

# Library Resources & Technical Services

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## ABOUT THE COVER

A portion of a photo of the 1992-93 ALCTS Board of Directors. The entire photo appeared in *ALCTS Newsletter* 4, no. 2/3 (1993). Pictured are: (front) Jean Acker Wright; (middle row, left to right) Karen Muller, John Webb, Walter High; and (back row, left to right) Barbara Tillett, Arnold Hirshon, Liz Bishoff, Katha Massey.

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For current news and reports on ALCTS activities, see the ALCTS Newsletter Online at [www.ala.org/alcts/alcts\\_news](http://www.ala.org/alcts/alcts_news).



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# Editorial

Peggy Johnson



Writing a timely editorial or one that will seem pertinent (or, with luck, entertaining) four months after I put fingers to the keyboard is always a challenge. We have snow on the ground in Minnesota and spring will have arrived by the time this issue reaches your mail boxes. The ALA Midwinter Meeting will be over and people will be getting ready for Annual Conference in Washington, D.C.

That observation gives me the starting point for this editorial. The Association for Library Collections & Technical Services (ALCTS) will be a major player at the 2007 Annual Conference as we celebrate fifty years as an association serving the profession. The week of programming and events begins with a one-and-a-half-day conference (June 20–21), “Interactive Futures: A National Conference on the Transformation of Library Collections & Technical Services.” Featured speakers are Richard A. Lanham and Stephen Abrams. Lanham is an author, lecturer, and UCLA English professor emeritus, whose works include *The Electronic Word: Democracy, Technology, and the Art* (Univ. of Chicago Pr., 1993) and *The Economics of Attention* (Univ. of Chicago Pr., 2006). Abram is vice president of innovation, Sirsi Corporation, and a leading international librarian and provocative thinker in the North American library community. The conference features plenary and breakout sessions. It concludes with the ALCTS 50th anniversary gala dinner cruise on the Potomac River. This is a conference not to be missed!

ALCTS also will be offering five preconferences, two of which are two-day events, one is a single day, and two are half days. They are:

- Comprehensive Series Training
- Basic Library of Congress Classification
- What They Don't Teach in Library School: Competencies, Education, and Employer Expectations for a Career in Cataloging
- Managing the Multigenerational Workplace: Practical Techniques
- Workflow Analysis, Redesign, and Implementation: Integrating Electronic Resources

With such a variety of topics and options for length of time involved, attendees are sure to find something that meets their needs and interests.

In addition, ALCTS is sponsoring fourteen programs during the conference. All look splendid. The ALCTS President's Program, “Libraries and Findability: Elegant Hacks for Our Future,” deserves special mention. Peter Merville is the keynote speaker and described as a passionate advocate of the role that “findability” plays in defining the user experience. Merville is the author of *Ambient Findability* (O'Reilly, 2005) and coauthor of *Information Architecture for the World Wide Web: Designing Large-Scale Web Sites*, 2nd ed. (O'Reilly, 2002). He is the president and founder of Semantic Studios, an information architecture, user experience, and findability consultancy. He is a graduate of University of Michigan's School of Information, where he is an adjunct faculty member. The President's Program will be Monday, June 25, 10:30 a.m., and is the final event in the ALCTS 50th Anniversary Celebration.

I encourage you to join the celebration. Detailed information is available at the ALCTS anniversary Web site ([www.ala.org/alcts50](http://www.ala.org/alcts50)). Be sure to visit the section “Looking Back,” which has a list of past presidents, photos, trivia, and more.

As I look toward the fiftieth anniversary festivities, I also ponder the future of ALCTS and *LRTS*. Both depend on you—being engaged in ALCTS activities, volunteering for service, and writing for publication. To that end, I am suggesting topics that would make excellent themes for papers to be submitted to *LRTS*. These topics could be the starting point for research projects or a catalyst for essays that thoughtfully consider one or more perspectives on a particular topic. *LRTS* also publishes papers in a section called “Notes on Operations,” which report practical applications and problems solutions that have implications beyond the library in which they occur.

We have had few papers in the area of acquisitions recently, yet I think this is one of the exciting, fast-moving areas in technical services. What new services are foreign vendors offering and how do they compare with those provided by U.S. vendors? How do these changing services from both foreign and domestic vendors affect workflow, allocation of staff time, and level of staff (type or classification) doing the work? Is anyone thinking about a standard elements for an acquisitions record? What about a historical review of the changes undergone and undertaken by monograph vendors to meet libraries’ changing expectations? Related to this topic—are libraries changing practices to mesh with changing services, or are libraries driving the changes in services that vendors supply? Does anyone have experience with the new WorldCat Selection service, based on the Integrated Tool for Selection and Ordering at Cornell University Library (ITSO CUL)? Perhaps someone in a library implementing this service could collect data pre- and post-implementation and prepare an analysis for *LRTS*.

The future of the catalog is the topic du jour and probably de dix ans. Next generation catalogs and various initiatives underway (such as PennTags, WorldCat Identities, and University of Illinois at Champaign-Urbana Libraries’ Buy a Book service) to enhance current catalogs and services are fascinating. What do librarians at Endeca-using institutions have to tell us? Those that are looking to implement the Ex Libris Primo should be thinking now about how they can share their experiences and the results with colleagues.

Preservation of digital content and traditional formats remains a critical topic. I would welcome exploration of solutions to digital archiving—helping readers understand LOCKSS, PORTICO, dark archives, semi-dark archives, light archives, perpetual archives, and where librarians and libraries have responsibilities. Do microforms still have a role in library collections? Are they being replaced by

digitized content? If so, what are the responses from and consequences to users?

The landscape for licensing digital content and access to digital content is changing rapidly. Perhaps now is the time for a paper that considers the Google project, the Open Content Alliance, and in-house projects—and how they are, together, building a new universe for information seekers. How do these new types of collections fit with traditional collection, use, and user assessment? Are libraries employing statistical measures of usage for Web-based information resources? Have the guidelines for these measures promoted by the International Coalition of Library Consortia affected the practices of content providers? I’ve heard talk about a universal license. What has been the result of national e-content licenses in other countries? Licensors and licensees both have perspectives that can be explored and shared.

I am especially interested in trends in the organization of technical services, the changing skill sets expected of professional librarians, and the expanding role of non-MLIS professionals. What defines original cataloging or, more to the point, what is the role of MLIS professionals in technical services?

Anyone who is considering writing a paper for *LRTS* should review the “Instructions for Authors” and “Author FAQ” sections on the *LRTS* Web site ([www.ala.org/alcts/lrts](http://www.ala.org/alcts/lrts)). The *LRTS* Editorial Board provides mentors to potential authors, who are interested in this service. I conclude with my now familiar advice for aspiring authors.

- Do not write a simple how-we-did-it good paper. Successful projects can be the basis of good papers, but they need to be placed in a larger context. Why should readers care? Have others tackled the problems or written about it? What can readers learn from the project being reported?
- Be attentive to grammar and spelling. Proofread and proofread again.
- Check citations for accuracy.
- Do not overshadow prose with illustrative matter. Most papers need no more than six to eight (at most) figures and tables. The data represented in illustrative matter and their significance should be explained in the prose. Illustrative matter is not required; some papers do not need tables reporting quantitative and statistical findings or figures demonstrating topics addressed.
- Be sure that your paper fits within the scope of *LRTS*.
- Browse through recent issues of *LRTS* to get a sense of style, length, and tone. Read the papers that received the Best of *LRTS* award. I commend to you:

- Jennifer Bowen, "FRBR: Coming Soon to Your Library," 49, no. 3 (July 2005): 175–188.
- Kristin Antelman, "Identifying the Serial Work as a Bibliographic Entity," 48, no. 4 (Oct. 2004): 238–55.
- Amy Weiss, "Proliferating Guidelines: A History and Analysis of the Cataloging of Electronic Resources," 47, no. 4 (Oct. 2003): 171–187.

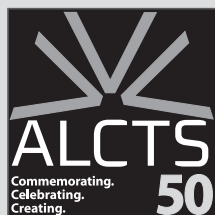
- *LRTS* is a scholarly journal. Your paper should reflect this while being readable. Ponderous prose is deadly.

Finally, do not hesitate to contact a member of the Editorial Board or me if you wish to discuss a potential paper.

### ALCTS, *LRTS* 50th Anniversaries

The stellar lineup of events highlighting the Association for Library Collections & Technical Services (ALCTS) 50th anniversary celebration, "Commemorating our Past, Celebrating our Present, Creating our Future," will begin at Midwinter Meeting's Anniversary Year Kickoff Reception and will include the ALCTS National Conference, a gala dinner cruise, and the annual President's Program featuring Peter Morville, author of *Ambient Findability* and president of Semantic Studios.

ALCTS members and *Library Resources & Technical Services* (*LRTS*) subscribers will also enjoy anniversary articles, a complimentary copy of the fifty-year cumulative index to *LRTS* and the reissue of *LRTS* volume 1, number 1. A 50th anniversary commemorative publication will be available for purchase through the ALA Online Store in late 2007.



### Web Site Explains, Entertains

The ALCTS anniversary Web site ([www.ala.org/alcts50](http://www.ala.org/alcts50)) provides information on all anniversary events, links to registration forms and information, and serves up photos, trivia, and other surprises.

### Contribute Your Thoughts, Photos

A special 50th anniversary survey is being conducted to be an informal (and, we hope, fun) exercise for those who have chosen library careers to reflect on their time in the profession and size up their expectations for the future. Take the survey now by visiting the 50th anniversary Web site ([www.ala.org/alcts50](http://www.ala.org/alcts50)) and clicking on the "Survey" link.

Everyone is invited to contribute photos (candid or professional) to the ALCTS photo gallery on the Web site. Photos can range from shots of ALCTS events to family photos from trips to Seattle and Washington, D.C. Submission instructions are on the 50th anniversary Web site.

# Quo Vadis, Preservation Education?

## A Study of Current Trends and Future Needs in Continuing Education Programs

By Karen F. Gracy and Jean Ann Croft

*This research study assesses preservation education offered by continuing education (CE) providers in the United States. Educators teaching preservation workshops for regional field service organizations and other local and regional preservation networks were surveyed about the type and number of workshops offered, content of preservation offerings, audience, faculty resources, future plans for curricula, and availability of continuing education credits. The investigators hypothesize that preservation workshops offered by CE providers serve multiple purposes for the library and archival science professions, becoming not only an avenue for professionals to continue to develop or reinforce their knowledge and skills in preservation, but also often the primary source of rudimentary preservation education for library and information science professionals and paraprofessionals. This paper reviews the literature relevant to the study of preservation in the CE environment, describes the research methodology employed in designing and conducting the survey, presents the resulting data, and analyzes the trends revealed by the data in order to understand more fully the goals and objectives of CE in preservation during the last decade and to gauge future directions of the field. This paper concludes by presenting plans for further research, which will expand upon initial findings of this survey.*

### The Need for Continuing Education in the Field of Preservation

As part of an overall desire to promote continuing professional development and to foster lifelong learning, continuing education (CE) provides an essential service to library and information science (LIS) practitioners. It gives librarians, archivists, and other cultural heritage professionals essential information, skills, and insight throughout their career. Both the American Library Association (ALA) and the Society of American Archivists (SAA) affirm the value of CE in promoting lifelong learning for practitioners.<sup>1</sup>

Continuing education plays a particularly important role in sustaining the preservation imperative, as it often serves as the first or only source of information for professionals and support staff on how to protect and extend the life of library and archival materials. The 2005 Heritage Health Index, which aimed to “assess the condition and preservation needs of U.S. Collections,” indicates the

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fundamental need for preservation education: of the more than 30,000 American cultural institutions, responsible for more than 4.8 billion artifacts, 70 percent of collecting institutions indicate a need to provide additional training and expertise for staff caring for their collections.<sup>2</sup> The LIS field must focus on providing practitioners with ample opportunities to increase their knowledge of preservation concepts and help them master key preservation skills, through both graduate and continuing education.

Given the challenges to be faced in educating the next generation of LIS professionals to care for cultural heritage materials, the authors of this paper felt that the time was ripe to conduct a formal study of the state of continuing education. Thus, this research aims to thoroughly document activities in the field of continuing education for preservation during the last decade, and offer suggestions for how CE providers can best place themselves to provide the needed knowledge and expertise to effectively administer preservation programs in libraries and archives.

### **History of Preservation Continuing Education and Its Impact on the Preservation Field**

Education in preservation has a relatively brief history compared with that of other specializations within LIS. In the 1970s, few graduate library science programs offered conservation or preservation as a regular part of their curriculum. Continuing education offerings—primarily in the form of workshops and short courses—constituted the primary source of preservation education for most practitioners. Many current graduate school offerings in preservation can trace their roots to these pilot programs, as they were often first offered through university CE programs.<sup>3</sup> In the last three decades, many leading preservation professionals (both educators and administrators) focused their efforts on integrating preservation into graduate library science education.<sup>4</sup> These labors have been fruitful, as more than three-quarters of all LIS schools with ALA accreditation now offer at least one course in the area of preservation.<sup>5</sup> Continuing education was seen as playing a complementary role, however. Its role was not particularly well-defined beyond the general recommendation to acquaint practitioners with the “basic tenets of preservation,” and to serve as a potential route to specialization within the preservation field.<sup>6</sup>

In its 1991 report, the Preservation Education Task Force, organized by the Commission on Preservation and Access, suggested that CE efforts should focus on developing short-term, intensive training programs for mid-career librarians and archivists, similar to the in-house training program found at the library system of the University of California–Berkeley.<sup>7</sup> The reasoning behind this recommendation was that such programs were necessary because pres-

ervation was not yet a part of most LIS graduate programs' curricula at that time.

In the 1990s, several programs were launched in emulation of the short-term model, including the SAA Preservation Management Institute (1987) and its successor, the Preservation Management Training Program (1992–1994); the Preservation Intensive Institute, first hosted by the University of Pittsburgh in 1993 and in 1994 at UCLA; and the Rutgers Preservation Management Institute (first held in 1998). As the names of these programs suggest, they emphasized the management aspects of preservation, rather than simply teaching basic skills such as book repair. They had significant impact on the LIS profession, as dozens of professionals graduating from these programs were able to integrate preservation administration principles into the management of their own institutions.<sup>8</sup>

Programs of this kind require a significant investment of time and resources, and rely heavily on subsidies from federal and regional funding agencies. Without such funding, sustaining programs is difficult, as most potential students cannot afford them (unless their employers provide subsidies). For example, tuition for the most recent offering of the Rutgers Preservation Management Institute (PMI) in 2005 was \$4,075, which covered the costs of fifteen days of instruction and the review of course assignments by instructors. This amount did not include costs for travel, accommodations, and meals. Scholarships from the National Endowment for the Humanities and the New Jersey Historical Commission covered tuition and travel-associated costs for a dozen students; each offering of the PMI is limited to twenty students.

Of the three major initiatives, only the Rutgers program has survived over the long term and continues to educate administrators to manage preservation programs. While the aims of these programs were admirable, the difficulties in sustaining intensive programs of this type mean that most of them remained experiments rather than successful models that could be duplicated in multiple venues.

Given the high costs of intensive training, another model for continuing preservation education also grew and expanded during this period: the regional workshop, as offered by field service programs, professional associations, and other local preservation-focused organizations. The target audience for these briefer offerings (most often held as half-day or one-day programs) has been much broader than for intensive programs, as educators aim to serve the needs of professionals and paraprofessionals at all levels of expertise, not just mid-career professionals. Workshop providers focus on providing training in key areas such as disaster preparedness and recovery, management of environmental conditions, and book repair. While the management perspective is still central to most of these workshops, the broad spectrum of the potential audience and the limited time



available for instruction often leads to a focus on training and skills rather than analysis and synthesis of preservation concepts.

The work of Cloonan provides an interesting perspective on approaches to preservation education.<sup>9</sup> Cloonan's research targeted respondents in various institutional environments as well as international settings. Utilizing interviews and questionnaires, the author surveyed respondents and sought feedback concerning what they identified as issues and challenges in preservation education and suggested resolutions to the problems. In considering the differences in focus and objectives between graduate and continuing education in preservation, Cloonan made a distinction among several related concepts: training, education, and continuing education:

Training usually implies the learning of specific or specialized skills, often in a workshop setting; for example, disaster recovery, care of photographic prints, book repairs, or monitoring the library environment. Education is a more comprehensive term which refers not only to acquiring skills, but also to obtaining knowledge through experience, creativity, analysis, and the exchange of ideas. Education is life-long while training takes place over a finite period of time. Continuing education can take place at any stage of one's career. It may consist of refresher courses, or may lead to certificates of advanced study. Library schools, libraries, and professional associations offer continuing education programs.<sup>10</sup>

Although these distinctions are helpful in theory, in practice the lines between training and continuing education are often blurred in preservation CE offerings. For the purposes of this study, the investigators chose to combine the categories of training and continuing education together under the category of continuing education.

Furthermore, other organizations in addition to universities, libraries, and associations have taken on responsibility for CE as Cloonan defined it. Although a number of graduate education providers continue to offer CE courses to the LIS community, the fiscal realities of running a self-sufficient CE program (one that may have been heavily subsidized by the institution or external grants) have led many information schools to bow out as CE providers, particularly in those areas where the audience may not be large, or where a region is already well-served by a field service provider.<sup>11</sup> This trend away from universities as preservation CE providers and toward other organizations also affected how the investigators chose to define the population for this study; see the Current Sources of Continuing Education for Preservation and Research Method sections that follow.

### **Current Sources of Continuing Education for Preservation**

In the United States, many different organizations offer continuing education on preservation topics; sources include field service programs of regional conservation centers and library consortia, local preservation networks, universities, and professional associations. Although some of these education providers offer preservation workshops (particularly those dealing with popular topics such as book repair or disaster recovery) on a regular basis, others offer preservation topics sporadically, as the need arises, or upon request.

The organizations comprising the Regional Alliance for Preservation (RAP) have become among the most reliable sources for preservation education. RAP is a network of organizations devoted to preservation and conservation of cultural objects that provide assistance to library, archive, and museum professionals across the country. RAP organizations focusing on preservation of library and archival materials include the Northeast Document Conservation Center (NEDCC), the Conservation Center for Art and Historic Artifacts (CCAHA), Amigos Library Services, and the Southeastern Library Network (SOLINET). All of them consider education to be part of their mission and have developed an ongoing curriculum in preservation.

