libraries on their Web sites, and vendors can be archivists. Traditional collection management values may soon reach a digital wall that challenges the definition of collection, along with assumptions about collection building. The digital environment demands new approaches to collecting for future generations. Librarians already grapple with balancing collection services for present and future clientele. Determining responsibility for digital archiving is essential to creating an information legacy for future generations. Will libraries find a way to gain control of electronic archives, or will we rely on publishers or networks to assume this role? Rising expectations for immediate and portable access to content compel librarians to consider links between finding tools and collection content early in the selection process. Those who have written about impending change in the collections environment give practitioners a foundation for innovation.

The literature of collection development and management is primarily applied, reflecting the pragmatic nature of authors and readers. Publications on organization, training, professional development, management of print collections, and subject-oriented collection development from 1997 to 2003 generally indicate reliance on traditional skills and knowledge, even though practitioners are applying practical approaches to new formats and types of media. Several issues that dominated the library literature a few years ago, such as the serials crisis, finance and budgeting, and licensing, have not been resolved or forgotten, but have taken backstage to other topics, particularly those that embrace the digital age.

The past seven years have witnessed publication of more theoretical commentary on fundamental changes emanating from an increasingly networked environment. Authors who explore the implications of collection building in the digital age challenge readers to imagine a vastly different future for collection development practice. Themes covered in the early sections of this review—electronic resource development, creation of digital collections, scholarly communications, and collaborative collection development—reflect the

increasingly digital domain of the profession. May the next *LRTS* review cover a shorter time period, because the collection management landscape promises further transformation, expansion, and complexity.

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Notes on Operations

Criteria for Replacing Print Journals with Online Journal Resources

The Importance of Sustainable Access

William H. Walters

Long-term sustainability should be a primary concern of librarians deciding whether to replace print subscriptions with online journal resources. This article describes the six criteria used at St. Lawrence University to determine whether particular online resources can be regarded as acceptable substitutes for print. Three conventional criteria—completeness, timeliness, and reliability—are supplemented by three others that focus on the legal, economic, and organizational components of sustainable access. Together, these six criteria can be used to draw an important distinction between permanent subscriptions and supplementary resources. Although the replacement of print subscriptions with nonsustainable resources can sometimes reduce short-term costs, it also increases long-term risk by making sustainability of access contingent on sustainability of payments.

Just five years ago, few librarians regarded online access to journals as an acceptable substitute for print. Reviewing reports from five academic libraries, Easton found that only one institution, Drexel University, had planned a large-scale cancellation of print subscriptions in favor of online resources.[1] Moreover, Drexel's decision to cancel print was based on the unusual assertion that "archival storage . . . is not part of the mission of the Drexel Library."[2]

Librarians who have chosen to retain their print subscriptions often cite the problems associated with online journals: late issues, missing issues, missing components (articles, book reviews, letters), missing pages, missing tables and figures, and poor image quality.[3] Systematic evaluations conducted at two research universities revealed these same problems, along with several others: missing journals (those promised in online collections but not actually provided), instability of servers and access mechanisms, discrepancies in presentation, and the possible removal of contested or objectionable content.[4]

Published evidence suggests that many librarians' attitudes have changed in recent years, however. One informal assessment revealed that many collection development librarians now welcome the substitution of online resources for print.[5] Likewise, a 2003 survey of college and university librarians revealed that more than 65 percent had cancelled print subscriptions in response to the increased availability of online journals.[6] Librarians' opinions are far from unanimous, however. While Peters predicts "an orderly retreat from print," Rowse anticipates the continuation of a hybrid environment in which print and online formats will coexist.[7] Specifically, Rowse contends that print journals will maintain their dominant status in the humanities but not in the sciences. Jaeger asserts that "the paper copy will prevail at least for the next fifty years," chiefly because so many of the countries that contribute to scientific research lag behind the

William H. Walters (whwalters@stlawu.edu) is Collection Development Coordinator and Acquisitions Librarian at St. Lawrence University in Canton, New York.