Other regional and local organizations, such as the California Preservation Clearinghouse, the Massachusetts Board of Library Commissioners, and the New York State Program on the Conservation/Preservation of Library Research Materials, also play an important role in providing preservation education to practicing professionals and paraprofessionals. These local organizations often work with RAP institutions to offer workshops, with the local preservation network providing the venue and the RAP member providing qualified instructors. Associations, while serving as a critical source of CE workshops, are not always consistent providers of CE programs. Most association CE offerings are tied to annual conferences and must be proposed by members of the association each year, thus one cannot count on the same topics being offered regularly. The primary exception to this situation is SAA, which offers a full slate of regional workshops through its CE program in addition to its conference offerings.

### **New Directions for Continuing Education**

While core topics such as disaster response and recovery, management of environmental conditions, and book repair continue to be the mainstay of continuing education in preservation, CE providers also strive to address digital preservation issues. Thus far most CE programs have focused primarily on using digitization to reformat objects. The School for Scanning, a three-day symposium hosted by the

NEDCC, was a pioneer in providing education in how to manage digitization projects (its target audience is preservation administrators). The ongoing preservation of digitized and “born-digital” materials has received far less attention to date, although that is slowly changing as the field begins to embrace digitization as a preservation reformatting method.<sup>12</sup> The recent introduction of workshops that aim to give a general overview of the critical issues surrounding digital preservation indicate that the field is beginning to move beyond the building of digital libraries, to the maintenance of these new resources over time. While the preservation community recognizes the need for educating librarians and archivists in how to preserve the massive quantities of digital materials in their care, the lack of concrete strategies and standards continue to frustrate both educators and potential audiences for CE workshops in digital preservation.

CE programs are also moving beyond the care of paper-based materials, to target visual materials, sound recordings, and moving images. According to a 2001 study of Association of Research Libraries (ARL) members, the holdings of ARL libraries include 1.3 million moving images, 5.3 million sound recordings, and more than 64 million graphic materials.<sup>13</sup> The Heritage Health Index, which includes many more institutions, indicates that cultural institutions hold 40.2 million moving images, 46.4 million sound recordings, and 724.4 million items in photographic collections.<sup>14</sup> Yet, many librarians and archivists with preservation responsibilities are not adequately prepared to care for these media. Most graduate courses and CE workshops that focus on the basics of preservation give scant attention to the care of media other than paper-based material or still photographs. Although some CE workshops specializing in these media exist, they are not offered with the same regularity as other courses, often being seen as special topics or part of an advanced curriculum rather than being included at the introductory level.

### **Comparing the Roles of Graduate and Continuing Education in Preservation**

The division between preservation education in graduate programs and through CE is murky, as the curriculum of graduate and CE courses often overlaps significantly. One might trace the reasons for this overlap to two factors: the relatively small number of professionals exposed to preservation in graduate school (less than 5 percent of all MLIS recipients include preservation as part of their coursework), leading to a large number of practitioners who must then pursue basic preservation education elsewhere; and, the large number of paraprofessionals given preservation responsibilities who do not have access to preservation education through a formal degree program.<sup>15</sup>

Because of this blurring of the line between graduate and continuing education for preservation, the authors of

this study hypothesize that the opportunities offered by CE providers go beyond simply facilitating lifelong learning objectives. They aim to close the gap in the knowledge base of LIS practitioners that cannot be filled satisfactorily by formal educational programs or on-the-job training alone. While they aspire to serve multiple audiences and a variety of purposes for the library and archival science professions, they now function as the *de facto* primary source of rudimentary preservation education for LIS professionals and paraprofessionals. As a corollary hypothesis, this study suggests that current preservation education within traditional library and archival studies programs does not provide adequate preparation in the areas of technical and managerial expertise to deal with the preservation of digital collections, audiovisual media, or visual materials. The investigators approached these problems as issues worthy of research, in order to document the current situation and place these issues on the national LIS educational agenda. Specifically, the investigators sought to address the following research questions:

1. What is the composition of curricula for CE programs in preservation? How has that curricula changed over the past decade?
2. What is the relationship between graduate and continuing education in preservation?
3. How do educators plan to keep pace with new formats and technological advancements?
4. Do preservation educators provide students with the opportunity to put theory into practice? If so, how is this achieved?
5. What do preservation educators see as the key knowledge and values in preservation education? How are these values reflected in the curricula?

The following report summarizes the results of the research undertaken to find answers to the previous questions.

### **Research Method**

This survey aimed to document the extent and breadth of offerings found in continuing education offerings sponsored by field service programs and other regional or local networks. The survey also attempted to gauge the attitudes and views of preservation educators across the spectrum of preservation education in relation to topics such as growth of the field.

#### **Establishing a Working Population of Preservation Education Providers**

This assessment of preservation education was directed toward CE providers in the United States. The popula-

tion of CE providers proved to be an amorphous group, thus recipients of surveys were identified in several ways. The investigators used a combination of sources, including a listing of members of RAP (which consists of field service providers), listings in the eighth edition of the *ALA Preservation Education Directory* (published in 2002), and recommendations from colleagues.<sup>16</sup> The research team also sent out a general call via several electronic discussion groups: the Preservation Administration Discussion Group, or PADG; jESSE (a list devoted to discussion of library and information science education issues); and Forum for Archival Educators (a private discussion list whose members are educators in archival studies programs).<sup>17</sup> Additionally, a Web site was set up to allow individuals involved in preservation education to request a survey.<sup>18</sup> Finally, an announcement was published in October 2003 issue of *The Abbey Newsletter*, a periodical devoted to current news and developments in library and archival preservation.<sup>19</sup>

The main criterion for including an education provider in the study was evidence that the organization was committed to offering preservation workshops with some regularity (i.e., at least once a year). An examination of the information provided in the *ALA Preservation Education Directory* and the organization's Web site (if one existed) served as the primary method that was used to make this determination. The investigators may have underestimated the size of the CE provider population, in that they may have failed to identify ad hoc or regional organizations; however, these methods provided a feasible sampling frame with which to proceed with the study. When multiple responses were received from the same institution, the researchers compared responses and selected the most reliable.

To encourage participation, survey recipients were assured of the confidentiality of their responses. Because of this requirement, the investigators were sometimes required to aggregate data in order to maintain the confidentiality of participants despite the small size of the working population.

### Description of the Survey Instrument

The survey (see appendix) was sent to field service providers and other organizations identified as sources of continuing education. The research team targeted those individuals identified as being in charge of educational offerings. The investigators asked questions dealing with the following topics:

- type and number of workshops offered;
- frequency of workshop offerings;
- enrollment statistics;
- existence of credential in preservation and/or award of CE credits;

- content of preservation workshops;
- incorporation of preservation into related workshops;
- faculty resources;
- future plans for curricula; and
- audience for workshops.

In total, 38 surveys were sent to potential participants; this list consisted of educators identified through the initial compilation of the working population (as previously detailed). Although postings were made to various electronic discussion groups as previously detailed, the investigators received no additional requests for the survey from educators who were not on this initial list. Recipients who did not respond to the call to participate were sent a reminder after six weeks; a second reminder was sent twelve weeks after the initial contact to those who still had not responded. After three attempts at contact, the research team considered the data collection period to be closed.

To standardize coding and subsequent analysis of data, the survey used checkboxes wherever possible, and refrained from open-ended questions as much as possible. Where participants were asked to fill in answers (for example, "list each preservation workshop offered"), the investigators created nominal coding categories to aggregate data.

### Potential Sources of Bias

The investigators see several potential sources of bias in this research. First, the data may be slanted toward those individuals who are predisposed to participate in surveys. Field service providers were more apt to respond, as education is often a central part of their organizational mission. Second, answers to certain questions about future plans in hiring and curriculum should be treated somewhat cautiously. Respondents who were not full-time employees of an organization may not have had a complete understanding of the current situation regarding hiring or curriculum revision. Additionally, some organizations may be wary about revealing plans in this area (despite assurances of anonymity) for fear of being seen as making a firm commitment to hiring of new instructors or offering new workshops.

A second source of bias lies in the definition of the working population for this study. Early in the research project, investigators made the decision to exclude professional associations as part of the population on the observation that many associations do not regularly offer preservation workshops as part of an established CE program (as most workshops are tied to conferences). SAA is the primary exception, as has been previously noted. In retrospect, the research team admits that the exclusion of association data may slightly skew the overall trends identified and conclusions reached in this study.

The most significant potential bias of this research concerns truthfulness in reporting data. For the questions that asked respondents to provide hard numbers (particularly about enrollment figures over a five-year span), several participants indicated that the numbers they were providing were estimates or guesses since they had not kept good records of such data. Thus the researchers exercised extreme caution in interpreting these statistics, with the understanding that they may not be exact representations of the phenomenon being measured.

## Findings and Discussion

In total, the research team received a total of 20 completed surveys from CE providers. This number was reduced slightly due to the removal of institutions or organizations that identified themselves as being outside of the working population, leaving 18 useable surveys. Revising their population size to 36 providers, the investigators calculate the response rate as 50 percent (numbers do not include surveys removed for the previously noted reasons). This rate offers some reassurance that the research team may rely on the results to be statistically accurate. The extremely small population size in question leads them to be extremely cautious in interpreting results and their potential implications, however.

The investigators used a standard statistical analysis package, SPSS, for all survey data entry and analysis. The primary analysis used was frequency distribution; this data is presented in tabular form, with discussion following each table.

### Survey Responses

Readers are invited to consult the appendix to examine the survey instrument; the report uses the abbreviation "Q" followed by the question number to indicate from which question the data are drawn (thus, Q1 refers to Question 1).

### Availability of Course Offerings

As stated previously, 18 surveys from CE providers were used in the final analysis. Of those 18 usable surveys, 13 organizations indicated that they offered workshops in preservation (Q1). Those organizations that teach

preservation workshops are more likely to offer a series of sessions touching upon preservation issues rather than just a single workshop (Q2): out of 13 respondents, 10 organizations (76.9 percent) offer more than 3 workshops, 2 organizations (15.4 percent) offer 3 workshops, and 1 organization offers 2 workshops (7.7 percent). The investigators interpret these results to be an indication of the popularity of preservation as a topic for CE workshops. The hands-on nature of many of these programs appeals to both professionals and paraprofessionals, who see them as having practical use (see also the discussion below of reasons for attending preservation workshops).

### Enrollment in Preservation Workshops

CE providers were asked to list the workshops they offered by title, indicate their frequency, and give the enrollment figures for the period of 1999–2003 (Q3) (see table 1). Unfortunately, the investigators are unable to report the total number of workshops offered in this period, due to variations in the way that this data was reported (some respondents did not indicate how many times in a year that certain workshops were offered).

Table 2 data show that disaster planning and emergency management workshops have consistently had the most appeal for CE students. The topic is offered by the majority of respondents, has high enrollment, and is most likely to be

**Table 1.** Frequency of preservation workshops offered by continuing education providers (N varies)

Type of workshop	Annually	Biannually	More than once a year	Irregular or unspecified frequency	Total number of providers (N)
Care and handling/collections conservation	2	1	4	5	12
Book repair	0	1	2	3	6
Commercial binding	1	0	0	1	2
Management of environment/pest and mold control	2	0	1	3	6
Disaster planning/emergency management	3	0	4	5	12
Exhibits and security	0	0	1	4	5
Care of time-based (audiovisual) and visual materials	1	0	0	4	5
Reformatting and digitization	0	0	2	2	4
Grant writing and fund-raising	1	0	0	2	3



offered two or more times a year. The investigators suspect that the spike in enrollment for these workshops in 2000 may have been due to a state-sponsored program that promoted disaster planning in that year. Given the continued interest in disaster planning in the wake of recent natural disasters such as Hurricane Katrina and concern over terrorism, the researchers suggest that interest is likely to remain strong. Workshops focusing on the management of environmental conditions, including pest and mold control, show steady enrollment. Interest in the programs is not surprising, as they complement offerings in disaster planning. Problems with pests and mold often materialize as a result of water-related disasters. In considering the enrollment in 2001, the investigators believe that this increase may be another example of a state or regionally sponsored educational offering that generated the upswing.

The popularity of care, handling, and book repair programs also seems fairly consistent over the five-year period; half of the respondents report offering care and handling at least once a year (one-third of them offer it more than once a year). Investigators suspect that many of the enrollees in these classes are either paraprofessionals or professional librarians who did not have the opportunity to take preservation in their LIS graduate program. Also, those students who may have had exposure to the administrative side of preservation in previous courses, but not some of the more technical aspects, may find this workshop to be of interest. This topic also holds appeal for those practitioners working in institutions where resources are minimal; improvements in care and handling of materials, such as proper shelving and housekeeping, are often inexpensive to implement.

The data reveal several other interesting trends, particularly the increasing interest in the preservation of audiovisual media. Workshops in time-based and visual materials show steady increases in enrollment from 1999 to 2003, as more and more cultural heritage professionals become cognizant of the importance of preserving these types of materials.

Reformatting and digitization workshops are still in demand, although the downward trend indicates that their initial appeal may be waning somewhat due to the maturation

of institutional practices in establishing and sustaining digitization projects. While the investigators speculate that these classes initially attracted many librarians and archivists who were given the responsibility for managing or initiating digitization projects, the demand for this information also may be partially fulfilled through graduate education offerings in digital libraries that have emerged in the past decade.

The small number of individuals taking workshops in commercial binding may be tied to the reduction in the number of print subscriptions in favor of electronic journal subscriptions, as well as increased interest in reallocating staff and fiscal resources to digitization projects. These trends are not surprising, given the proliferation of new media as part the responsibilities of librarians and archivists. The heterogeneity of most collections demands that information professionals become versed in the preservation requirements of many different types of media.

Shifting resource and budgetary management may also affect grant writing and fund-raising efforts. While workshops focusing on these areas currently have the benefit of a solid enrollment rate, the investigators expect that institutions will continue to place a greater emphasis on securing outside funding, which may drive enrollment rates higher. The strain on operating budgets will compel institutions to educate their staff in how to write viable grant proposals that will stand out as superior in an increasingly competitive funding environment.

**Table 2.** Enrollment statistics for preservation workshops, 1999–2003

Type of workshop	1999	2000	2001	2002	2003	Total (1999–2003)
Care and handling/ collections conservation ( <i>N</i> =12)	319	351	231	267	424	1,592
Book repair ( <i>N</i> =6)	173	106	182	151	261	873
Commercial binding ( <i>N</i> =2)	14	11	12	21	9	67
Management of environment/ pest and mold control ( <i>N</i> =6)	56	42	110	86	71	365
Disaster planning/emergency management ( <i>N</i> =12)	515	855	483	439	386	2,678
Exhibits and security ( <i>N</i> =5)	17	63	26	16	122	244
Care of time-based (audiovisual) and visual materials ( <i>N</i> =5)	67	26	193	165	120	571
Reformatting and digitization ( <i>N</i> =4)	356	292	274	166	145	1,233
Grant writing and fund-raising ( <i>N</i> =3)	97	17	160	0	95	369

Attendance and participation in workshops about exhibits and security have some fluctuation, but interest remains strong. The diversity of collections presents institutions more opportunities to showcase their treasures and highlight a specific corpus of information amidst the greater body of work, yet the fragility and vulnerability of these materials requires archivists and librarians to learn how to exercise caution in presenting them.

### *Audience*

Eight respondents gave information about the types of students who enrolled in their workshops (Q16). The investigators calculated the mean of reported percentages for the following categories: administrators (13.1 percent), supervisors or department heads (15 percent), entry-level professionals (22.5 percent), support staff (i.e., paraprofessionals, 30.6 percent), students (7 percent), volunteers (7.8 percent), and others (4 percent). Other types of attendees noted by respondents included the general public and facilities staff. One respondent wrote in the margins of the survey instrument that the composition of the audience depends upon the topic of the workshop. While disaster preparation and recovery tended to draw administrators, supervisors, department heads, entry-level professionals, and support staff, the digitization workshops were composed of non-supervisory entry-level professionals, support staff, students, and faculty ("many of them senior faculty," a respondent reported). The high number of paraprofessionals and entry-level professionals (those segments of the audience comprise 53.1 percent) suggests that these individuals are arriving on the job with little or no exposure to preservation concepts or experience with preservation work. In particular, for entry-level professionals, the significant number of MLIS graduates who have had minimal preservation education is particularly troubling.

### *Reasons for Attending Preservation Workshops*

The reasons why attendees enroll in preservation workshops are varied. The 11 organizations offering data on this question (Q17) cited the following motives for enrollment: CE credits (3 organizations, 27.3 percent), workshop required for performing job duties (9 organizations, 81.8 percent), general interest in subject matter (9 organizations, 81.8 percent), and other reasons (4 organizations, 36.4 percent). The other reasons mentioned included:

- part of degree program;
- continuing education (no CE credits awarded);
- new job responsibility; and
- "course useful for understanding reasons behind techniques or work (for example, book repair, or introduction to XML)."

From this data, investigators surmise that students are most likely to enroll when they are beginning a new job, have new job responsibilities, or when the workshop offers a hot topic such as digitization with which students feel they should be familiar. The researchers also infer that employees may be more likely to take workshops if their employer subsidizes the cost of enrollment, which may help to explain the high percentage of organizations reporting that enrollees cite general interest as a reason for taking classes.

### *Credentials and CE Credits*

Among survey respondents, no CE providers offered a credential in preservation or preservation management, aside from one program that is affiliated with an LIS school (Q4). Several providers do offer CE credits, however (3 respondents out of 13, or, 23.1 percent, grant credits) (Q5). The investigators suspect that public and school librarians tend to be most interested in CE credits, as most academic librarians do not have CE requirements.

### *Faculty Resources*

The individuals who teach preservation in CE programs consist largely of professional conservators and preservation administrators (Q9). Many of these instructors work full-time or part-time for field service programs (comprising almost two-thirds of the total number of faculty), while the rest work as consultants for some of the smaller regional preservation alliances, and organizations that function largely on a volunteer basis. Just how many of the full-time and part-time staff members also "moonlight" as consultants for the smaller organizations is unknown, but anecdotal evidence suggests that the percentage of overlap between the two is significant. The investigators interpret the high number of faculty who work full-time for these organizations (42, or 63.6 percent) as an indication of survey respondents' strong commitment to preservation education.

### *Credentials of Educators*

Instructors of preservation workshops generally possess at minimum a professional-level master's degree (MLIS or equivalent); 42 of the instructors at the 13 responding organizations have such a background (Q10). Many of them also possess a post-master's degree certificate in conservation or preservation administration (15 instructors). Ph.D.s teaching CE courses are a rarity; the lone Ph.D. reported in the survey was qualified in history, not library science. Ph.D.s serving as CE instructors are likely to remain scarce as few Ph.D. students are specializing in preservation at this time. In addition, many of the workshops focus on practical day-to-day skills, with which many Ph.D.s may not be as familiar. Respondents also cited extensive experience in

conservation benchwork as a valued credential. Other types of credentials mentioned (by 9 instructors) included benchwork, a degree in museum studies, and an internship in a preservation department at an Association of Research Libraries (ARL) library. Because of the practical emphasis of many of the CE workshops, practitioners with significant technical expertise and administrative experience appear to be the most desirable candidates for instructor positions.

#### *Hiring in Preservation CE*

The survey asked respondents to indicate whether or not they planned to hire additional instructors to teach CE courses in preservation. Out of the 13 respondents to this question, 7 (53.8 percent) reported in the affirmative, while 6 (46.2 percent) said that they had no plans to hire additional staff at this time (Q11). Those who responded in the affirmative (and one respondent who had responded in the negative) indicated the following types of field service positions would be offered: 3 organizations would like to hire a conservator on a full-time basis, 4 organizations would like to hire consultants on a contractual basis, and 1 organization would like to use more volunteers (Q12). Investigators interpret these data as a sign of positive growth for CE in the preservation arena.

#### *The Preservation Curriculum in CE*

As might be expected, workshops tend to be much more focused than graduate school courses, less theoretical, and oriented toward issues of practice and technique. Table 4 summarizes the types of topics and formats covered in workshops offered by organizations that participated in the survey (Q6). Disaster recovery and control of environmental hazards have significant coverage in preservation education workshops. The data also show the continued importance of teaching preservation of paper-based media, book repair, enclosures and housing, and visual materials. While digitization, electronic media objects, audiovisual media, and electronic records have received some attention by CE providers, the primary focus of these workshops is still on the perennial preservation imperatives of books, paper, and photographs.

Other topics and activities mentioned included “meta-data relating to digitization or preservation,” “copyright as it relates to digitization,” and “packing and shipping.” Other formats mentioned included:

**Table 3.** Preservation faculty in continuing education (broken down by rank; N=13)

Type of faculty	Number of faculty	Percentage of total number of faculty
Full-time staff (conservation training)	29	43.9
Full-time staff (preservation administration training)	13	19.7
Part-time staff (conservation training)	1	1.5
Part-time staff (preservation administration training)	2	3.0
Consultants hired on contract basis	20	30.3
Volunteers	1	1.5
<b>Total</b>	<b>66</b>	<b>100*</b>

\*Percentages do not add up to 100 due to rounding.

- “all non-paper-based collections: ceramics, glass, metals, organic material, plastics, textiles, ptgs [paintings], etc.”;
- “paintings, ethnographic material (including Native American), art on paper, frames, polychrome sculpture”;
- scrapbooks; and
- archival material.

Because a number of the organizations offer workshops in the conservation of cultural heritage objects, they cited various other formats that one may not consider to be part of the library or archival preservation agenda. Interestingly, conservation treatments are not often taught; this omission may be related to the distinction between activities that may be carried out by preservation administrators and support staff and those repairs and treatments that require the attention of a trained conservator.

#### *Preservation Issues and Related Workshops*

Preservation also plays a part in other workshops in which it is not the main focus. In particular, workshops on archives and manuscripts, special collections, and collections management are most likely to discuss preservation issues. Other workshop topics mentioned included rare books librarianship, digital libraries, technical services, and security (see table 5). Many organizations cited this question as “not applicable” because all of their workshop offerings focus on preservation (Q7).

Survey participants were also asked to list workshops that included “preservation as a significant component

**Table 4.** Topics, activities, and formats covered in continuing education preservation workshops (N=13)

Topic or Format Covered	Number of Providers Offering	Number of Providers Not Offering
<b>(Topics)</b>		
History and theory of conservation/preservation	5 (38.5%)	8 (61.5%)
Ethics of conservation/preservation	5 (38.5%)	8 (61.5%)
Conservation science (including materials deterioration)	5 (38.5%)	8 (61.5%)
Book repair and rebinding (including hands-on practice)	8 (61.5%)	5 (38.5%)
Conservation treatments	3 (23.1%)	10 (76.9%)
Enclosures and housing	8 (61.5%)	5 (38.5%)
Reformatting options (microfilming, photocopying, digitization)	7 (53.8%)	6 (46.2%)
Control of environmental conditions (temperature, relative humidity, air quality, pest management)	10 (76.9%)	3 (23.1%)
Preservation assessment (surveying and policy recommendations)	7 (53.8%)	6 (46.2%)
Management (personnel, fiscal, facilities)	4 (30.8%)	9 (69.2%)
Emergency preparedness and disaster recovery	12 (92.3%)	1 (7.7%)
Staff and user education	6 (46.2%)	7 (53.8%)
Other topics	2 (15.4%)	11 (84.6%)
<b>(Formats)</b>		
Paper-based media (books and documents)	12 (92.3%)	1 (7.7%)
Photographic media	12 (92.3%)	1 (7.7%)
Visual materials	7 (53.8%)	6 (46.2%)
Audiovisual media (sound recordings and moving images)	7 (53.8%)	6 (46.2%)
Magnetic and optical media (removable storage media)	6 (46.2%)	7 (53.8%)
Electronic records	4 (30.8%)	9 (69.2%)
Digital library objects (both digitized and "born digital")	5 (38.5%)	8 (61.5%)
Other formats	4 (30.8%)	9 (69.2%)

(defined as spending at least 10 percent of workshop time speaking about preservation issues)" (Q8). Only 2 out of 13 organizations reported such workshops, largely because many of these organizations only offer workshops in the area of preservation. Organizations that offer other types of workshops list the following classes as having a significant preservation component:

- Introduction to Library Collections (30 percent of workshop);
- "Digital topics" (10 percent of workshop);
- Commercial Library Binding (60 percent of workshop); and
- Local History and Special Collections (30 percent of workshop).

#### *Plans for the Future*

Ten out of 13 respondents, or 76.9 percent, responded affirmatively to the question, "Does your institution plan to introduce new workshops in preservation in the near future (in the next 1–3 years)?" (Q13). Table 6 summarizes those subjects seen as potential new workshops (Q14, respondents could mark more than one choice).

Respondents appear to be most interested in adding workshops to deal with photographic and other types of visual materials. Somewhat counterintuitively, interest in reformatting and digital preservation is weak, leading investigators to wonder whether or not current offerings are seen as sufficient and meeting demand. Four providers indicated that they desired to add a collections conservation laboratory class, which researchers interpret as a response to students' continuing demand for more hands-on opportunities. This data may also suggest that institutions have increasing interest in supporting in-house repair programs as part of a triage strategy (identifying and repairing minor damage early on, in hopes of increasing the number of times materials can be circulated).

Other future workshops mentioned included the following:

- "permanence and safety of artist materials";
- "writing a disaster plan," "disaster planning," "disaster response";
- "conducting building risk assessments";
- "collection care planning and management, conservation/preservation planning, handling and housekeeping for collections, earthquake supports and mounts, protecting collections on display and in storage, integrated pest management";
- "environmental threats"; and
- "designing conservation concerns into new buildings and additions."



As these topics indicate, providers are most interested in offering new workshops that target specific topics within the broader areas already defined. The nature of CE workshops, which rarely last longer than a day, encourages providers to narrow the focus and scope of programs.

The other three organizations showed no interest in additional workshops in the area of preservation (Q15). Reasons cited included:

- low enrollment in current offerings (1 respondent);
- lack of available expertise to offer workshop (1 respondent);
- lack of fiscal resources (1 respondent); and
- “[organization] will merge with [professional association] and preservation will become a component of their workshop offerings.”

Because of the small number of responses, identifying any sort of trend from this data is difficult, other than the fact that a lack of human and fiscal resources is slightly more likely to affect an organization’s ability to offer new workshops than other factors.

## Conclusion

Data from this study supports the premise that CE is picking up much of the slack that LIS programs are creating, offering programs on multiple topics not given sufficient coverage at the graduate level; additionally, CE courses often provide the only preservation education for paraprofessionals and administrators who did not have the benefit of such a course in their graduate program.

After examining the survey results, the investigators wonder whether it is problematic that CE providers often serve as the primary source for preservation education. When comparing the current state of preservation education to the circumstances that existed fifteen years ago, the research team sees little actual change over this period. The specificity of the programs and the brevity of the encounters often hinder efforts to transition CE into the kind of educational experience envisioned by Cloonan and others, i.e., the opportunity to facilitate the sharing of knowledge through “experience, creativity, analysis, and the exchange of ideas.”<sup>20</sup> Hence, CE should not be considered a substitute for graduate education, but ideally, a supplement that builds upon a foundation already laid by LIS programs, and a path towards specialization in preservation. The investigators suggest that CE providers and institutions consider exploring new avenues for providing the type of in-depth experience introduced by the intensive models (for example, Rutgers and the other preservation management institutes offered in the past), but adapted to the online environment,

**Table 5.** Preservation integrated into other workshops? (N=13)

Other Workshops	Yes	No
Archives and manuscripts	3 (23.1%)	10 (76.9%)
Rare books librarianship	1 (7.7%)	12 (92.3%)
Map librarianship	0 (0%)	13 (100%)
Special collections	4 (30.8%)	9 (69.2%)
Collections management/development	4 (30.8%)	9 (69.2%)
Digital libraries	2 (15.4%)	11 (84.6%)
Records management (including electronic records management)	0 (0%)	13 (100%)
Technical services (including serials)	2 (15.4%)	11 (84.6%)
Other (Security)	1 (7.7%)	12 (92.3%)
Not applicable	7 (53.8%)	6 (46.2%)

**Table 6.** Interest in Expanding Preservation Curricula (N=10)

Workshop Topic	Number of Respondents
Introductory course in preservation history	1
Collections conservation laboratory	4
Reformatting	1
Photographic media	4
Visual materials	5
Audiovisual media	2
Digital preservation	1
Other courses	8

which would keep costs down and make them more accessible to students whose institutions could not support onsite attendance. Although not all topics lend themselves easily to the online environment, digital preservation is an area that seems particularly suited to this model.

The investigators found that the data generated from this study answered many of the questions raised about the “who, what, when, and where” of CE in preservation, but did not sufficiently capture the underlying explanations of certain phenomena. Questions that remain unanswered include:

- Is growth in CE driven more by demand or by the availability of government subsidies of both provider programs and enrollment in those programs? What happens to CE programs if government funding is severely curtailed or eliminated—will employing institutions assume the full costs of providing CE opportunities to their employees?

- How do graduate LIS curricula influence CE curricula, and vice-versa? Although CE programs can be more agile in offering new topics, in areas such as audiovisual and visual materials, to what level of complexity can CE aspire, given the brief nature of most workshops?

The investigators feel that these questions are best addressed using another methodological approach, ideally a qualitative one. Thus this study represents the first phase of a larger research project. Building upon the initial results of the survey, the investigators hope to follow up with in-depth interviewing of key informants involved in preservation CE at selected sites. After analyzing the interview data and comparing those results to those of the survey, the investigators hope to have a more complete picture of the state of preservation CE in the United States, which will be used to create recommendations for directing preservation CE in the next decade.

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## Appendix: Survey Instrument

### Preservation Education Needs for the Next Generation of Information Professionals

#### Survey for Educators Teaching Preservation in Field Service Programs and Other Providers of Continuing Education for Preservation

##### Types of Courses/Frequency Offered

1. Does your organization offer workshops on preservation and/or conservation of library/archival materials?  
☐ Yes (go to next question)  
☐ No (go to question 18)
2. How many workshops do you offer on preservation of library/archival materials? Do not include courses that merely incorporate preservation as part of a related topic (such as archives or collection development) unless preservation issues constitute at least one-third of the material covered.  
☐ 1  
☐ 2  
☐ 3  
☐ More than 3
3. List each preservation course offered, and indicate the regularity with which it is offered. Also indicate its enrollment over the last five years, broken down by years.

Course Title	Frequency	Enrollment over the Last Five Years
		2003: 2002: 2001: 2000: 1999:
		2003: 2002: 2001: 2000: 1999:
		2003: 2002: 2001: 2000: 1999:
		2003: 2002: 2001: 2000: 1999:
		2003: 2002: 2001: 2000: 1999:

4. Does your organization offer a credential in preservation?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

5. Does your organization offer continuing education credits?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

### **Content of Preservation/Conservation Coursework**

6. What topics are covered in preservation coursework? Check all that apply.

\_\_\_\_\_ History and theory of conservation/preservation

\_\_\_\_\_ Ethics of conservation/preservation

\_\_\_\_\_ Conservation science (including materials deterioration)

Activities:

\_\_\_\_\_ Book repair and rebinding (including hands-on practice)

\_\_\_\_\_ Conservation treatments

\_\_\_\_\_ Enclosures and housing

\_\_\_\_\_ Reformatting options (microfilming, photocopying, digitization)

\_\_\_\_\_ Control of environmental conditions (temperature, relative humidity, air quality, pest management)

\_\_\_\_\_ Preservation assessment (surveying and policy recommendations)

\_\_\_\_\_ Management (personnel, fiscal, facilities)

\_\_\_\_\_ Emergency preparedness and disaster recovery

\_\_\_\_\_ Staff and user education

\_\_\_\_\_ Other: \_\_\_\_\_

Formats:

\_\_\_\_\_ Paper-based media (books and documents)

\_\_\_\_\_ Photographic media

\_\_\_\_\_ Visual materials (architectural drawings, maps, prints)

\_\_\_\_\_ Audiovisual media (sound recordings and moving images)

\_\_\_\_\_ Magnetic and optical media (removable storage media)

\_\_\_\_\_ Electronic records

\_\_\_\_\_ Digital library objects (both digitized and “born digital”)

\_\_\_\_\_ Other: \_\_\_\_\_

### **Related Coursework**

7. How do you incorporate preservation into other workshops? Please check all that apply.

\_\_\_\_\_ Archives and manuscripts

\_\_\_\_\_ Rare books librarianship

\_\_\_\_\_ Map librarianship

\_\_\_\_\_ Special collections

\_\_\_\_\_ Collections management/development

\_\_\_\_\_ Digital libraries

\_\_\_\_\_ Records management (including electronic records management)



- \_\_\_\_\_ Technical services (including serials)  
 \_\_\_\_\_ Other: \_\_\_\_\_  
 \_\_\_\_\_ Not applicable

8. Please list any related courses that include preservation as a significant component (defined as spending at least 10 percent of workshop time speaking about preservation issues).

Course Title	Percentage of Course Devoted to Preservation Issues

9. Who teaches preservation workshops for your organization? Fill in the blanks with the number of instructors. Do not count instructors who merely incorporate preservation as part of a related topic (such as technical services).

- \_\_\_\_\_ Full-time staff with conservation training and experience  
 \_\_\_\_\_ Full-time staff with preservation administration training and experience  
 \_\_\_\_\_ Part-time staff with conservation training and experience  
 \_\_\_\_\_ Part-time staff with preservation administration training and experience  
 \_\_\_\_\_ Consultants (hired on a contractual basis to teach particular courses)  
 \_\_\_\_\_ Volunteers

10. How many faculty members hold:

- \_\_\_\_\_ A professional-level master's degree?  
 \_\_\_\_\_ A certificate of advanced study in conservation or preservation?  
 \_\_\_\_\_ A Ph.D. degree?  
 \_\_\_\_\_ Another degree or certification (please list types: \_\_\_\_\_)?

11. Do you have any plans to hire additional staff or recruit volunteers to teach in the area of preservation/conservation?

- \_\_\_\_\_ Yes (go to next question)  
 \_\_\_\_\_ No (go to question 13)

12. If yes, what type(s) of position(s) would be offered? Fill in the blanks with the number of positions.

- \_\_\_\_\_ Full-time staff position for conservator  
 \_\_\_\_\_ Full-time staff position for preservation administrator  
 \_\_\_\_\_ Part-time staff position for conservator  
 \_\_\_\_\_ Part-time staff position for preservation administrator  
 \_\_\_\_\_ Consultant (hired on a contractual basis to teach particular courses)  
 \_\_\_\_\_ Volunteer work

13. Does your institution plan to introduce new workshops in preservation in the near future (in the next 1–3 years)?

- \_\_\_\_\_ Yes (go to next question)  
 \_\_\_\_\_ No (go to question 15)

14. If yes, please list what type(s) of course(s) will be offered and when you hope to offer it (them):

Year	Type of Course
_____	Introductory course in preservation history, theory, science, etc.
_____	Collections conservation laboratory experience (book repair, rebinding, deacidification, other treatments)
_____	Reformatting (microfilming, copying, digitization)
	<i>Specialized preservation seminars in:</i>
_____	Photographic media
_____	Visual materials (architectural drawings, maps, prints, etc.)
_____	Audiovisual media (sound recordings, moving images)
_____	Digital preservation (electronic records and other digital media)
_____	Other: _____

Go to question 16.

15. If no, why not? Check all that apply.

\_\_\_\_\_ Low enrollment in current preservation offerings

\_\_\_\_\_ Low enrollment in past preservation offerings

\_\_\_\_\_ Preservation felt to be discussed sufficiently in other workshops on related topics (e.g., technical services, collection development)

\_\_\_\_\_ Lack of available expertise to offer workshop

\_\_\_\_\_ Lack of fiscal resources

\_\_\_\_\_ Other: \_\_\_\_\_

### **Audience**

16. Please estimate average percentages of students who enroll in coursework:

\_\_\_\_\_ Administrators

\_\_\_\_\_ Supervisors or department heads

\_\_\_\_\_ Entry-level professionals

\_\_\_\_\_ Support staff (paraprofessionals)

\_\_\_\_\_ Students

\_\_\_\_\_ Volunteers

\_\_\_\_\_ Other: \_\_\_\_\_

17. What reasons do attendees give for enrolling in your courses? Check all that apply.

\_\_\_\_\_ Continuing education credits

\_\_\_\_\_ Course required for performing job duties

\_\_\_\_\_ General interest

\_\_\_\_\_ Other: \_\_\_\_\_

**Future Participation in This Study of Preservation Education Needs**

18. May the investigators of this study contact you or a representative of your institution again about participating in the next phase of this study? Please check the appropriate box below with your preference and include contact information if requested.