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United States in their provisions for online access.[8]

Conventional Criteria for the Assessment of Online Journal Resources

Since the replacement of print subscriptions with online journals is seldom an all-or-nothing proposition, several libraries have established criteria for the evaluation of online journal resources. This article describes the criteria developed at St. Lawrence University, an undergraduate college of two thousand students located in Canton, New York. The university subscribes to 2,080 print journals and maintains access to twenty online journal resources that provide the full or partial content of more than ten thousand serial publications.

At St. Lawrence, six criteria have been used to evaluate whether each online resource can be regarded as an acceptable substitute for the corresponding print journal(s). The six criteria address not whether a particular online resource is worth acquiring, but whether it serves as an adequate substitute for print—whether the print subscription(s) can be cancelled once online access is established. These standards are intended to supplement rather than replace the usual selection criteria for journals and online resources.[9] The six criteria can be applied to online journals purchased individually, to online collections of journals (those that include a specified set of titles), and to online aggregations of articles (those that include content taken from a variety of journals, newspapers, and other serials). The first three criteria are straightforward:

1. Completeness: The online resource must provide complete page images and include the complete content of each issue: all figures, tables, book reviews, letters to the editor, and so on.
2. Timeliness: Each article must appear online at the same time it is available in print, if not earlier.
3. Reliability: Day-to-day access must be reliable—quick server response, stable URLs, and provision of backup servers.

Criteria similar to these have been adopted by the University of Alberta and the University of Oklahoma.[10] Moreover, the Alberta and Oklahoma standards for completeness and reliability are more fully developed than those in use at St. Lawrence. They address such issues as hardware and software requirements, off-campus access, interlibrary loan, and legal mandates for the retention of print. In contrast, the criteria developed at Seton Hall University allow for widespread cancellation of print subscriptions based almost solely on overlap between print and online holdings.[11]

Notably, the *c*ompleteness and timeliness criteria in use at St. Lawrence, Alberta, and Oklahoma all assume that the print copy—not the online version—is authoritative. This may not always be the case. In the near future. we may have to evaluate, for instance, whether each print journal provides the complete content of its online equivalent and whether the paper copy arrives in a timely manner after the posting of the Web document.

Sustainable Access Criteria for the Assessment of Online Journal Resources

The standards of completeness, timeliness, and reliability have been widely acknowledged in the literature. The criteria in use at St. Lawrence are noteworthy, however, for their emphasis on a fourth standard: sustainability. Specifically, the St. Lawrence policy reflects a commitment to sustainable access at the institutional level—a commitment to the provision of long-term, uninterrupted access for our library patrons. Sustainable access can be contrasted with archival preservation, which often focuses on the resource itself rather than its accessibility to a particular group of users.[12] For example, the guidelines in use at Alberta, Oklahoma, and elsewhere specify that the vendor must maintain a permanent electronic archive.[13] Unfortunately, however, this provides permanent access only for the vendor—not for the subscribing libraries. Likewise, several authors have recognized the value of sustainable access without discussing its importance in the decision to replace print journals with online resources.[14] While archival preservation can be seen as a responsibility of the library profession as a whole (or of society in general), sustainable access is the responsibility of individual libraries or consortia.

Sustainable access is central to the fourth, fifth, and sixth criteria adopted at St. Lawrence University:

4. The site license must include provisions for permanent library retention of the content purchased during the license period, along with any necessary access mechanisms (interfaces, database rights, and so forth).
5. The university must participate through a library consortium that has the resources to ensure that the content provider adheres to the legal provisions for long-term access. Alternatively, the provider may itself be a library consortium.
6. If the resource is a collection of journals, the provider must demonstrate a commitment to the long-term provision of each journal title included in the collection.

As these criteria suggest, the main barriers to sustainable access are economic and legal rather than technological.

The most important component of sustainable access is licensing—

specifically, a license agreement that provides permanent access to the content generated or purchased during the license period. With appropriate license provisions, a library that cancels its subscription after ten years will retain permanent access to the ten years' content that was purchased. In contrast, many licenses for networked resources are essentially lease agreements; they provide access only for the duration of the contract. If a lease agreement is cancelled after ten years, the library no longer has any rights to the content that was provided during the period of the agreement. Leasing is not unique to the online environment. Several business reference publishers have chosen to lease rather than sell their print publications, and many public libraries lease multiple copies of high-interest titles. Ironically, some of the same libraries willing to accept lease agreements in the online environment have rejected similar lease agreements for print resources.