\_\_\_\_\_ No, I am not interested in further participation. Please do not contact me again.

\_\_\_\_\_ Yes, I (or a representative of my institution) would be interested in further participation. Please contact \_\_\_\_\_ at the following address, phone number, and/or e-mail: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

Thank you for participating in this survey! Any further questions or comments may be directed to Dr. Karen F. Gracy (kgracy@pitt.edu) or Ms. Jean Ann Croft (jeanann@pitt.edu).

# DACS and RDA

## Insights and Questions from the New Archival Descriptive Standard

By Beth M. Whittaker

*Describing Archives: A Content Standard (DACs) is the new archival content standard published by the Society of American Archivists (SAA). The publication of this forward-thinking and comprehensive response to changing information needs and technologies should be of interest to all cataloging communities. DACs raises issues about content standards for resource description that should be addressed much more broadly. The library cataloging community is in the process of an extensive revision of its cataloging codes, and new approaches in this standard appear to be embodying some of the same concepts as DACs. DACs, therefore, can be seen as a smaller and more focused implementation of some of the principles that will emerge in the new Resource Description and Access (RDA). Simultaneously, the standard can be used to examine whether taking some of these developments further would improve access to materials.*

**D***escribing Archives: A Content Standard (DACs) is the new archival content standard published by the Society of American Archivists (SAA).<sup>1</sup> Not simply an updated manual for cataloging archives, it is a forward-thinking and comprehensive response to changing information needs and technologies. Although a relatively recent publication, DACs has already generated discussion in the archival community. DACs raises issues about content standards for resource description that should be addressed beyond the archival community, as well. As the library cataloging community is in the process of an extensive revision of its cataloging codes, DACs can be seen as a smaller and more focused implementation of some of the principles that will emerge in the new Resource Description and Access (RDA), which will replace the Anglo-American Cataloguing Rules (AACR).*

### Archival Description and Library Cataloging

In order to understand how innovative *DACS* truly is, surveying the context from which it emerged is necessary. This paper will not provide a detailed history of archival cataloging, although general sources are available to do so.<sup>2</sup> Since *DACS* owes its structure to the characteristics of archival material, a few points are worth mentioning, particularly historic milestones in archival content standards and cataloging codes.

One of the most prominent features of archival material (from a cataloging point of view) is the lack of a chief source of information. Kiesling has called archives a “non-transcription community,” while books and serials catalogers

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form a “transcription community,” in which bibliographic descriptions are based largely on transcription of information on items at hand.<sup>3</sup> Other non-transcription communities are becoming more interested in exploring the role of their descriptive information in a more bibliographic context. In this way, archivists can serve as a model for film and video catalogers, computer files catalogers, museum objects catalogers, and others.

Another prominent feature of archival description is the relationship among several types of abstracts of collections: standard bibliographic records, finding aids, inventories, and so on. A one-to-one correspondence between the record and the “thing” being cataloged is not present. By the time descriptions of huge archival collections are recorded in bibliographic records, much information has been lost due to system restrictions and descriptive conventions. In observing this hierarchy of metadata in 1995, Hensen wrote, “It is absurd to imagine that the conventions of author-title cataloging with two or three subject headings could even begin to capture the complexity of most archival materials (even if they *had* authors and titles.)”<sup>4</sup> This perception of the limitations of library cataloging to describe archival materials heavily influenced the development of DACS.

Prior to 1967, rules for manuscript cataloging did not appear in library cataloging manuals at all. Choice of entry for manuscripts was addressed in the 1949 *A.L.A. Cataloging Rules for Author and Title Entries*, but no guidance for description was given.<sup>5</sup> The 1967 *Anglo-American Cataloguing Rules* (AACR1) introduced rules for describing both individual manuscripts (200–204) and collections (205–207).<sup>6</sup> *Anglo-American Cataloguing Rules*, 2nd ed. (AACR2) deviated from AACR1’s approach.<sup>7</sup> This edition created rules in chapter 4 for cataloging manuscripts that are have been characterized as “not archival.”<sup>8</sup>

*Archives, Personal Papers, and Manuscripts* (APPM) was a response from the archival community to AACR2, which was seen as inadequate for modern manuscript and archival description.<sup>9</sup> APPM demonstrated that “the system of library-based cataloging techniques embodied in the second edition of *Anglo-American Cataloguing Rules* (AACR 2) could be adapted to serve the needs of the archival community.”<sup>10</sup> In this way, it filled a niche for archives similar to other format-specific implementations of AACR.

In recent years, two major developments affecting archival description have emerged: the International Council on Archives’ *General International Standard Archival Description* (ISAD(G)) and *International Standard Archival Authority Record for Corporate Bodies, Persons, and Families* (ISAAR (CPF)).<sup>11</sup> Just as the Anglo-American cataloging community interprets the larger International Standard Bibliographic Description (ISBD) framework, American archival cataloging rules have attempted to respond to changes in the international ISAD(G). ISAD(G)

might be seen as an archival Dublin Core set of descriptive elements. These core elements can be used at any level of description (e.g., folder or series)

Attempts to create a joint descriptive standard for the American and Canadian archival communities and to accommodate international standards ISAD(G) and ISAAR(CPF) reached a state of hopeful optimism. Although there was not enough common ground between American and Canadian archivists to create joint content standards, “the dialogue between Canadian and U.S. archivists will surely continue.”<sup>12</sup> In the meantime, DACS corresponds very closely to the elements of ISAD(G) and ISAAR(CPF) with only one element excluded. The Level of Description element is excluded based on the acknowledgement that no consensus exists on how to apply terminology for more than five levels of description, and that recording such complexity does not in itself link multilevel descriptions.<sup>13</sup>

DACS, like APPM before it, serves as a replacement for the skeletal rules in AACR2 chapter 4 for cataloging manuscripts, but makes conscious departures from AACR tradition in some ways. It “provides more specific guidance in the description of contemporary archival materials and eliminates some of the less user-friendly aspects of AACR2, including many abbreviations and the coded recording of uncertain dates, conventions necessitated by the space limitations of 3 x 5 catalog cards but no longer helpful or necessary in modern information systems.”<sup>14</sup> Eliminating these less user-friendly aspects may pose the greatest challenge to our thinking about cataloging rules.

## Structure of DACS

DACS begins with a “Statement of Principles,” a “recapitulation of generally accepted archival principles.”<sup>15</sup> This section recaps essential ways in which describing archival materials may differ from describing library materials, particularly in fundamental areas such as *respect des fonds*, the relationships between arrangement and description, and the description of creators. Next is an “Overview of Archival Description,” which outlines both Access Tools such as MARC 21 and Encoded Archival Description (EAD) finding aids, as well as Access Points that should be provided.

“Part I: Describing Archival Materials” includes “rules to ensure the creation of consistent, appropriate, and self-explanatory descriptions of archival material.”<sup>16</sup> “Part II: Describing Creators” offers a uniquely archival perspective. Naming creators is not sufficient. “Additional information is required regarding the persons, families, and corporate bodies responsible for the creation, assembly, accumulation, and/or maintenance and use of archival materials being described.”<sup>17</sup> This indicates the importance of context in archival description.

“Part III: Forms of Names” consists of “information about creating standardized forms for the names of persons, families, or corporate bodies associated with archival materials . . . . These can be used in descriptive elements, archival authority records, or as index terms.”<sup>18</sup> Finally, *DACS* concludes with appendixes, a glossary, a list of companion standards, crosswalks, and full EAD and MARC 21 examples.

### ***DACS, AACR2, and RDA***

At the time of *DACS*’s publication, its departures from *AACR2* were nearly revolutionary. In summing up the changes in archival cataloging practices brought about by the possibilities of EAD-encoded finding aids and their relationship to cataloging, Hensen suggested that new cataloging paradigms had not yet emerged. Referring to the promise of revolutionary bibliographic control at the International Conference on the Principles and Future Direction of AACR convened in 1997, he believed the

inertia inherent in existing catalogs of millions upon millions of bibliographic records is sufficient to discourage most library bureaucrats and administrators from undertaking massive and systematic changes—particularly in an environment that is itself so volatile as to defy reasonable calculation. . . . [The] archival community . . . concluded that it must proceed on its own, while the library world may yet move more decisively.<sup>19</sup>

In the last few years, the ongoing process of development of new cataloging standards for mainstream materials has revealed more obvious parallels between *DACS* and the emerging successor to *AACR2*. The prospectus for *RDA* illustrates clearly that some of the major issues articulated in *DACS* are being considered within the library cataloging community as well.<sup>20</sup>

Prominent among them is that these rules should be based on principles, should cover all types of materials, should be easy to use and interpret, and “will be used as a resource beyond the library community to facilitate meta-data interoperability.”<sup>21</sup> This broadening of the scope of AACR underscores the emerging Web-format world. Also important is the statement that “the language needs to be clearer and more direct, and that library jargon should be avoided.”<sup>22</sup>

In keeping with the idea that *RDA* is marketed more towards metadata communities beyond libraries, rules will be structured “to facilitate application to a wide variety of resources” with general instructions that are “formulated in clear, concise, and simple terms,” supplemented with more detailed instructions applicable to complicated situations.<sup>23</sup>

In addition, the standard will encompass a “general movement towards simplification and an emphasis on principle-based cataloger’s judgment.”<sup>24</sup> Another point of similarity is that *RDA* “establishes a clear line of separation between the recording of data and the presentation of data.”<sup>25</sup>

*RDA*’s three-part structure seems to also closely parallel that of *DACS*, with the first part focusing on resource description. The second will cover the provision of access points for “relationships” and the third covering the formulation of name and title access points and other data used for authority control.<sup>26</sup>

The development of format-specific rules for archives and manuscripts within the context of *RDA* also merits mention. The Library of Congress (LC) and SAA have both responded to proposed archival rules to supersede *AACR2* chapter 4 in *RDA*. While the future integration of these comments and *DACS*’s format-specific rules into *RDA* remains unclear, the standards will likely continue to overlap to some degree.<sup>27</sup>

### **Major Issues Addressed in *DACS***

#### **Output Neutrality**

The output neutrality of *DACS* underscores a major question for the cataloging community at large. Is it necessary for cataloging standards, which have existed in a MARC-based world for at least twenty years (and a card-based world for much longer) to become output neutral? In fact, MARC records are simply manifestations of descriptions that could be output in any number of ways. For archival material, longer, more complex descriptions can be created and coded as instances of EAD finding aids, which is why *DACS* provides examples to accompany its guidelines in both MARC and EAD formats.

Catalogers do not need to be convinced of the value of standardization. Digital projects describing images at the item level, for example, may use part of our descriptive conventions in formulating name headings, and bibliographic descriptions themselves have been exposed to a larger audience (and divorced from the context of the catalog) through the Open WorldCat project.<sup>28</sup> Since data exchange formats could change, the future needs of the archives community could continue to be served by *DACS* descriptions in an increasingly mapped and cross-walked environment. Descriptions (or parts of descriptions) coded in an XML format (such as EAD) are potentially reusable in limitless ways.

This bifurcation of content and carrier appears to be the direction being taken by *RDA*. The Joint Steering Committee for Revision of AACR states that “what is being developed is in effect a new standard for resource description and access, designed for the digital world” and that the new approach for *RDA* will have “instructions for recording

data [that] will be presented independently of guidelines for data presentation.”<sup>29</sup>

This major change likely will be more difficult to implement in a library world wedded to forms of display derived from catalog records than in the archival world, accustomed to many different forms of description. For example, how many catalogers still spend time “upgrading” records while copy cataloging by changing punctuation to conform to ISBD conventions? While this is nearly instinctive behavior among many catalogers, the content may remain essentially the same but time and energy is being spent on adapting the carrier.

### Content versus Context

Closely related to output neutrality is the separation of descriptive content from historical or biographical context. In the cataloging world, these two factors have been closely linked. For example, although authority records reside in library catalogs, they provide context for understanding name headings, rather than describing materials created by the entities represented in the authority records themselves. The increasingly common use of library authority files (particularly the LC Name Authority File) for nonlibrary cataloging indicates a potential need to broaden their usefulness. Tillett asserted, “as we open our authority files for access through the Internet, we find the authority file becoming a useful tool for other librarians and information professionals and even end-users.”<sup>30</sup>

How much more might this be the case in the archival world, where archivists who maintain official files are often the acknowledged experts on a particular person or organization? Although not explicitly mentioned in *DACS*, the creation of a parallel structure for creator information to EAD, called Encoded Archival Context, is worth examination.<sup>31</sup> Archives have traditionally maintained extensive supplemental documentation on creators, necessary to fulfill their missions, particularly when the creators have a relationship with the archives themselves (such as in institutional archives.) *DACS* explicitly separates these two types of information in theory, with the potential to allow other users to benefit from this information in a variety of ways, rather than simply serving as a reference for librarians and archivists. Users with systems that combine these types of records can continue to create functional descriptions.

### Levels of Description and Data Elements

The existence of levels of description in archival practice is a central factor in *DACS*, meriting a brief but important first chapter. Haworth has argued that “given its hierarchical structure, archival description presents complex challenges

that the MARC data structure was never designed to accommodate.”<sup>32</sup> This complexity of relationships is not unique; museum collections, digital projects, and other emergent communities have similar, if not identical issues. In cultural-heritage communities, descriptions of collections are often as—if not more—important to users than are descriptions of individual items, since the presence of an item within a larger collection often conveys important information about its provenance and use.

Although many catalogers (and perhaps most non-catalogers) think of the MARC structure as flat, AACR2 did articulate levels of description; MARC has developed to accommodate relationships among these levels, most notably with linking fields and series tracings. These mechanisms are often difficult to exploit in library systems, but they exist. The widespread inclusion of table of contents information in MARC records, for example, has changed the nature of the relationship between the piece and the record and opened the possibility of a network of relationships among descriptions. The inherent relationships among serials, which merge, cease, resume, and split off from one another, highlight another area where complexity built into MARC could be illustrated better in catalog records. Outside the MARC world, links between digital files, such as images and the metadata describing them within a database, show additional possibilities to highlight these relationships. The importance of levels of description successfully articulated by *DACS* for archival material should encourage us to explore this concept in other types of materials as well.

The *Functional Requirements for Bibliographic Records* (FRBR) model also will be on the minds of catalogers examining the new standard. This is particularly interesting as it points out parallels between “levels of description” and the FRBR model. For example, if collections are treated as works, what is the role of FRBR in archival descriptions of archival series or even items?<sup>33</sup> Can individual letters be seen as manifestations of the content of a larger collection?

Another bold statement that appears, at first, to contradict existing MARC structure is *DACS*’s assertion that data elements are mutually exclusive—“The purpose and scope of each element has been defined so that the prescribed information can go in one place only.”<sup>34</sup> How would this principle be applied in a MARC universe, particularly where catalogers have often deliberately replicated information from coded fixed fields in narrative variable fields in an attempt to overcome limitations of library systems? Perhaps restricting information to one place only would force the issue of displaying now-invisible content hidden in coded strings (such as 007 fields.) An approach more consistent with the spirit of *DACS* might call instead for standardizing such information in eye-readable fields in ways that are immediately comprehensible to users.

### Abbreviations

This spirit of user-friendliness is very prominent in *DACS*'s recommendations rejecting standard abbreviations. Specific examples include the extent element (2.5) where a note explains, "It is recommended, though not required, that terms reflecting physical extent be spelled out rather than abbreviated, as abbreviations may not be understood by all users."<sup>35</sup> The emphasis on the user is one of *DACS*'s more controversial recommendations.

When considering the amount of time spent to type "feet" versus "ft.," for example, enhancing clarity for a variety of users perhaps not fluent in English and very likely unfamiliar with jargon is worth a sacrifice of a few keystrokes. Depending on the system used for creating *DACS*-compliant descriptions, abbreviations could be expanded automatically, in much the same way that some integrated library systems expand relator codes into relator terms between MARC records and public displays. In rejecting a holdover from a paper-based descriptive environment, *DACS* is pushing the envelope in a way that could be revolutionary if applied more broadly.

### Creatorship and Name Headings

*DACS* takes a different approach to authorship than *AACR2*, defining "creator" as "a person, family, or corporate body that created, assembled, accumulated, and/or maintained and used records in the conduct of personal or corporate activity. A creator can also be responsible for the intellectual content of a single item."<sup>36</sup> *AACR2* does not define a creator at all, but instead defines personal author as "the person chiefly responsible for the creation of the intellectual or artistic content of a work," along with specific functions like "editor," "producer," and "collaborator."<sup>37</sup> Rules in *AACR2* chapter 21 also detail concepts of shared responsibility and mixed responsibility. Despite this sophistication, even experienced catalogers sometimes have trouble determining how to apply these rules in complex situations.

One example highlights the difficulty of applying these concepts in the current bibliographic context. Though an individual could be a "personal author" for a blog, the content linked from the author's comments on news articles complicates the authorship to a mind-boggling degree. A blogger may be a creator, but—according to *AACR2* terminology—is probably not an author. This complexity of creatorship is present in other formats as well, although mainstream cataloging practice has tended to try to fit these formats into a bibliocentric box, with detailed rules for determining chief responsibility even for works with complex creatorship.

One of many frustrations wrought for catalogers by the specificity of the MARC format is the distinction between

creators as names and as subjects. Depending on a library system's indexing rules, as well as local indexing decisions often driven by cost, creators of collections may need to be indexed twice, as both 6xx (subject) and 7xx (name) fields, in order to ensure users will be able to locate relevant material however they search. This leads to duplication that in itself can sometimes be misleading. Cataloging rules continue to appear needlessly complicated to the outside world.

One way in which these distinctions between "author" and "subject" headings have been acutely confusing is the use of family names. *AACR2* does not allow for describing families as "authors," yet "the use of family names as creators in the description of archives was part of previous bibliographic cataloging codes, has a long tradition in archival descriptive practice, and has been officially sanctioned at least since the first edition of *APPM* was published by the Library of Congress in 1983."<sup>38</sup> *DACS* makes this explicit in 12.29A, calling for the addition of the word "family" to the family surname.<sup>39</sup> Although this raises the question of how *DACS*-based records would function in a MARC catalog of AACR records, library cataloging guidelines also are moving in this direction.

A final challenge to traditional cataloging practice is hinted at in *DACS*'s treatment of name headings, a challenge that may deserve to be taken up much more broadly. Is including detailed and often confusing rules about how to form name headings in each cataloging code necessary? Could one simply point creators of descriptions directly to the (de facto) authority file, and provide abbreviated guidance about forming headings when catalogers encounter names that are *not* in the authority file? *DACS* begins the process of removing specialist names from its basic content standard with the reference to AACR rules to create Islamic names.<sup>40</sup>

### Artificial Collections

Finally, one of the major differences between *DACS* and earlier archival cataloging standards is the elimination of the concept of the "artificial collection." "Materials that are gathered together by a person, family, or organization irrespective of their provenance are intentionally and consciously assembled for some purpose. Most repositories in the U.S. have such collections, and they need to be handled and described the same way as materials traditionally considered to be 'organic.'"<sup>41</sup> In addition to standardizing the way archival collections are described, this development has a potentially interesting implication for handling non-archival material, as well. Recent national efforts to reduce backlogs in special collections, for example, have often called for greater use of collection-level records for materials such as books, maps, or pamphlets. The forthcoming edition of the new descriptive rules for rare books include an appendix



on collection-level cataloging, which bridges an uncomfortable gap between the transcription and non-transcription approaches.<sup>42</sup>

### Areas for Further Exploration

While *DACS* and *RDA* both seem revolutionary in many respects, perhaps some of these suggestions have not been taken far enough. If a drive to simplify records and tailor resource description to both users and the materials themselves are noble goals, several areas could be further developed. Although none of these suggestions are novel and provocative, and authors have proposed many of them in the literature before, the emergence of new codes provides another opportunity to raise the questions. It also allows some context for examining how major changes might be made.

First among these seems to be abbreviations. Separating the content of a bibliographic description from its format finally divorces, at least in theory, the description from the legacy of the catalog card. Many abbreviations continue to persist from that legacy. What is the reason, for example, to insist on abbreviations such as “ca.” before dates, when other, fuller syntax might make the point much more clearly to a universal audience?

*RDA* promises to “minimize the need for retrospective adjustments when integrating data produced using *RDA* into existing files.”<sup>43</sup> This is also the case with *DACS*, which should cause very little conflict between descriptions created using it and *APPM*, for example. In the major source of potential conflict, family names, the Anglo-American cataloging community could learn from the specialists in archives. For example, even if *RDA* does not adopt the user-friendly recommendations on abbreviations, records will be no more difficult to interpret than those records created using pre-AACR rules and punctuation conventions that exist in our combined catalogs to this day.

Another major opportunity is to use *DACS* as a springboard to examine all aspects of archival description, from initial processing documentation to final finding aids and catalog records. Particularly in those environments where these functional tasks are undertaken by different people, *DACS* can provide a common ground for archivists, catalogers, and other personnel to look for efficiencies and improvements in the process, an area that some in the profession have identified as a pressing need.<sup>44</sup>

The authority work required by both libraries and archives might benefit from a more collaborative approach, as well. Would maintaining an authorized heading be possible in a wiki-like environment, allowing any institution to contribute additional information or references as they see fit? This is already present in the popular environment, where hyperlinks to explanatory materials often point read-

ers to Wikipedia as an authoritative source.<sup>45</sup> This allows readers unfamiliar with a topic or concept to be introduced to further information without interrupting the narrative flow of the text. It also might lead to greater standardization simply through forcing the blogger to consider the relationship between the term as used and the term as “authorized” in Wikipedia as the link is constructed. The same principle might work well with the kinds of historical or biographical contexts provided for names and even subjects in resource descriptions. Particularly among specialized communities, this decentralized approach might be more beneficial than limiting references based on the constraints of our old library systems, and would leverage subject expertise where needed.

Another area where such cooperative authority work might benefit both users and libraries is in the realm of serial title changes. Although *DACS* proposes no such thing, a broad interpretation of the rules for recording administrative structure, predecessor and successor bodies, and names of corporate bodies might allow such context, removed from the heading, to serve as an innovative way to handle serial title changes. For example, if long narratives of administrative histories were provided outside the context of resource catalogs, including references contributed cooperatively for varying names and titles, with a single entry point for the serial itself, the function of a serial title name might be served without ongoing maintenance currently required by current cataloging rules.

The final, and perhaps most challenging, development might be to take simplification of creator heading rules further. For example, AACR2 currently devotes the bulk of chapter 22 to the “exceptions”—headings that are not commonly encountered in most libraries and archives in the English-speaking world. They are even called “Special Rules for Names in Certain Languages,” a title that acknowledges just how obscure these headings are. Entire sections are devoted to Indonesian and Malay names, which are so complex that even the detail found in these rules cannot clarify them for an audience with no knowledge of these languages. Since catalogers working with large collections of Malay materials are likely to have greater knowledge about the formation of these names, as well as reference sources not available to average librarians, cataloging codes could be simplified and shortened tremendously by removing these rules entirely and pointing people who need to formulate these headings to another source.

This would have several benefits. The code itself would be shorter and underlying principles would be more apparent, leading to better-developed cataloger judgment. The perception of complexity that is often seen as a reason *not* to create descriptions using AACR-type rules might be mitigated. Finally, the disconnect between subject expert usage and cataloger usage that has plagued library history (most

recently with the romanization of Chinese characters) possibly could be avoided.

## Conclusion

DACS has foreshadowed RDA in transforming description of cultural heritage materials for an Anglo-American world. Many of its innovations, such as separating content from carrier and content from context, are being incorporated in the revision of library standards. Others, such as reducing or eliminating the use of abbreviations, may be more controversial in the larger library community. Nonetheless, catalogers not familiar with archives would do well to think about how archival materials mirror in many ways the types of materials they increasingly are being expected to organize for retrieval. The parallels are not exact, but they are informative.

The impact of DACS at this time is limited to the archival community in the United States, since it is an SAA standard. Just as harmonization between AACR and other non-English speaking standards has been difficult to achieve due to differing descriptive traditions, the efforts to address standards for archives across the world will prove as frustratingly complex. Unlike the MARC environment, where catalogers are largely dependent on bibliographic utilities, archivists retain a high degree of control over their own descriptive records, making compliance difficult, if not impossible, to ensure. DACS attempts to address this problem through flexibility, but that same flexibility may lead to a high degree of non-standardization, even when archivists and catalogers are attempting to follow its guidelines. The legacy of archival description residing in other systems, such as paper finding aids, card files, or even databases, must be addressed.

This leads to one last question that must be asked about the future of all descriptive standards in the cultural heritage community: why should other communities care? Certainly the profession has been successful at standardizing bibliographic description of books and serials to a high degree, even across the English-speaking world. Other types of materials have remained segregated within systems that seem to work for them. Even communities such as museums, which often share libraries' emphasis on standardized vocabulary for descriptive fields (such as terms from the *Art & Architecture Thesaurus*) may not see a need to adopt more library-like practices for their entire descriptive framework, despite the best intentions of the drafters of RDA. We must ask ourselves what we are offering these other communities before attempting to create a standard that we hope they may want to use.

Any effort to revise descriptive standards must balance the historical value and proven results of our rules with the

promise of the future. DACS succeeds in doing this for archival materials, while still retaining a refreshing simplicity and brevity. We might hope descriptive standards for library materials could achieve the same.

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# Mapping WorldCat's Digital Landscape

By Brian F. Lavoie, Lynn Silipigni Connaway,  
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*Digital materials are reshaping library collections and, by extension, traditional library practice for collecting, organizing, and preserving information. This paper uses OCLC's WorldCat bibliographic database as a data source for examining questions relating to digital materials in library collections, including criteria for identifying digital materials algorithmically in MARC21 records; the quantity, types, characteristics, and holdings patterns of digital materials cataloged in WorldCat; and trends in WorldCat cataloging activity for digital materials over time. Issues pertaining to cataloging practice for digital materials and perspectives on digital holdings at the work level also are discussed. Analysis of the aggregate collection represented by the combined digital holdings in WorldCat affords a high-level perspective on historical patterns, suggests future trends, and supplies useful intelligence with which to inform decision making in a variety of areas.*

## Introduction

Print books have been the traditional focus of library collections; indeed, the word *library* itself originates from the Latin word for book, *liber*. Over time, library collections have diversified to embrace a variety of information resources, such as scholarly journals, photographs, microfilm, and videotapes (the authors note that a Columbus-area public library even circulates artwork to its users). But after print books, one may argue that digital materials have made the greatest impact on the nature and shape of library collections. The reverberations of this impact are still being felt and the long-term consequences for traditional print book collections are yet determined.

Digital materials are shifting long settled library practice for collecting, organizing, and preserving information. Libraries have been challenged with the need to collect and manage new types of materials (for example, software and Web sites), as well as new forms of traditional materials (for example, electronic books and electronic journals). The established custodial role of libraries has been overturned by the growth in digital content obtained through license or subscription rather than direct acquisition. Simultaneously, companies such as Amazon and Google are making inroads into traditional library services all along the discovery-to-delivery chain. Information seeking increasingly occurs in a variety of digital environments, with the ensuing need to adapt traditional library roles and services to meet the emerging needs and expectations of the "e-user" (for example, through the provision of online virtual reference services).

The impact of digital technologies goes well beyond new forms of material in library collections. Even so, the rapid proliferation of digital content—information represented as ones and zeros instead of ink on paper—is the epicenter from which ancillary effects ripple out to other library spheres. Any systematic analysis of how digital technologies have transformed libraries would find a use-

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ful starting point in examining how digital technologies have transformed library collections.

This paper uses the OCLC Online Computer Library Center, Inc. WorldCat bibliographic database to examine questions relating to the growth of digital materials in library collections, including criteria for identifying digital materials algorithmically in MARC21 records: the quantity, types, characteristics, and holdings patterns of digital materials cataloged in WorldCat; and trends in WorldCat cataloging activity for digital materials over time. Issues pertaining to cataloging practice for digital materials and perspectives on digital holdings at the work level are also discussed. The purpose is to obtain a general understanding of the process by which digital materials have filtered into library collections over time, and to characterize the types of digital materials libraries have included in their collections.

Taken together, the digital materials cataloged in WorldCat represent an *aggregate collection*, that is, the combined holdings of multiple institutions, viewed as a single unit. In the context of WorldCat, an aggregate collection can encompass the holdings of thousands of libraries. Analysis of aggregate collections affords a high-level perspective on historical patterns, suggests future trends, and supplies useful intelligence with which to inform decision making in a variety of areas. Lavoie, Connaway, and Dempsey use aggregate collection analysis to examine the scope and implications of the Google Print for Libraries (now Google Book Search) project.<sup>1</sup> Lavoie and Schonfeld use similar techniques to examine the systemwide print book collection.<sup>2</sup> The present study also centers around an aggregate collection, in the form of the combined digital holdings in WorldCat. Analysis of this "aggregate digital collection" provides insight into the digital materials represented in WorldCat, trends in cataloging activity for digital materials, and reliable bibliographic criteria for automated identification of digital materials in library catalogs. This study is the first to consider digital library holdings from the perspective of an aggregate collection and is intended to provide a preliminary mapping of WorldCat's digital landscape.

### Rationale for the Study

Several considerations motivated this study. First, establishing reliable criteria for identifying and characterizing digital materials in MARC21-based catalogs is of growing importance for libraries. Valuable data on digital holdings can be extracted from libraries' local integrated library systems (ILS), as well as union catalogs like WorldCat. Reliable bibliographic criteria are needed to ensure that these data can be extracted using automated methods, are consistent in their interpretation, and can be meaningfully compared across collections. WorldCat is a good resource for obtaining

these criteria, in that it represents a large pool of cataloging "evidence" that transcends local variations in cataloging rules and practice, and from which a robust, consistent set of criteria can be identified. This paper suggests a set of bibliographic criteria useful for broadly characterizing the materials in digital collections.

A second consideration follows from the first. The ability to extract useful data from local or union catalogs creates opportunities to support decision making in a variety of areas. Digital collections are expanding in size, scope, and complexity. Effective management of these collections requires the gathering and analysis of data to inform decision making. For example, a library may wish to have detailed information about its digital holdings in order to characterize the prevailing balance across various dimensions of the collection (material type, format, online access, and so on), and identify areas of need to guide future acquisitions. Analysis of local digital collections is important, but libraries can often benefit from a wider perspective. For example, a library considering an investment in a digitization program may want to know what other libraries have already digitized, in order to avoid duplicative effort. Similarly, a library making an initial investment in digital collection development may want to know what types of digital materials have been collected by other libraries, perhaps as a means of identifying a core set of essential resources. This paper uses the digital materials cataloged in WorldCat to illustrate some ways to analyze digital collections, either at the local or aggregate level.

Advances in computing capacity, both in terms of processing power and storage, have made large-scale data mining feasible and economical for libraries. Results from data mining can be used to inform planning, allocate funding and staff, and facilitate cross-institutional collaboration. This paper hopefully will encourage libraries to think about new ways to utilize the bibliographic data in local systems and union catalogs to support digital collection management.

### A Note on Data Sources

The analysis reported in this paper is based on a July 2005 copy of WorldCat, containing 58,004,317 bibliographic records with 990,238,973 holdings. WorldCat is the world's largest bibliographic database, representing the combined holdings of more than 20,000 libraries worldwide. As such, it is a data source that supplies a uniquely broad perspective on digital materials in library collections. Using WorldCat limits the analysis to the digital materials that libraries have chosen to catalog in WorldCat. Unfortunately, no reliable estimate of the proportion of digital materials cataloged exists, let alone those that are included in WorldCat. Nevertheless, the fact remains that WorldCat is the most comprehensive single data source for conducting an analysis of this kind.

## Criteria for Identifying Digital Materials

The first step in mapping out WorldCat's digital landscape is to establish borders around the territory of interest—in other words, to determine how many digital materials are cataloged in WorldCat. This requires a set of bibliographic criteria for identifying digital materials, based on information available in a MARC 21 record.<sup>3</sup>

This requirement is complicated by the fact that digital format can be indicated in multiple ways in a MARC record; moreover, cataloging practice for digital materials has been, and remains, in a state of flux. Weiss traces the evolution of cataloging practice for digital materials and notes:

what has happened repeatedly with computer-based materials—a set of rules is issued and immediately superseded because of new developments in technology. Another set of rules is issued to address the shortfall. Catalogers are required to utilize multiple and sometimes conflicting cataloging standards in order to describe computer-based materials.<sup>4</sup>

Examination of MARC guidelines reveals a number of criteria, used either singly or in combination, that could potentially identify a record that describes a digital resource. These include:

- Type of Record = computer file (byte 6 of the leader equal to "m")
- Form of Item = electronic (byte 23 or byte 29 of the 008 field equal to "s")
- General Material Designation (GMD) = electronic resource (subfield \$h of the 245 field equal to "electronic resource." Older GMDs for digital materials include "machine readable data file" and "computer file." These have been updated in WorldCat to reflect the current "electronic resource.")
- Additional Materials/Form of Material = computer file/electronic resource (byte 0 of 006 field equal to "m")
- Physical Description = electronic resource (byte 0 of 007 field equal to "c")
- Electronic Location and Access (2nd indicator of 856 field equal to 0 and there is no subfield \$3)
- Reproduction Note = electronic reproduction (subfield \$a of 533 field equal to "electronic reproduction")

The first three criteria (Type of Record, Form of Item, and General Material Designation) are reliable indicators that the record describes a digital resource. The other four criteria are less reliable. Information in the 006 and 007 fields can be problematic for automatic (that is, machine-based) identification of digital materials, because these fields are repeatable and can apply either to the item

described in the record, or to accompanying or related material. No prescribed ordering for repeated 006s or 007s helps resolve this issue. The 856 field is frequently mis-coded. For example, instances of the 856 field, with second indicator equal to zero and no subfield \$3 and therefore ostensibly the network location of the resource described in the record, are sometimes incorrectly used to supply the Uniform Resource Locator (URL) of a Web site related to the item. Finally, the 533 field is problematic because the relevant information ("electronic reproduction" in subfield \$a), while commonly used, is not mandatory and therefore may not appear. Another point to note about the 533 is that the record in which it appears describes the *original*, not the reproduction itself. This criterion was included, however, for two reasons: (1) the 533 describes a complete resource in its own right, and (2) if the digital reproduction was not catalogued separately, the description in the 533 may be the only record of this material.

Other combinations of bibliographic data probably exist that could be used to identify digital materials, but these combinations are unlikely to yield anything more than a negligible number of additional records. The criteria specified previously should be sufficient to identify virtually all WorldCat records describing digital materials.

A computer algorithm was developed that identifies all records in WorldCat satisfying one or more of the aforementioned seven criteria. The algorithm was used to scan the July 2005 copy of WorldCat. The scan identified 1,015,072 records satisfying at least one of the three reliable criteria (Type of Record, Form of Item, GMD).

A second scan was done on the remaining records using the four less reliable criteria (Additional Materials/Form of Material, Physical Description, Electronic Location and Access, Reproduction Note). This yielded an additional 169,437 records, a 17 percent increase over the previous total. Not all of these additional records actually describe digital materials, for the reasons mentioned previously.

Identification of digital materials in WorldCat requires a balancing of two sometimes competing factors: *precision* (minimizing the number of non-digital items falsely identified as digital) and *recall* (maximizing the number of digital materials identified). If precision is the overriding concern, limiting the extraction parameters to the three reliable criteria is the best strategy; if the chief objective is recall, use of all seven criteria is preferable, even though this inevitably will result in a number of false matches. Since the number of additional records brought in by the four less reliable criteria is small (at most a 17 percent increase, in reality probably much less), the analysis reported in this paper is confined to the 1,015,072 records in WorldCat matching the Type of Record, Form of Item, or GMD criteria (or two or all three criteria) for digital materials.