Sustainable access provisions ensure that back issues remain accessible even if the current subscription is cancelled. Ideally, they also provide for continued access if the online vendor goes out of business. Licenses that comply with criterion 4 provide permanent rights to any access mechanisms necessary to view and download the content; they do not require the continued payment of fees beyond the period of the license. Few license agreements meet this standard, however. If a participating library cancels its ScienceDirect subscription, for instance, offline digital copies of the subscribed "textual content" will be supplied only if the library "defrays the costs of preparing the data set sought."[15] Online access to the digital backfiles requires the payment of additional fees: "an annual maintenance fee plus an annual access fee based on the Subscriber's prior twelve (12) months' usage."[16]

Unfortunately, sustainable access provisions are not self-enforcing. Many libraries have no effective recourse if a major online vendor fails to abide by the terms of a license agreement. For this reason, consortial purchasing is important. (See criterion 5.) While no small college is likely to influence the profits of a major online vendor, many consortia have the purchasing power to exert considerable market pressure on companies that fail to live up to their license agreements. Most consortia also have the resources and expertise to successfully pursue their interests if legal action is required.

The final criterion is a response to the fact that many online collections do not provide permanent access to any particular set of journals. In fact, some of the most popular online collections have been known to drop (and add) journals without advance notice. This last criterion is difficult to implement, of course, since any online collection may drop journal titles in the future. At the same time, however, online collections known to have dropped journal titles can be safely removed from the list of those that provide sustainable access.

Implementing Sustainable Access Criteria

Sustainable access criteria were introduced at St. Lawrence University only recently, in May 2003. Nonetheless, they have been understood and supported by the university community over the course of the latest serials review. The use of specific, objective standards has allowed the library staff to cancel virtually all those print subscriptions for which sustainable online access has been established. Conversely, these same principles have allowed us to maintain print subscriptions in those cases where the criteria for sustainable online access have *not* been met. At St. Lawrence, each online journal collection and aggregation has been assessed in accordance with the six criteria. Individual online journal subscriptions have not yet been evaluated, however.

As of April 2004, only two online journal collections held by St. Lawrence—Project MUSE and BioOne—met all six criteria for the replacement of print subscriptions. Project MUSE, introduced in 1995 by Johns Hopkins University, provides the full content of nearly 250 journals in the humanities and social sciences. BioOne, sponsored in part by the Scholarly Publishing and Academic Resources Coalition (SPARC), currently offers sixty-nine bioscience journals and is scheduled to include two hundred titles when the collection is complete. Both MUSE and BioOne are selective in the journals they include, and both were created as alternatives to single-publisher collections, such as Kluwer Online, ScienceDirect, and Wiley InterScience.

Although the library subscribes to many additional online journal resources, they are regarded as supplements to our permanent journal subscriptions rather than replacements for them. That is, the six evaluative criteria have been used at St. Lawrence to distinguish between permanent subscriptions and supplementary resources.

Permanent subscriptions are those journals for which sustainable access has been established, either in print or online. At St. Lawrence, all print journals are regarded as permanent subscriptions, as are those online titles that meet the six criteria mentioned here. If a permanent online resource is discontinued for some reason (other than cancellation), the title will be restored as a print subscription. If a print subscription is discontinued for some reason (other than cancellation), sustainable online access will be established. Changes to the permanent subscription list are normally made only after consultation with the departmental faculty, often in the context of a formal serials review.

Supplementary resources are those online journal resources that do

not meet the six criteria set forth here. They include several major full-text databases, such as LexisNexis Academic and EBSCO Academic Search Elite, among others. At St. Lawrence, most faculty understand that the library cannot guarantee access to the journals included in these supplementary resources. If a particular journal is dropped from a full-text database regarded as a supplementary resource, the library has no obligation to re-establish access through other means. Changes to the supplementary resource list are made by the librarians, sometimes in consultation with the academic departments.