Two further points should be noted in regard to the records analyzed in this study. Audio compact discs (CDs),

such as music albums, and digital versatile discs (DVDs), such as movies, are forms of digital material. Standard cataloging practice for audio CDs seems to be to designate Type of Record = i or j (non-musical/musical sound recording), with a GMD of "sound recording"; the term "digital" is indicated in subfield b of the 300 field (physical description—other physical details). Criteria for DVDs can also be identified. Including the CD and DVD criteria as indicators that the record describes digital material would, thus, be logical. Despite this, the researchers decided to exclude audio CDs and DVDs from the analysis. These materials constitute an important component of library collections in their own right; as such, they are a distinct class of materials and warrant separate study.

Finally, analysis of the digital materials in WorldCat revealed that, in several instances, sets of books were represented in the database only at the collection level. For example, four digital collections—Eighteenth Century Collections Online (~150,000 titles), Early English Books Online (~100,000 titles), Early American Imprints: Series I, 1639-1800 (~36,000 titles), and PsycBooks (~850 titles, ~13,800 chapters)—are each treated as a continuous resource and represented in WorldCat by a single record. Another extensive digital collection, Gutenberg-e, is represented in WorldCat by a record describing the collection as a whole, as well as several additional records describing some of the individual titles. Collection-level cataloging implies that simple record counts will understate the number of digital materials actually represented in WorldCat. Efforts are currently underway to extend the granularity of e-resource collection descriptions in WorldCat. In order to identify library electronic resource holdings in WorldCat at the item level, OCLC has integrated the Openly Informatics database. It not only provides metadata for resources in digital format, including books, serials, audiobooks, theses, and dissertations, but also identifies and updates libraries' digital resource holdings. This ensures that libraries' digital resource holdings are current and accurate, enabling authenticated end users to access full-text online content through direct links to content aggregators through WorldCat.

In sum, the more than one million WorldCat records identified using the Type of Record, Form of Item, or GMD digital criteria do not perfectly reflect all digital materials held by libraries. Therefore, a key point that should be emphasized is that the analysis that follows can be interpreted as nothing more than a *characterization of the digital materials cataloged in WorldCat*, and not as a characterization of all digital materials held in library collections. Nevertheless, digital materials cataloged in WorldCat provide a broad sample of library digital collection decisions and cataloging practices over more than three decades.

## The WorldCat Digital Landscape

As of July 2005, approximately one million digital materials of all descriptions were cataloged in WorldCat. These records constitute about 2 percent of the total records in WorldCat. The proportion of WorldCat devoted to digital materials is as yet quite small, but indications are that this figure is trending upward. Comparison of the July 2005 totals with those from a year earlier suggests that the number of digital materials cataloged in WorldCat is growing rapidly. The July 2005 total of more than one million digital materials represents a 35 percent increase over the total for July 2004 (about 750,000). Over this same period, WorldCat as a whole grew by about 9 percent, so the number of WorldCat records describing digital materials grew nearly four times faster than the database as a whole.

Returning to the figures for July 2005, the one million WorldCat records describing digital materials had a total of 30,773,412 holdings attached to them. These holdings account for approximately 3 percent of all WorldCat holdings. On average, then, a WorldCat record describing a digital resource has about 30 holdings attached to it. This is misleading, however, because the distribution is skewed and only about 14 percent of these records actually have 30 or more holdings attached. The median number of holdings for a WorldCat record describing a digital resource is only one.

The top ten most widely held digital resources in WorldCat as of July 2005 were:

1. *Bipolar Disorders: A Guide to Helping Children & Adolescents* (M. Waltz): 1,340 holdings
2. *The Dictionary of Space Technology* (J. Angelo): 1,328 holdings
3. *Eating Disorders: A Reference Sourcebook* (R. Lemburg and L. Cohn): 1,284 holdings
4. *The Mafia Encyclopedia* (C. Sifakis): 1,272 holdings
5. *A Dictionary of Zoology* (M. Allaby): 1,266 holdings
6. *The Greenspan Effect: Words That Move the World's Markets* (D. Sicilia and J. Cruikshank): 1,264 holdings
7. *US v. Microsoft* (J. Brinkley and S. Lohr): 1,261 holdings
8. *The Internet Edge: Social, Legal, and Technological Challenges for a Networked World* (M. Stefik): 1,261 holdings
9. *African-American Art* (S. Patton): 1,260 holdings
10. *Ace Your Midterms and Finals: Principles of Economics* (A. Axelrod): 1,259 holdings

All of these titles are e-books offered through OCLC's NetLibrary service. This result is not surprising, because the NetLibrary e-book service has been integrated into libraries'

WorldCat cataloging workflow; for example, libraries who build NetLibrary e-book collections have their holdings set automatically in WorldCat.

The top ten most widely held digital resources in WorldCat, excluding NetLibrary e-books, are:

1. *Where to Write for Vital Records* (National Center for Health Statistics): 1,112 holdings (Web site)
2. *Alzheimer's Disease: Methods and Protocols* (N. Hooper): 647 holdings (e-book)
3. *Statistical Abstract of the United States* (US gov't): 625 holdings (CD-ROM)
4. *County Business Patterns* (US gov't): 589 holdings (CD-ROM)
5. *The National Trade Data Bank* (US gov't): 585 holdings (CD-ROM)
6. *The Budget of the United States Government* (US gov't): 560 holdings (CD-ROM)
7. *Faith in Every Footstep, 1847–1997: 150 Years of Mormon Pioneers* (Church of Jesus Christ of Latter-day Saints): 555 holdings (CD-ROM)
8. *USA Counties* (US gov't): 541 holdings (CD-ROM)
9. *Crime in the United States* (US gov't): 534 holdings (CD-ROM)
10. *REIS: Regional Economic Information System* (US gov't): 502 holdings (CD-ROM)

This list suggests that first, widely held digital items (apart from NetLibrary e-books) are primarily government publications, and second, these publications are stored on a physical container, that is, CD-ROM discs.

In general, holdings of digital materials were widely dispersed. Table 1 reports the holdings distribution for all digital materials identified in the July 2005 copy of WorldCat.

Nearly 60 percent of the digital materials cataloged in WorldCat have only a single holding attached. In comparison, an analysis of print books cataloged in WorldCat as of January 2005 indicates that 37 percent were uniquely held. In other words, nearly double the proportion of digital materials are uniquely held compared to print books.

Interpretation of this result is difficult with the data available. It could reflect a general dissimilarity across digi-

tal collections (evidenced by only a small proportion of digital materials being widely held). It could also reflect a lack of convergence across libraries in regard to cataloging or attaching holdings to digital resources. The most likely scenario, however, involves some combination of both factors.

## Online versus Offline

One key advantage of the digital format is that materials can be accessed over a network from geographically dispersed locations. The ability to access material remotely from the desktop is increasingly becoming an expectation among library users. Knowing how many of the digital materials cataloged in WorldCat are available online is therefore important.

In principle, online materials can be identified by the presence of an 856 field, with a second indicator of zero and no subfield 3. A second indicator of zero indicates that the URL given in the field pertains to the material described in the record; the absence of a subfield 3 implies that the entire item is available online rather than just a portion of it.

Running these criteria against the more than one million digital materials cataloged in WorldCat indicates that almost half are available online, but this number is likely a low-end estimate. An inspection of the records failing the 856 field criteria (that is, records representing digital resources that are ostensibly offline) reveals that the situation is more nuanced than a straightforward application of the 856 field criteria would suggest.

A random sample of 100 records was drawn from the collection of offline records. Analysis of the records reveals they can be grouped into three broad categories. Forty percent of the sample were records describing resources that were clearly offline (for example, software or data stored on CD-ROM or other physical containers).

A slightly larger proportion, 44 percent, was records describing resources that appeared to be available online, but for one reason or another failed the 856 field criteria. Some 856 fields in these records supplied URLs that did not point to the resource itself (and therefore the second indicator was not zero); for example, digital content available through license or subscription, where the URL in the 856 field points not to the resource itself, but to some form of mediation page where the user can log in to obtain access or ordering information. In other cases, the URL pointed to the resource, but the second indicator was left blank (no information). Some cases show what appear to be non-standard uses of the second indicator or subfield 3 even when the URL does in fact point to the resource in question. Another example is where the record indicates that the resource is available through the Web (usually in the 533 field), but no 856 field, and therefore no URL, is provided.

**Table 1.** Holdings pattern for digital materials

Number of Holdings	% of Digital Materials	Cumulative (%)
1	59	59
2–10	23	82
11–100	8	90
>100	6	96*

\*About 4 percent of the records describing digital materials had no holdings attached.



The remainder (14 percent) are records where it was not clear from the information available whether or not the resource described was available online. Examples include resources where the 856 field points to an ordering page, publication information, or even the publisher's home page, but whether the content could be accessed online is not clear.

Extrapolating these results to all records failing the standard online criteria suggests that anywhere from 73 to 80 percent of the digital materials in WorldCat are actually available online, compared to the approximately 50 percent indicated by matching the standard 856 field criteria. Only about two-thirds of these online materials can be reliably identified using machine processing. Adoption of cataloging practices that permitted a reliable distinction between online and offline digital materials, obtained through machine processing of the record rather than human inspection, would be beneficial in organizing and presenting search results in library catalogs.

### Cataloging Activity

The earliest confirmed record in WorldCat describing a digital resource (that is, the one with the lowest OCLC number) is record #1617882, created on September 11, 1975, by the American Antiquarian Society and entered into WorldCat later that year. The record describes a data file, recorded on a single tape reel, containing 1860 and 1880 U.S. census data on residents of Worcester, Massachusetts.

Since that time, more than one million additional records for digital resources have been added to WorldCat. Only in the last few years has the flow of records describing digital resources been significant. Table 2 shows the number of records describing digital materials entered into WorldCat for each year between 1975 (the year the first digital record was entered) and 2005.

Several years exhibit significant jumps compared to the previous year, for example, 1984 (833 records) compared to 1983 (133 records); and 1985 (5,204 records) compared to 1984 (833 records). Only in 1992 does a steady acceleration become evident; the yearly total increased from 5,750 records in 1992 to 31,020 records by 1999. In 2000, cataloging of digital materials in WorldCat spiked, rising to 166,961 records. From this point onward, the annual total of digital materials cataloged in WorldCat has never fallen below 110,000, suggesting that the dramatic increase witnessed in 2000 was the catalyst for a sustained movement to higher levels of cataloging activity for digital materials.

The majority of digital materials cataloged in WorldCat as of July 2005 were entered in the last few years. Eighty-five percent of these records were entered in 2000 or later—that is, in the previous five and a half years. Only about 1 per-

cent were entered prior to 1986. This suggests that cataloging of digital materials in WorldCat is a fairly recent phenomenon, confined for the most part to the last half-decade, even though the second edition of *Anglo-American Cataloging Rules (AACR2)* incorporated rules for cataloging digital materials more than twenty-five years ago in 1978, and the era of personal computing dates from roughly the same time, with the introduction of the Apple II in 1977 and the IBM PC in 1981.<sup>5</sup>

Another interesting characteristic of WorldCat cataloging activity for digital materials is the proportion of records originating from the Library of Congress compared to the proportion contributed by the OCLC membership. Using the presence of "DLC" in the 040 subfields \$a and \$c to identify a Library of Congress record (that is, the record was both created and transcribed by the Library of Congress), analysis revealed that 16,826 records describing digital materials, or about 2 percent, were created by the Library of Congress.

In comparison, about 11 percent of WorldCat as a whole consists of Library of Congress records, suggesting that WorldCat records describing digital materials are much more likely to be contributed records than the average WorldCat record. Further work is needed to understand the implications of this finding, but one can surmise that the disparity reflects the fact that many digital materials do not yet fit the pattern of the types of materials usually cataloged by Library of Congress. It might also provide some explanation for the wide variance in cataloging practice for digital materials, since contributed records will reflect the practices and policies of a variety of institutional contexts.

**Table 2.** Distribution of records by year entered in WorldCat, 1975–2005

Year	Number of Records Entered
1975	1
1976	1
1977	0
1978	4
1979	5
1980	5
1981	83
1982	101
1983	133
1984	833
1985	5,204
1986	5,171
1987	4,636
1988	6,163
1989	6,797
1990	4,505
1991	4,447
1992	5,750
1993	7,660
1994	8,566
1995	11,099
1996	13,520
1997	17,495
1998	20,162
1999	31,020
2000	166,961
2001	118,487
2002	128,988
2003	110,727
2004	198,215
2005*	276,666

\* Estimated based on number of records entered through June 2005



## Types of Materials

Cataloging rules for digital materials have undergone a shift in focus from emphasizing the form of the item (that is, its digital format) to emphasizing its content, or *material type*. Weiss discusses this point in her paper.<sup>6</sup> To some degree, this shift has been necessitated by the rapidly expanding range of materials available in digital form, which has in turn been reflected in libraries' digital collections. The shift has led to a need for increasingly granular descriptions of digital materials; in other words, segregating a library's digital holdings as a single, monolithic portion of the collection is not sufficient. Table 3 provides a breakdown of the WorldCat records describing digital materials according to the MARC Bibliographic Level categories.

Monographs clearly account for the vast majority of digital materials (85 percent). The only other categories of significance are serials (9 percent) and monographic component parts (5 percent). Monographic materials encompass a fairly wide range of information resources, however, so it is helpful to consider a different view of the digital materials in WorldCat, based on the MARC Type of Record categories. This distribution is provided in table 4.

Nearly three-quarters of the digital materials in WorldCat are some form of language material. Again, this is a fairly wide-ranging category. A further breakdown of the digital language materials according to some well-known material types, shown in table 5, provides still more insight into the types of digital materials held in library collections. Books in digital form constitute the largest proportion of digital language materials. Government documents also claim a significant proportion, as do e-journals.

Tracking the change in the mix of digital material types over the years is interesting. Table 6 shows the distribution of records across Type of Record categories for three periods: 1985 and earlier, 1986 through 1995, and 1996 and later. The results in table 6 indicate a profound shift in the types of digital materials held by libraries. Virtually all digital materials cataloged in WorldCat in 1985 or earlier (99 percent) were described as "computer files." In contrast, more than three-quarters of the digital materials cataloged in WorldCat in 1996 or later were designated as "language materials," with only 18 percent designated as "computer files." The other major point revealed by these data is the significant expansion in the range of materials falling into the digital category. Digital materials cataloged during or before 1985 were predominantly in two categories: computer files and language materials. Only two other categories (projected medium and kit) were represented. Between 1986 and 1995, the range of material types showing up in WorldCat widened appreciably. Computer files and language materials were still the only categories with significant representation, but seven additional material types were also represented.

**Table 3.** Distribution of records by MARC bibliographic level

Bibliographic Level	Number	%
Monograph	863,620	85
Serial	90,624	9
Monographic component part	49,551	5
Subunit	8,655	1
Serial component part	1,568	<1
Collection	1,054	<1
Integrating resource	0	0

**Table 4.** Distribution of records by MARC type of record

Type of Record	Number	%
Language material	726,299	72
Computer file	234,691	23
Two-dimensional non-projected medium	22,870	2
Cartographic material	14,786	1
Manuscript language material	4,735	<1
Non-musical sound recording	3,978	<1
Musical sound recording	3,917	<1
Projected medium	1,986	<1
Notated music	1,515	<1
Kit	120	<1
Mixed material	115	<1
Manuscript cartographic material	31	<1
Manuscript notated music	23	<1
Three-dimensional artifact or natural object	6	<1

**Table 5.** Types of digital language materials

Material Type	Number	%
Monographic language materials (books)	472,680	65
Government documents*	114,185	16
Language-based serials (journals)	67,861	9
Theses/dissertations*	28,911	4
Other	42,662	6

\*Government documents were identified on the basis of information in the 008 field, while theses and dissertations were identified on the basis of the existence of the 502 field.

Between 1996 and 2005, five material types (language materials, computer files, two-dimensional non-projected medium, cartographic material, and manuscript language materials) displayed significant representation, while nine other categories were also represented.

At least part of the difference exhibited across time in the range of digital materials reflects changes in cataloging

practice for digital materials rather than changes in the types of digital materials cataloged and entered into WorldCat. As noted previously, early cataloging rules for digital materials tended to emphasize form over content; in other words, the most significant property of digital materials was the fact that they were digital. As cataloging rules evolved, form was de-emphasized in favor of material type and subject area. Knowing that a resource was a computer file was not enough; the fact that it was an e-book or e-journal was also important. In light of this, at least part of the expansion over time in the range of digital material types is likely the result of changes in methods of bibliographic description, suggesting that the relatively narrow range of material types identified in early years (pre-1985) may mask a wider variety of materials lumped together under the single category of "computer file."

Other factors leading to the observed differences over time in the range of digital material types in WorldCat are changing collection development policies and an expanding diversity in the types of digital materials available for acquisition. For example, libraries currently likely have a lower propensity to acquire and catalog "shrink-wrapped software" (that is, computer files) and a greater propensity to acquire online content, such as e-books and e-journals, than in the past. Moreover, many forms of online content were simply not widely available until the mid- to late 1990s. Further work is needed to analyze trends in the types of digital materials available for acquisition, as well as changes in collection development policies for digital materials.

### "Digital Works"

A great deal of recent work has focused on aggregating, managing, and displaying bibliographic data at multiple levels of granularity. Work in this area is underpinned by the *Functional Requirements for Bibliographic Records (FRBR)* model, a framework for articulating the relationships between bibliographic entities, including works, expressions, manifestations, and items. *FRBR* defines a work as "a distinct intellectual or artistic creation."<sup>7</sup> Thus, *Macbeth* is a work. A manifestation, on the other hand, is a physical embodiment of an expression of a work. Thus, the Folger Shakespeare Library edition of *Macbeth*, published in paperback

by Washington Square Press in 2004, is a manifestation of the work *Macbeth*. A single work can have multiple manifestations associated with it.