To some extent, the automatic designation of print journals as permanent subscriptions reflects the distinction between the ownership of physical artifacts (print) and the ownership of access rights (online). After all, the license provisions needed for sustainable access to online journal resources are not necessary in the case of permanent print subscriptions. However, it is entirely possible that new, online-only resources will be added in the permanent category, and that certain print subscriptions (limited-retention magazines, for instance) even now can be properly regarded as supplementary resources.

Conclusion

With constant or declining acquisitions budgets, many librarians have been tempted to divert funds from journal subscriptions to online resources that do not meet the criteria for sustainable access. This is a risky strategy, since librarians who give up permanent rights to content are essentially betting that they will have adequate funds to pay for online access in every subsequent year. Without sustainable access, the inability to pay in any particular year results in the loss of all content. An institution that subscribes for five years before canceling is left with nothing in return for its five-year investment. Although many librarians have accepted leased access in an attempt to reduce short-term costs, the surrender of sustainable access rights makes less sense when library budgets are uncertain and the library's ability to continue making payments is in doubt. Moreover, many contracts specify that online content lost through a lapse in payments can never be restored in its original form. ScienceDirect provides a good example of this. If a library cancels its ScienceDirect subscription then later resubscribes, Elsevier will not provide online access to the back files from the first subscription.[17]

The distinction between sustainable and temporary access has been overlooked by several recent commentators. For example, McDonald contends that "libraries may save direct subscription costs of anywhere from 5 percent to 25 percent" by switching from print to online access.[18] He neglects to mention that the least expensive online resources often fail to meet sustainable access criteria and that the right to use these resources is essentially being leased rather than sold. Likewise, Cox compares the costs of print and online journals without considering the distinctions between permanent and temporary access.[19] An analysis of investment value would have resulted in conclusions far different from the results of his cost-per-use calculations. Finally, Peters worries that librarians may "find themselves investing in print journal collections at levels out of kilter with [their] value."[20] This is a legitimate concern, and the decision to replace print subscriptions with sustainable online resources is often well founded. In making these decisions, however, we should be fully aware of the distinction between investing in our collections and paying for temporary access. Sustainable access criteria are therefore important in the decision to replace print subscriptions with online journal resources.

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Book Reviews

Edward Swanson, Editor

E-Serials Cataloging: Access to Continuing and Integrating Resources via the Catalog and the Web. Ed. Jim Cole and Wayne Jones. Binghamton, N.Y.: Haworth, 2002. 329p. $59.95 cloth (ISBN 0-7890-1710-5); $39.95 paper (ISBN 0-7890-1711-3). Published simultaneously as *The Serials Librarian* 41, nos. 3/4.

This collection of papers addresses a topic of great concern to most libraries—the cataloging of electronic serials—and while the field is rapidly changing, these articles go a long way toward building an understanding of the many issues surrounding electronic serials.

The editors organized the book into six sections that approach the topic of electronic serials from many aspects. The first section addresses general issues, and the bulk of it is a chapter by Ann Copeland that provides an excellent historical context for this topic through a review of the literature in the 1990s. Copeland's discussion of the early days of electronic serials cataloging, multiple versions, standards development, and metadata helps to set the stage for the rest of the book.

The second section of the book addresses the topic of standards through two chapters. Françoise Pellé in "ISSN: An Ongoing Identifier in a Changing World" and Sten Hedberg in "ISBD(ER) and its Role in the Management of Electronic Resources" discuss the historical evolution of the International Standard Serial Number (ISSN) and the International Bibliographic Description for Electronic Resources (ISBD[ER]). Both authors make the case for the need for standards and their role in the improved control of and access to electronic serials as they develop in a rapidly changing bibliographic landscape. Both chapters are well written and contribute substantially to this compilation.