WorldCat records describe manifestations. The finding that there are more than one million digital materials cataloged in WorldCat is equivalent to saying that more than one million digital manifestations are cataloged in WorldCat. This in turn invites the question of how many distinct works are represented by these digital manifestations. To answer this question, the *FRBR* work set algorithm developed by OCLC Research was used to cluster the more than one million WorldCat records describing digital materials into their associated works. The OCLC Research work set algorithm converts MARC21 bibliographic databases into *FRBR* work sets, where a work set is a cluster of all records (that is, manifestations) pertaining to the same work.<sup>8</sup>

The 1,015,072 digital manifestations in WorldCat can be rolled up into 921,095 distinct works. As of July 2005, 46,155,940 distinct works were represented in WorldCat as a whole, so only about 2 percent of the works in WorldCat contain at least one digital manifestation. This is a remarkably small number and suggests that there is tremendous scope for mass digitization programs.

On average, a "digital work" in WorldCat (that is, a work containing at least one digital manifestation) will include 1.1 digital manifestations, a result not significantly different from 1. In comparison, the average work in WorldCat, taking into account all formats, contains approximately 1.3 manifestations. In practice, works can vary considerably in the number of manifestations associated with them. Table 7 shows the distribution in the size of "digital works." The

**Table 6.** Distribution of records by type of record and period

Type of Record	1985 and earlier (%)	1986–1995* (%)	1996 and later (%)	All years (%)
Language material	1	4	77	72
Computer file	99	96	18	23
2-dim. non-projected medium		<1	2	2
Cartographic material		<1	2	1
Manuscript language material		<1	1	<1
Non-musical sound recording			<1	<1
Musical sound recording		<1	<1	<1
Projected medium	<1	<1	<1	<1
Notated music			<1	<1
Kit	<1	<1	<1	<1
Mixed material		1	<1	<1
Manuscript cartographic material			<1	<1
Manuscript notated music			<1	<1
3-dim. artifact/natural object			<1	<1

\*Percentages do not add up to 100 due to rounding.

results in table 7 indicate that 667,124 (nearly three-quarters) of the 921,095 works containing at least one digital manifestation are single manifestation works. In other words, the work consists of one manifestation, which is a digital object. This would suggest that most “digital works” in WorldCat (that is, works with at least one digital manifestation) are, in fact, works that are “born-digital” (that is, have no antecedents in the print world). This hypothesis must be advanced with some caution; other non-digital manifestations may exist for these works, but have simply not been cataloged in WorldCat.

To gain more insight into this issue, a random sample of 100 single-manifestation “digital works” was chosen for manual inspection. These records represent a fairly diverse set of materials, including a number of materials that were definitely born-digital (for example, Web sites and software) as well as other materials that are likely to have been born-digital (for example, government reports, theses, and dissertations). Other materials, such as books and serials, are more questionable. For these materials, the reason they appear as single-manifestation digital works is likely because other non-digital manifestations have not been cataloged in WorldCat, or were cataloged differently. Scanned images of historical artifacts are likely to fall into this category.

These conclusions are hardly more than speculation. A good topic for future research would be to look at the “digital works” in WorldCat and try to determine how many are, indeed, single manifestation, born-digital works or whether other manifestations also exist. This information can be of vital importance in a number of library decision-making contexts, such as preservation.

## Conclusion

The ultimate significance of digital materials in library collections is not their growth in number and diversity. Rather,

it is the opportunities they present for meeting the needs of users who increasingly operate in networked digital spaces. In this sense, a study of the number, type, and features of digital materials in WorldCat—a study solely confined to the digital materials themselves—is necessarily incomplete. Further work is needed to understand how these digital materials can be incorporated into a range of information environments and linked to emergent user behaviors.

As of July 2005, WorldCat contained more than one million records describing digital resources, to which more than 30 million holdings have been attached. While the number of digital materials cataloged in WorldCat is still proportionately small, it is clearly a growing segment in terms of both size and importance, reflecting similar trends in individual library collections. These digital materials form the digital landscape through which future workflows, services, and user interactions must navigate. As digital materials continue to proliferate in library collections, this landscape will expand and exhibit increasingly complex features; consequently, libraries will require detailed information about their digital holdings to support collection management decisions. Being able to isolate digital materials in a collection for automated analysis will therefore be important, but these materials cannot be viewed monolithically. Analysis must proceed on a more granular level, as libraries will wish to know not only the size of their digital collections, but also how these collections measure up along multiple dimensions, such as material type (for example, books, e-journals, and software) and mode of access (for example, online versus offline).

As libraries look for innovative, efficient ways to manage their digital holdings, some analysis may be directed at the level of the aggregate collection—that is, the combined holdings of multiple institutions. Analysis of aggregate digital collections (where aggregation can occur on a consortial, regional, national, or even international basis) facilitates direct collaboration between libraries in a variety of areas, such as mass digitization or cooperative collection development. It also allows individual libraries to make decisions placed against a larger context, which in turn helps foster convergence in areas where this is important, and avoid duplication in others.

Because WorldCat represents the aggregate holdings of thousands of libraries, it offers a unique perspective on the incorporation of digital materials into library collections. It also points to some limitations concerning legacy bibliographic data for digital materials. Because digital materials have been subject to a particularly fluid evolution of cataloging practice and acquisition methods, repurposing legacy bibliographic data to meet the new uses emerging from networked digital environments for research and learning becomes correspondingly more difficult. Stabilization of cataloging rules for digital materials would help greatly in this

**Table 7.** Distribution of “Digital Works” by size (number of manifestations)

Work Size (# of Manifestations)	Number	%
1	667,124	72
2	138,322	15
3	56,771	6
4	20,820	2
5	9,639	1
6–10	15,559	2
11–100	11,155	1
>100	1,705	<1

regard. In addition, new practices need to be adopted for cataloging the output of mass digitization programs. Success in both of these areas will facilitate automated scanning and processing of bibliographic databases, which in turn will support views of the information contained within that are tailored to the needs of "e-learners" and "e-researchers."

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# Notes on Operations

## Application Profile Development for Consortial Digital Libraries

### An OhioLINK Case Study

By Emily A. Hicks, Jody Perkins,  
and Margaret Beecher Maurer

*In 2002, OhioLINK's consortia of libraries recognized the need to restructure and standardize the metadata used in the OhioLINK Digital Media Center as a step in the development of a general purpose digital object repository. The authors explore the concept of digital object repositories and mechanisms used to develop complex data structures in a cooperative environment, report the findings and recommendations of the OhioLINK Database Management and Standards Committee (DMSC) Metadata Task Force, and identify lessons learned, addressing data structures as well as data content standards. A significant result of the work was the creation of the OhioLINK Digital Media Center (DMC) Metadata Application Profile and the implementation of a core set of metadata elements and Dublin Core Metadata Element Set mappings for use in OhioLINK digital projects. The profile and core set of metadata elements are described.*

### Introduction

Digital repositories have evolved from relatively simple collections of digital objects with individual metadata schemas to complex online environments needing reliable and flexible metadata structures to accommodate differing demands, platforms, and services. One example of this trend, the OhioLINK Digital Media Center (DMC) developed out of a statewide collaborative environment and continues to be redefined to meet the needs of cooperating libraries.<sup>1</sup> OhioLINK, the Ohio Library and Information Network, is a consortium of eighty-five college and university libraries and the State Library of Ohio. The goal of OhioLINK is to provide easy access to information and swift delivery of materials throughout the state. OhioLINK services include a central online catalog, shared electronic resources, a electronic theses and dissertations center, and an environment for digital project development and access.

By 2002, five years after the DMC was established, the need to restructure and standardize the metadata was clear to OhioLINK staff and member libraries. The DMC provides access to a variety of digital media assets including image, sound, and video files from OhioLINK institutions, other partner organizations, and commercial vendors. A series of subject-specific databases had been created, each with a separate, discipline-appropriate metadata scheme. Little attempt had been made to standardize information across the databases and searching was limited to one database at a time.

OhioLINK's Database Management and Standards Committee (DMSC), composed of technical services representatives from OhioLINK member institutions, appointed the OhioLINK Database Management and Standards Committee (DMSC) Metadata Task Force in spring 2003. The Task Force was charged with providing direction to the DMSC and OhioLINK on the development of the DMC, surveying current and emerg-

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ing metadata standards, and drafting guidelines for the use of metadata in the DMC.

The primary result of the Task Force's work is the OhioLINK DMC Metadata Application Profile.<sup>2</sup> Complex environmental and historical factors and the great diversity of needs within the OhioLINK environment informed the application profile creation process. This paper describes the mechanisms used to foster the evolution of data structures in a cooperative environment and discusses specific decisions and findings that resulted in the creation of an application profile, including the identification of a core set of metadata elements. The paper presents the Task Force's findings, lessons learned, and recommendations, addressing data structures as well as data content standards. Finally, the paper describes the current status of the DMC as well as plans to incorporate the DMC into the OhioLINK Digital Resource Commons (DRC).<sup>3</sup>

## A Review of the Literature

### Identifying Appropriate Metadata

Several studies have shown that quality metadata is an important component of digital collections. In their article about the challenges of metadata in university digital libraries, Attig, Copeland, and Pelikan assert that successful digital libraries must have a "robust metadata structure that can accommodate and preserve a variety of discipline-specific metadata while supporting consistent access across collections."<sup>4</sup> In a 2004 study of Australian digital collections, Hider finds that respondents think using already established standards when describing digital collections is very important.<sup>5</sup> Bruce and Hillmann point out that while the library community is comfortable with attempting to quantify and measure quality, as evidenced by the acceptance of the BIBCO core

record, this acceptance must take place at the community level, and that "most metadata communities outside of libraries are not yet at the point where they have begun to define, much less measure, quality."<sup>6</sup> Dushay and Hillmann adapt a commercially available visual graphical analysis tool to evaluate metadata, with the aim of developing a tool for efficiently analyzing large databases of metadata.<sup>7</sup>

Broad agreement on what constitutes *good* metadata, or even *appropriate* metadata is difficult. Scalability and relevance have been identified by Intner, Lazinger, and Weihs as features of good metadata as well as "adequate description of the kinds of data elements for which the library's users search."<sup>8</sup> This last factor can vary widely within any consortium's community. Researchers also have found that designing elaborately perfect metadata schemas may not help provide access in the absence of good data. Attig, Copeland, and Pelikan write that they "were forced to ask how little metadata would be required for discovery" and that "this question is particularly important for image data."<sup>9</sup>

According to the National Information Standards Organization (NISO) framework, good metadata is appropriate for the materials in the collection, users of the collection, and intended current and likely use of the digital object; supports interoperability; uses standard controlled vocabularies to reflect the what, where, when, and who of the content; includes a clear statement on the conditions and terms of use for the digital object; is authoritative and verifiable; and supports the long-term management of objects in collections.<sup>10</sup>

Specific guidelines, such as the Computer Interchange of Museum Information's (CIMI) "Guide to Best Practice: Dublin Core" and the Collaborative Digitization Program's (CDP) "Dublin Core Metadata Best Practices," provide a more detailed account of implementing the metadata

component of digital projects.<sup>11</sup> These guidelines typically include element-level guidance on semantics (how to interpret an element), syntax (how to format the data that populates an element), and recommended value domains (what controlled vocabularies, coding schemes, etc. are valid for a given element). The CIMI document guides the implementation of Dublin Core (DC) in a museum environment, presenting element level guidelines for all of the fifteen elements in DC Simple.<sup>12</sup>

Information environments also can heavily affect metadata implementation. Providing access to digital libraries differs significantly from providing access to traditional libraries. Intner, Lazinger, and Weihs note that the very fact that the items being described are online is the "most important and obvious difference."<sup>13</sup> The authors go on to say that:

Digital libraries are likely to be very large, quickly growing, frequently changing databases; they are likely to be collaborative efforts; they are likely to include more diverse types of materials; and their users do very little searching while they are at the digital library's home institution, if it has only one. As a result, asking a librarian how to find something one believes should be in the database but does not show up in answer to a search query may not be an option. . . . Without standard methods for describing database documents and their contents, maintaining authority control, and so on, access to the documents suffers.<sup>14</sup>

Baca concurs in her article about applying metadata schemas and controlled vocabularies, stating that the metadata standard for cultural heritage institutions must be "appropriate to

the materials in hand and the intended end-users must be selected.”<sup>15</sup>

In an article titled “Developing a Metadata Strategy,” Agnew details the steps involved in building a metadata repository, including “modeling the information needs of your community, selecting and adapting a metadata standard, documenting your metadata, populating the database and sharing your metadata with other repositories and metadata initiatives.”<sup>16</sup> OhioLINK institutions emphasize the importance of that consortial community. Bauer and Carlin explain that the DMC is specifically designed to eliminate barriers to institutional participation and they encourage OhioLINK institutions to focus on “content creation, acquisition and development, thus promoting the true nature of an academic collaborative venture.”<sup>17</sup> The impact of this perspective on the quality of the DMC legacy data will be discussed later in this paper.

Cooperative communities have historically struggled to reconcile their independent metadata systems, comprised of legacy data, even in the MARC environment where standards are far more secure. Bruce and Hillmann comment that “legacy data presents special problems for many communities, as it rarely makes a clean transition into new metadata formats.”<sup>18</sup> Bishoff and Meagher find no compelling reason to require institutions with legacy data to create new records since “economic reality requires this level of flexibility.”<sup>19</sup> Cromwell-Kessler points out that the retrospective conversion of already existing legacy data is “expensive and time-consuming. Where no single standard exists, integration will entail ‘translating’ from one structured data system to another.”<sup>20</sup>

Bishoff and Meagher perceive the challenge for collaborative projects to be the integration of separate collections “using a common set of metadata standards while retaining the unique character of each collection.”<sup>21</sup> A 2004

Australian study of digital collections found that almost all of the institutions surveyed valued standardized metadata and federated search functionality and that most were working toward interoperability.<sup>22</sup> Chohey reasons, “Because metadata for digital collections is not likely to be stored for use by any institution except the one creating and maintaining it, the driving force behind the development of metadata standards for digital collections in the future is most likely to be a desire for uniform access methodology across collections.”<sup>23</sup> Intner, Lazinger, and Weihs state, “Given the choice between a perfect but unique metadata schema utterly lacking in interoperability and a moderately good schema that gets high marks for interoperability, most experts recommend the latter . . . [because] in a collaborative environment interoperability trumps perfection every time.”<sup>24</sup>

If interoperability is the key, how is it attained? Much has been written on the process of cross-walking or data mapping between metadata systems, as well as on the integration of disparate metadata systems within a single database. Cromwell-Kessler says that the process entails “difficult decisions about how to handle complex data issues.”<sup>25</sup> Baca writes about the importance of the selection of appropriate metadata schemas and the role of metadata mapping and cross-walks.<sup>26</sup> Bishoff and Meagher discuss how a collaborative project developed a matrix to look at common elements across metadata standards.<sup>27</sup>

The Collaborative Digitization Program (CDP), formerly known as the Colorado Digitization Project, experienced many of these issues.<sup>28</sup> As early as 2000, Allen described the collaborations inherent in the project and the results, noting the great need for good communications and planning within the collaborative environment, stating “[t]he risks relate to quality of the digital objects, digital preservation, and quality of metadata,

and these risks must be ameliorated through extensive education and training.”<sup>29</sup> The program focuses on the importance of learning through doing, and recognizes that there are unique challenges in cooperative projects.<sup>30</sup> According to Intner, Lazinger, and Weihs, the CDP is currently in the middle of its second strategic plan and doing well.<sup>31</sup>

Attig, Copeland, and Pelikan study the deployment of three separate metadata schema within a single database by creating a merged super-set of all the elements in the three standards.<sup>32</sup> Although this exercise proves to be relatively uncomplicated, it does not ensure true interoperability. According to Attig, Copeland, and Pelikan, “The main difficulties concern the *meaning* of the values contained in the elements. . . . They may arise out of contextual differences in the use of language in different disciplines or differences in the role that the data element itself plays in imparting meaning to the values (the hierarchical context). Regardless of the source of the differences, *mapping is about meaning*.”<sup>33</sup>

Baca advocates the use of structured vocabularies and thesauri for populating metadata schemas “to increase both precision and recall in end-user retrieval.”<sup>34</sup> Metadata created by the contributors can be created more quickly and earlier in the information life cycle for rapidly growing digital collections; the process of metadata creation can more actively involve the contributors in collection development; and the contributors, as experts, can provide more accurate and granular access points.<sup>35</sup> Unfortunately, according to both Chohey and Weibel, this rosy future has not been realized.<sup>36</sup> Weibel calls the prospect of self-archived metadata seductive.<sup>37</sup> Attig, Copeland, and Pelikan contend that, in order to accommodate contributor-created metadata, the requirements for data entry must be kept modest at best.<sup>38</sup>

Few traditional library catalogers have experience outside the MARC and Anglo-American Cataloging Rules paradigm. Data content standards for cultural objects were only recently formalized with the 2006 publication of *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images*.<sup>39</sup> Bishoff and Meagher note that one of the major challenges of the CDP is the lack of cataloging expertise, which they consider "a problem for all types and sizes of institutions, not just the small libraries and historical societies."<sup>40</sup> They find that few catalogers participating in the program have experience analyzing and describing digital objects. Chopey observes that the level of granularity within digital collections is often higher than in library catalog.<sup>41</sup>

Caplan's *Metadata Fundamentals for All Librarians* provides an excellent introduction to a variety of metadata schema and serves as a springboard for analysis of available metadata standards.<sup>42</sup> Caplan lays out the principles and practices that underlie most standards and then applies these standards through critical descriptions of various families of metadata schemas. One of the metadata schemas that Caplan describes is Dublin Core (DC). This set of metadata elements was one of the products of an invitational metadata workshop held in Dublin, Ohio, at OCLC, the Online Computer Library Center, in March 1995.<sup>43</sup> The Dublin Core Metadata Initiative's (DCMI) element set has been selected for a multitude of metadata projects, primarily because it supports data mapping and sharing, is Open Archives Initiative (OAI) compliant, and is designed for simplicity of use.<sup>44</sup>

Hider found that most responding libraries used some level of implementation of DC in a 2004 Australian study of digital collections.<sup>45</sup> DC is the metadata element set of choice for the CDP to assure interoperability, although some elements were modified to facilitate the use of DC with

digital surrogates of primary source materials.<sup>46</sup> The CDP developed a set of DC-based best practices that provides one example of how to structure an application profile to describe a wide variety of resources in a complex consortial environment.<sup>47</sup>

In a 2004 study of the usage levels of unqualified DC metadata elements in Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) data providers, Ward found that only five of the fifteen elements are used most of the time and that more than half of the eighty-two data providers use only the creator and identifier elements.<sup>48</sup> According to Bruce and Hillmann, "Ward's study indicates that most metadata providers use only a small part of the DC element set, but her study makes no attempt to determine the reliability or usefulness of the information in those few elements."<sup>49</sup> A 2001 survey of DC users by Guinchard indicated that most groups choose DC for its perceived international acceptance, the flexibility of the DC elements, and the probability of future interoperability with other metadata schemes.<sup>50</sup> Critics of the DC element set contend that the fifteen elements are too simplified and calls for expansion have led to the addition of optional qualifiers. Others handle the simplicity issue by including non-DC metadata in addition to DC elements in their projects. In contrast to Ward's study, most of those surveyed by Guinchard use all fifteen DC elements, lending weight to the argument that DC provides a solid foundation for metadata development. The findings support the need for usage guidelines, and some survey participants even call for the development of a DC library application profile.