Educational topics constitute the third section of the book. Taemin Kim Park's chapter on "The Integration of Electronic Resources into Cataloging Instruction in the LIS Curriculum" presents the results of Park's research and investigation into the extent to which those forty-five library schools that have their course catalogs available on the Web address cataloging topics in general as well as electronic serials cataloging. This investigation provides a useful snapshot of the current state of affairs in today's library schools and shows a range of practice regarding the teaching of cataloging courses. Arlene Taylor's chapter on "Teaching Seriality: A Major Educational Challenge" illustrates the difficulty of teaching serials cataloging to library school students in one semester. She emphasizes that the implementation of logical cataloging rules will help to make the education of future catalogers easier. Park's and Taylor's chapters are the strongest of this section. In the third chapter, Elena Romaniuk describes how the Serials Cataloging Cooperative Training Program (SCCTP) came to Canada, providing much-needed training in serials cataloging to librarians who would not have been able to travel from remote locations. She applauds the offering of such courses regionally in order to address these needs. In the final chapter of this section, Danielle Hinton describes the development of an electronic journals tutorial at the University of Leicester. The tutorial addresses topics such as the different types of journals, how to locate an electronic journal, understanding access issues such as passwords, the differences between on- and off-campus access, and copyright restrictions. While this is an interesting and useful project, the chapter seems to be out of place in a book about electronic serials cataloging.

The fourth section of the book covers policies and procedures and is the heart of the book. Wayne Morris and Lynda Thomas discuss the use of single or separate records for electronic and print versions of serials. They use the University of Glamorgan's library experience to illustrate their thesis that the separate record approach for each electronic and print version provides better access to serials. While many might disagree with their conclusions, their analysis is interesting and well developed. In the next chapter, John Blosser, Tim Hagan, and Yvonne W. Zhang provide an annotated bibliography of Web resources that support the cataloging of electronic serials and other continuing resources. This should prove to be a useful resource for readers who are interested in learning more about the topic. Jeanne M. K. Boydston and Joan M. Leysen present the results of a survey of Association of Research Libraries (ARL) members regarding what is being cataloged at ARL libraries and by whom. Their results should inform other libraries that are assessing how to organize themselves in order to address the increasing demand for cat-

aloging the relatively new forms of publications such as electronic serials and other integrating resources like free Web sites. Beatrice L. Caraway lists examples of the many types of notes that are present in cataloging records for electronic serials. While it is interesting to see the wide variety of ways in which catalogers indicate similar or identical concepts, it might have been helpful if Caraway had provided some analysis of these notes and perhaps indicated a preferred wording or format when possible. Gregory Wool, in "On Pins and Needles: Using Structured Metadata for Collocation and Browsing Capability," discusses the four methods of providing structure in a catalog—cataloging rules, authority control, categorization, and relationship control—and how they enhance access and retrieval. This is a very stimulating discussion of the role of structured metadata in a catalog, although it does not seem to be directed to the topic of cataloging electronic serials. The principles that Wool discusses are applicable in all catalogs and, in that sense, they are relevant in the section of the book that is concerned with cataloging policies. In the final chapter of this section, Michael Wright describes OCLC's Cooperative Online Resource Catalog (CORC). While this is a useful description of the CORC service, it is already a bit dated as many of the changes hinted at in the chapter have already occurred.

The fifth section of the book addresses the topic of national projects and local applications. The strongest chapters in this section are the final three. Nicole Hennig describes the development of a database that controlled and provided access to electronic serials and included all of the information required to manage electronic journals, such as licensing information. As the development of electronic journal management systems interests many libraries, this chapter should prove helpful to readers. Evelinde Hutzler and Gerald Schupfner describe the development of a similar database that provides access to electronic journals in a consortial environment in Germany. Finally, David King discusses the efforts of the Kansas City Public Library to manage control and access to their many aggregator titles.

The last section of the book, "Books, Serials, and the Future," includes two chapters, the first of which, "E-Books: Should We Be Afraid?" by Susan Cleyle, discusses the development of electronic books, portable e-book readers, computer-based e-book readers, and Web-based e-book services. Although Cleyle draws parallels between the development of e-books and electronic journals and makes the case that libraries need to be involved in the ongoing development of e-books, this chapter feels out of place in this book. In the final chapter, "E is for Everything: The Extra-Ordinary, Evolutionary [E-]Journal," Gerry McKiernan discusses the evolution of the scholarly journal and the many new features that electronic journals provide, such as electronic manuscript submission, refereeing and review, alerting services, personalized e-journals, display control, and more. This is an enlightening and stimulating chapter and, with its visionary theme, the appropriate conclusion to the entire book.

Overall, this book is an excellent addition to the literature on serials cataloging and would be a useful addition to libraries that do not already subscribe to *The Serials Librarian*.—*Rebecca L. Mugridge (rlm31@psu.edu), Pennsylvania State University, University Park*

E-Serials Collection Management: Transitions, Trends, and Technicalities. Ed. David C. Fowler. New York: Haworth, 2004. 279p. $59.95 cloth (ISBN 0-7890-1753-9); $39.95 paper (ISBN 0-7890-1754-7).

This book, part of the Haworth Series in Serials and Continuing Resources, consists of eleven essays on issues facing those transitioning to electronic journals in library collections—more or less everyone working in a library. The issues include publishing, the use of subscription agents, cataloging, access methods, consortia, statistics, troubleshooting, reserves, accreditation, and databases. The contributors include practitioners in technical services, public services, and systems—all from academic libraries, with the exception of one from a law library—as well as representatives of a subscription agent. Although the book has a publication date of 2004, the content was submitted at the beginning of 2002.

Paul Harwood and Carolyn Alderson from Swets Blackwell in the United Kingdom open the collection with an overview of pricing, licensing, and alternative publishing models in the scientific, technical, and medical arena. They briefly describe the collaborative work of the International Coalition of Library Consortia in the United States and the National Electronic Site License Initiative in the United Kingdom in the areas of pricing, licensing, and usage statistics. There is unfortunately only a bare mention of alternative publishing models such as Paul Ginsparg's Physics Archive, BioMed Central, and Scholarly Publishing and Academic Resources (SPARC), but there is an extensive later chapter by Gerry McKiernan on open access.

Patricia A. Loghry provides a very useful summary exploration of the competing benefits and respective challenges of working with a subscription agent, a vendor/publisher, or a third-party provider in setting up access to electronic journals. Her conclusion is that electronic journals operations need to have a "metamediary"—a single point of contact for extended suppliers—who are the subscription agents. However, the agents need to continue to develop new services, and there needs to be standard-

ized license agreements and a central warehouse with updated information on all URLs.

The chapter on collection management and cataloging of online materials describes a telephone survey conducted by the technical services department of the Newton Gresham Library at Sam Houston State University. The authors conducted the survey to help them develop policies and procedures on collecting, accessing, and cataloging online materials. Seventy college and university libraries, nine junior and community college libraries, and thirteen public libraries received the survey, and 76 percent responded. I thought the analysis of the survey results was not very well presented, consisting mainly numbers and percentages given in lengthy paragraphs. The conclusion that "libraries do things differently" (45) is not particularly startling or incisive. But the survey itself could be useful as a model for a library to adapt for itself if it wanted to embark on a similar fact-finding project.

Lee Ann Howlett's chapter on Internet protocol (IP) and password access provides a very complete overview of the amazing number of access possibilities that publishers offer. It does an excellent job of defining IP and proxy access in simple terms and of explaining the reasons why publishers might choose a particular type of access.

Miriam Childs and Wil Weston summarize the historical development and future of academic consortia for cooperative purchasing of electronic resources, using OhioLINK as an example. Joanna Duy explains how usage data can be employed by libraries to see how their collections are being used and to determine their value. She describes the need for standardizing usage data from vendors and efforts toward that end such as the ARL E-Metrics Project and Project COUNTER.

Barbara Schader has written a case study on claiming and troubleshooting electronic journals at UCLA's Louise M. Darling Biomedical Library. Although it provides many useful examples of problems encountered by users and possible reasons for them, I find it written too much from a library's internal perspective—what they do and how they do it—to be as helpful to someone trying to learn how to troubleshoot as it could be.

Ebe Kartus and Susan Clarke write about their university's experience in setting up and operating an electronic reserve operation. Readers should be aware that all specific mentions of copyright issues refer to Australian law.

In "E-Books after the Fall," Vivian Lewis analyzes past and (then-)current electronic book initiatives. The section on libraries' requirements provides an excellent summary of collection development, pricing, access, archiving, integration, statistics, and branding issues.

Gerry McKiernan's chapter on open access or "liberating the scholarly literature" gives a thorough analysis of the development of the movement, specific initiatives and projects such as the Open Archives Initiative, and the self-archiving model. This chapter provides an excellent introduction to this important and growing publishing model. Cheryl McCain and Karen Rupp-Serrano review different regional accrediting agencies' standards and how libraries account for their electronic serials when doing a self-study. The last two chapters describe systems developed locally at the University of Oklahoma and Utah State University to manage access to electronic subscriptions.

I find one key area missing from this collection: licensing models, terms, and conditions. An overview of this important component in managing electronic serials would round out an otherwise comprehensive list of issues facing those brave souls who attempt it (not unlike herding cats, by the way!). As with all compendiums of this type, some chapters are better than others. My own preference is always for those who tell me not how they do it at their library but why they do it that way at their library—or at least what I would need to think about to do it at mine.

Which brings me to another pet peeve: it is almost entirely written by and for academic librarians. I applaud LadyJane Hickey and the others involved in the Sam Houston State survey for including public libraries; that is the only mention of a nonacademic library environment in this book. However, even they specifically excluded special libraries. Electronic resource management (ERM) affects every library of every type, and I would really like to see a broader representation of library types.

Some areas in this book are unfortunately outdated because of the length of the publishing cycle. As I said earlier in this review, these chapters were written in early 2002. That is like decades in this fast-moving, fast-changing environment. Many of today's readers are not looking to start building their own ERM system; they are looking at commercially produced ones, such as Innovative Interfaces' system. In the survey conducted by Sam Houston State, respondents report using the now-defunct CORC but not Serials Solutions or TDNet. The big collection development issues today are the Big Deal and the need for unbundling.

That said, I think that librarians looking for an overview of the main problems and trends to be considered in electronic resource management will by and large find it in this book. It will not really tell you how to solve the problems, but it may give you enough of a framework to know what you need to learn or think about.—*Betty Landesman (landesb@mail.nih.gov), National Institutes of Health Library, Bethesda, Md.*

The Enduring Library: Technology, Tradition, and the Quest for Balance. By Michael Gorman. Chicago: ALA, 2003. xiii, 157p. $35; $31.50 members (ISBN 0-8389-0846-2).

Predicting the future is always a tricky business. In *The Enduring Library,* Michael Gorman—academic library director, cataloging guru, and (since publication) ALA president-elect—does not actually set out to practice divination, but he does confront the question of whether libraries and librarianship have a future. Of course, he has done that before in *Future Libraries,* but in that book the question seems more hypothetical, the scenario more speculative, the danger more remote.[1] In the meantime, the rise to ubiquity of the Web and its concomitant search engines, the beginnings and the promise of large-scale digitization of paper-based archives, and an economic downturn putting greater pressure than usual on public institutions (at least in the United States) have emboldened prophets of the virtual library and thus given the question a new urgency.

As if in response, Gorman deemphasizes the cataloging (pun only partially intended) of anti-library attitudes and their exponents, a hallmark of *Future Libraries*, in favor of a more historical and philosophical approach. He contends that recent technological developments in librarianship represent one stage among many in an orderly evolution, rather than a cataclysm, and by setting changing means against a backdrop of much more slowly changing ends, he makes his position credible. Advances in communication and library service at the beginning of the twentieth century are shown to induce the same sort of vertigo, the same sense of loss and apprehension librarians experience today. Gorman also asserts the continuing value of the human record built up over time, even in the face of new technologies and new media, and in spite of the claims of some of their enthusiasts, such as William Arms (whose essay "Automated Digital Libraries: How Effectively Can Computers Be Used for the Skilled Tasks of Professional Librarianship?" receives a withering critique). Perhaps most effective is Gorman's use of one of his other works, *Our Enduring Values: Librarianship in the 21st Century,* to good advantage in a chapter relating present-day reference service to each of the "core values" posited in that book.[2]

Gorman is less convincing when he tries to use the distinction between new tools (or media) and new iterations of familiar tools (or media) to advance his position:

> The idea that the replacement of typewriters by word processors and LPs by CDs are examples of old technologies being killed by new technologies verges on the inane. Word processors are essentially electric typewriters with capabilities that exceed those of the IBM Selectric typewriter by about the same degree as the Selectric's capabilities exceeded those of a Remington typewriter of the 1920s. The CD displacing the LP is less significant than the flat-disc sound recording displacing the wax cylinder and the wire. Modern automobiles are equipped with a multiplicity of electronics and computer capabilities. That does not make my 2001 Chevy Malibu a new technology displacing the Chevy Bel Air of the 1950s. Each of these examples is a refinement within a particular technology, employing electronics and computers.

Presented as an argument against the notion that virtual libraries will make traditional libraries obsolete, this statement muddies the waters at best; in all the examples, the new has supplanted the old for most purposes. Gorman does much better, on the other hand, in spotlighting the gap between claims and requirements for the "universal digital library":

> There are many reasons why we are as far away from that universal digital library as we are from intergalactic space flight, and many of the obstacles to its achievement cannot be overcome without unknowable and incredible innovations in technology and the expenditure of unthinkable sums of money. To pursue the space metaphor, it is as if we talk and write incessantly about trips to Alpha Centauri and act as if such trips were imminent. All the while we are doing the library equivalent of scratching around in the nearer parts of the solar system that is the reality of human space exploration. It is good to reach for the stars, but not when it is at the expense of thinking about real terrestrial problems and issues. (96)

Here he bolsters powerfully his case against starving traditional library services to feed experiments in technology. This is a recurring theme of the book and one aspect of Gorman's consideration of the future. Others include: the non-uniqueness of the present time, which means we can apply lessons from the past; the importance (and the decline) of reading and higher-order literacy; society's (and the library profession's) fascination with networked electronic information sources; and preservation and transmission of recorded knowledge as the major task of librarianship.

Transmission, incidentally, includes bibliographic control, to which Gorman devotes a chapter addressing the achievements and the continuing value of cataloging as well as proposing a common-sense approach to cataloging the Web. Another chapter analyzes the nature of the Web and electronic documents in general,

again with an eye to how they might be given some intellectual organization. Here Gorman calls for the mapping and enumeration of Web documents and the development of a taxonomy for them as prerequisites to incorporating the Web into library services. That these proposals, as well as the library research agenda presented in another chapter, are essentially big ideas briefly sketched, with few, if any, suggestions for implementation, may disappoint some readers, but it befits the overall level of discourse in this book.

As already noted, many familiar themes related to the state of librarianship are considered in *The Enduring Library*. After a general assessment of the profession, emphasis falls in turn on communications technology (past and present), reading and literacy, the Web, traditional services, future challenges, and research needs. But to a large extent, each topic is presented in terms of its relationship to the others. The multiple themes recur and interact, conveying a rich sense of how the various tasks of and challenges to librarianship affect one another.

The overarching theme, however, is the concept of balance. Gorman's overriding concern in this book is that the future needs libraries and that libraries can secure their future by finding a way to balance and integrate traditional services and new technologies. While his point of view (marked by an acute awareness of threats to literacy and culture) is evident throughout (and forcefully and colorfully expressed, as in the quotes above), he is obviously seeking to balance the past with the future. The theme of balance extends to personal and worklife issues, with the final two chapters offering counsel on information overload, stress, and personal and professional values.

For librarians, there can hardly be a more stimulating professional read than *The Enduring Library*.—*Gregory Wool (gwool@iastate.edu), Iowa State University, Ames*

References

1. Walt Crawford and Michael Gorman, *Future Libraries: Dreams, Madness, and Reality* (Chicago: ALA, 1995).
2. Michael Gorman, *Our Enduring Values: Librarianship in the 21st Century* (Chicago: ALA, 2000).

Index

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Compiled by Edward Swanson

General Procedures Used in Compiling the Index

The following types of entries are included:

a. authors—of articles, reviews, and letters

b. titles—or articles and of articles about which letters were published

c. subjects—of articles and of books reviewed

Subject entries for individuals are identified by "(*about*)"; letters are identified by "(*c*)"

Reviews are indexed by name of reviewer and by subject of the work reviewed, identified by "(*r*)". They are also listed by title under the heading "Books reviewed." Subject headings are based on: *ASIS Thesaurus of Information Science and Librarianship,* 2d ed., edited by Jessica L. Milstead (Medford, N.J.: Information Today, 1998).

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50 East Huron Street, Chicago, IL 60611 • 312-280-5038

Fax: 312-280-5033 • Toll Free: 1-800-545-2433 • www.ala.org/alcts