Baca concludes that there is no "one-size-fits-all metadata scheme" and that therefore the first step is to select the appropriate metadata schema.<sup>51</sup> Cromwell-Kessler notes that metadata systems may be composed of different data elements func-

tioning at different levels, in different ways.<sup>52</sup> Intner, Lazinger, and Weihs suggest that metadata schemas change because new schema develop that have new features, and that standard schema are "nearly always preferred over customized or proprietary schemas that cannot be incorporated easily into a multi-institutional, multi-database, multi-community environment."<sup>53</sup> According to Hider's 2004 survey of Australian digital information providers, the top reasons for choosing a metadata format are:

- most appropriate standard for nature of collection;
- existing standard for non-digital collections;
- community's favored standard;
- government standard;
- interoperability;
- supported by system;
- existing expertise in the standard at the institution;
- requirement for participation in a cross-institution project; and
- simplicity.<sup>54</sup>

### Defining Appropriate Metadata Using Application Profiles

Developing application profiles is an important first step in defining appropriate metadata. According to Agnew, "Implementing a core or root schema implies that one's organization will be developing an application profile for the schema. . . . Once one has determined the data elements to be used, the attributes of those data elements, the order in which the data elements will display . . . and whether each element is repeatable, mandatory or optional, it is time to document the application profile."<sup>55</sup> The DCMI Glossary defines an application profile (AP) as:

a declaration of the metadata terms an organization, information resource, application, or user community uses in its

metadata. In a broader sense, it includes the set of metadata elements, policies, and guidelines defined for a particular application or implementation. The elements may be from one or more element sets, thus allowing a given application to meet its functional requirements by using metadata elements from several element sets including locally defined sets.<sup>56</sup>

Elements can be further refined or narrowed, but not changed. An application profile is not just a model for documentation or for formulating guidelines; it also represents an approach to metadata that is much more flexible and responsive to local needs than is possible when simply adopting someone else's guidelines.

Several reasons to use an application profile are presented by Neuroth and Koch.<sup>57</sup> An application profile provides a standardized way to document the important decisions that have been made about the elements, including content standards and rules for use. Such documentation can facilitate migration, harvesting, and other automated processes. A standard template for documentation makes it easier to maintain consistency across implementations and can assist the development of an overall metadata strategy in the future. An application profile offers a systematic way of developing and sharing a data model. Because an application profile enables tracking across implementations to verify compliance, Heery and Patel suggest it "can provide a basis for different metadata initiatives to work together."<sup>58</sup>

An application profile addresses local needs while still retaining desired levels of interoperability. Dekkers notes that the development of an application profile facilitates the use of multiple schemas because elements can be selected from more than one existing schema or locally cre-

ated and defined.<sup>59</sup> Guidelines unique to a given project or community of practice can be easily documented because, "An application profile is not considered complete without documentation that defines the policies and best practices appropriate to the application."<sup>60</sup> Bruce and Hillmann assert, however, that application profiles are more useful for specialized communities because "[a]pplication profiles, which by their nature are models created by community consensus, demand a level of documentation of practice that is rarely attempted by individual projects or implementers."<sup>61</sup> An application profile provides a framework for a fully developed set of guidelines that contributors can use as a reference or training guide for metadata creators. According to Bruce and Hillmann, "Better documentation at several levels has long been at the top of metadata practitioners' wish list. The first and most general improvement is in the application of standards."<sup>62</sup> Project and collection level application profiles, once archived and made publicly available in an application profile repository, can be used as resources for search terms and other project documentation and by prospective contributors or other project implementers seeking information on projects similar to their own.<sup>63</sup>

Heery and Clayphan note that an application profile, in the form of meta-metadata, also addresses issues of data preservation.<sup>64</sup> In the same manner that technical metadata is required for the ongoing preservation of digital objects, documentation of metadata in the standardized form of an application profile is needed for the preservation of metadata that inevitably will become vulnerable to corruption through the many versions and migrations that have come to be commonplace for digital collections.

Application profiles can be created at different levels of abstraction, ranging from community of practice

guidelines to project level implementations. Three levels are in common use:

- Discipline- or format-based communities of practice seeking to establish a standard set of guidelines specific to a certain discipline or format. Examples include the DCMI, the CanCore Learning Resource Metadata Initiative, and the Video Development Initiative.<sup>65</sup>
- Consortia or other collaborative groups seeking to establish a common set of guidelines for their members. Examples include the CDP and Canadian Culture Online.<sup>66</sup>
- Local project implementers needing to document local practice, track project specific details, and ensure compliance with other standards. At this level, application profiles are often called data dictionaries and are somewhat different than a full application profile. These local level application profiles include less detail and are more prescriptive since they document all the final choices made for a specific instantiation. Examples include the University of Washington and Miami University.<sup>67</sup>

In "Metadata Principles and Practicalities," Duval et al. support using application profiles to facilitate blending of metadata schemas to accommodate the functional requirements of an application while maintaining a necessary level of interoperability with base schemas.<sup>68</sup> They note, "Metadata modularity is a key organizing principle for environments characterized by vastly diverse sources of content, styles of content management, and approaches to resource description."<sup>69</sup> By combining established metadata schemas and observed best practice, a new application can be developed that meets



local requirements without sacrificing cross-domain interoperability.

### **Deploying Appropriate Metadata via Institutional Repositories**

In 2002, the Association of Research Libraries' Scholarly Publishing and Academic Resources Coalition (SPARC) released "The Case for Institutional Repositories: A SPARC Position Paper," which envisioned an institutional repository (IR) as a "strategic response to systemic problems in the existing scholarly journal system."<sup>70</sup> Lynch defines an IR 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."<sup>71</sup> Anuradha explains, "Institutional repositories (IR) are digital collections that capture, collect, manage, disseminate, and preserve scholarly work created by the constituent members in individual institutions. They are born out of problems with the current scholarly communication model developed by commercial publishers and vendors."<sup>72</sup> SPARC characterizes these repositories as being institutionally defined, scholarly, cumulative and perpetual, and open and interoperable.<sup>73</sup>

By studying the growth rates in the usage of electronic scholarly information, Odlyzko finds them sufficiently high to predict that "there will be no doubt that print versions will be eclipsed. . . . To stay relevant, scholars, publishers and librarians will have to make even larger efforts to make their material easily accessible."<sup>74</sup> Allard, Mack, and Feltner-Reichert find that "the growth in literature demonstrates that institutional repositories are gaining in momentum throughout academia."<sup>75</sup> In a 2005 study of IR deployment in thirteen nations, Westrienen and Lynch witnessed a great diversity in IRs, and predict that deployment rates will continue to increase.<sup>76</sup> Shearer acknowledges

predicting the long-term success of the IR model is difficult.<sup>77</sup> Chopey notes that successful implementations require broad collaborations of expertise as well as strong guidance from collection curators or compilers.<sup>78</sup> In addition, Lynch observes that the success of IRs depends on institutions recognizing IR as a serious and long-lasting commitment.<sup>79</sup>

### **Work of the Task Force**

The DMSC Task Force's examination of appropriate metadata, application profiles, and institutional repositories revealed challenges for consortial digitization projects such as integrating sometimes disparate collections using common metadata standards, choosing appropriate schemas, and creating good quality metadata. The next steps were to examine the metadata in the DMC, select a base schema, create a set of core metadata elements, and develop an application profile. The remainder of this paper details these decisions, providing recommendations, lessons learned, and conclusions.

### **Metadata in the Digital Media Center**

The DMC was established in 1997 using the Bulldog digital asset management software. When the Task Force began investigating metadata, the DMC contained collections with an eclectic assortment of digital media files of multidisciplinary interest, each with its own unique metadata needs and issues. At the time of this writing, the DMC contains more than 54,000 digital images of art and architecture, more than 1,500 full-length educational videos, and almost 4,000 items in six historic and archival collections. Contributions come from an array of Ohio institutions and arrive in a variety of formats including sound files, digital video, and various standard imaging formats. Commercial

collections—the Encyclopedia of Physics Demonstrations, LANDSAT 7 Satellite Images of Ohio, Sanborn Fire Insurance Maps, Saskia Art History Images, and the ART Collection of art and archaeology objects—are also available through the DMC. Licensing agreements for these databases require OhioLINK to restrict access to individuals associated with an OhioLINK member institution.

Metadata for each collection was supplied by the OhioLINK contributor, a commercial vendor, or harvested by the software. Subject terminologies specific to the genre of the collections, terms used by subject specialists, and terms familiar to patrons desiring access to particular collections of digital media were used. Topical overlap was minimal and the structures and specificity of the terminology varied widely. For example, terms used to describe the photographs in the Wright Brothers Collection were very different from those used to describe the videos in the Encyclopedia of Physics Demonstrations.

The Bulldog software allowed keyword indexing of selected fields within each collection. This indexing was augmented by structured index fields from commercial media products or adapted from the indexing supplied with a project. Descriptive terms for subject searches had to be selected from a pool of terms supplied with the software. The variance in initial metadata and subject terminology resulted in the creation of separate databases, each with metadata appropriate to a specific genre or discipline in addition to the more generic terms supplied by the software.

The limitations of the software ultimately hindered searching of the DMC collections. Content in one collection could not be searched from within another collection, nor could users of the repository expect consistent application of subject terms or consistent search results across the collections. Though a common subject



thesaurus for the DMC was available, it was not apparent from the user interface, nor was the Bulldog thesaurus available to users. By the time the Task Force was formed, a company called Documentum had acquired the Bulldog digital asset management software and was developing software that integrated document management, Web content management, digital asset management, and metadata with functionality to facilitate federated searching and data harvesting. Any new structure would have to address the quality, consistency, and compatibility of the metadata as well as access to the collections. After further examination of the Documentum system, OhioLINK staff decided to look for an open source system that could handle the varied metadata formats, metadata cross-walks, library-specific protocols, and higher education standards needed in today's consortial environment.

### **Legacy Data in the Digital Media Center**

From the beginning, the data structures in the DMC were not apparent or consistent because of the nature of the information. These metadata were created for collections that were designed for different audiences and based on various metadata standards. The need for a cross-disciplinary core set of elements was apparent. Every collection had unique fields and a few common fields that could be mapped to Dublin Core, the Visual Resources Association (VRA) Core, and the Collaborative Digitization Program Core.<sup>80</sup> Multiple types of data structures led to discrepancies between databases and with established standards. For example, the ART Collection data did not follow the standard set by the VRA, and, according to the license agreement, the data had to be mounted as provided. OhioLINK chose to accommodate the needs of a wide variety of contributors rather than risk losing the projects.

While all the databases contained a small number of similar fields, some databases included fields that did not apply to other databases. The Task Force prepared an analysis of metadata in each subject database to determine needs, characteristics, and problems. Initial efforts involved mapping existing DMC metadata and metadata from locally held collections not yet submitted to the DMC into one of several emerging metadata standards. The Task Force then compared the DMC elements to elements used by the Collaborative Digitization Program and Dublin Core. These efforts resulted in "The DMC Core Fields Analysis Document."<sup>81</sup> Further developments of this spreadsheet yielded initial assessments of whether or not each metadata element appeared to be mandatory, required, or optional; whether or not the data field was repeatable; and notations of any issues that appeared to be associated with use of the field.

### **Selecting a Metadata Standard**

Cross-domain interoperability is a common theme throughout digital library research. Digital collections with different architectures, metadata formats, and underlying technologies need common protocols and standards in order to interact. The Task Force agreed that the future of the DMC collections and their growth would depend on finding and adopting a set of metadata standards that would be flexible enough to accommodate the needs of the individual OhioLINK digital collections while facilitating federated searching, a challenge in part because no one had examined the relationships between the DMC databases that would facilitate federated searching. Though procedures (in the format of a proposal form) were in place for submitting collections to the DMC, enforced standards or documentation for establishing new data or metadata structures were not avail-

able to contributors.<sup>82</sup> The Task Force anticipated that a core set of metadata elements accommodating existing and future collections must be developed to facilitate potential development and federated searching. This core set of elements would be anchored in metadata standards and accompanied by a best practices document to assist data compatibility of future DMC collections.

In the preceding few years, there had been an explosion in the growth and development of non-MARC metadata standards. The Task Force considered and rejected a variety of standards for adoption in the DMC. Some standards, such as Encoded Archival Description (EAD) and Metadata Object Description Schema (MODS) were rejected because they were deemed too complicated for non-cataloger contributors.<sup>83</sup> The Text Encoding Initiative (TEI) standard was not considered because of concerns with attaching the metadata directly to the digital object.<sup>84</sup> Several educational standards, including Sharable Content Object Reference Model (SCORM), Learning Object Metadata (LOM) and Metadata for Education Group (MEG), were examined and deemed too specific for this project.<sup>85</sup> The VRA Core Categories also were discussed extensively, but were ultimately discarded as being too cultural object-oriented to accommodate the data.<sup>86</sup> The Task Force ultimately chose an application profile to document the current decisions and to provide the needed framework for a more fully developed set of guidelines in the future.

### **Selecting a Base Schema**

The Task Force needed a base schema that would accommodate the heterogeneous content of the DMC represented by multiple formats, multiple subject areas, and multiple contributors, and simultaneously support federated searching and harvesting. The schema also needed to be interoper-

able with legacy data and be adaptable to change over time. Every effort was made to choose recognized authoritative sources in common use by the digital library community. After a careful review of emerging metadata schemas, best practice documents, and the DMC elements currently in use, the Task Force selected the DC schema as the basis for the core element set because it met the requirements of the DMC environment.

The DC element set was developed with the goals of interoperability, extensibility, and flexibility in mind. Interoperability is important for cross-domain discovery and harvesting. DC provides a high level of interoperability and thus would support federated searching and harvesting. Other standards are too narrow to be applied across all of the DMC collections. The Task Force's work also indicated that all manifestations of existing DMC metadata, as well as selected schemas used in non-DMC collections at OhioLINK member institutions, could be mapped to elements in DC. Dublin Core Simple had been established as an international standard, which increased the possibility that it would come into common use. DC was also the foundation of the OAI-PMH.<sup>87</sup>

According to Lagoze, "The OAI approach to metadata harvesting exemplifies the notion of metadata modularization, mandating simple Dublin Core metadata for cross-community interoperability while supporting, in parallel, community-specific metadata for 'drill-down' searching within domains."<sup>88</sup> These trends are important because the larger the community of users for a single standard, the greater the opportunity for resource sharing through harvesting and

cross-domain discovery. DC also supports the creation of resource descriptions that are easy to produce and use, which is an important consideration for contributors without access to training or professional catalogers.

### Digital Media Center Core Metadata Elements

The Task Force discussed numerous fields as possible core elements and the implications of including and excluding each in the application profile. These discussions were often long and sometimes contentious. Even though most members worked in libraries, a substantial difference of views existed regarding metadata and what steps should be pursued. In the end, the list was narrowed to twenty-two core fields including elements from DC and supplementary elements deemed necessary in the OhioLINK environment. Mapping to the DC element and the DC definition has been retained for those elements drawn directly from the DC element set. Any refinements have been made according to DCMI principles. Table 1 is a list of the core fields and their relationship to the original, the digital

manifestation, and OhioLINK asset management. The Task Force viewed these core elements as a starting point for institutions interested in creating metadata for the collections in the DMC. Each institution would have the option to use only the core fields or to include additional fields beyond the core to adequately describe their collections. The creation of subject-related sets of element extensions and additional fields would be possible at any time.

The DMC Core contains six mandatory elements—Title, Creator, Digital Publisher, Asset Type, Object Identifier, and Permissions. Of these six elements, two are system-supplied—Asset Type and Object Identifier—and three are OhioLINK-specific—Asset Type, Object Identifier, and Permissions. By making Title, Creator, and Digital Publisher the only other mandatory elements and by demonstrating that metadata could be as simple or complex as a project warranted, the Task Force hoped to promote widespread adoption of the Core by DMC contributors.

The Title element, defined as a name given to a resource, was the most difficult element to finalize.

**Table 1.** DMC core elements

Elements related to the original (regardless of format)	Elements related to the digital manifestation	Elements related to OhioLINK asset management
Title*	Digital Publisher*	Collection Name
Creator*	Digital Creation Date	OhioLINK Institution
Contributor	Digitizing Equipment	Asset Type*
Date	Asset Source	OID (Object Identifier)*
Description	Rights	Permissions*
Subject		
Spatial Coverage		
Temporal Coverage		
Language		
Work Type		
Repository Name		
Repository ID		

\*Mandatory elements

Source: OhioLINK DMSC Metadata Task Force, "OhioLINK Digital Media Center (DMC) Metadata Application Profile" (May 11, 2004), [http://dmc.ohiolink.edu/docs/DMC\\_AP.pdf](http://dmc.ohiolink.edu/docs/DMC_AP.pdf) (accessed Aug. 11, 2006).

## Title

**Definition:** A name given to a resource. Typically a title will be a name by which the resource is known. It may also be an identifying phrase or object name supplied by the holding institution.

**Obligation:** Mandatory

**Occurrence:** Non-Repeatable

**Recommended Schemes:** none.

### Input Guidelines:

1. Identify and enter one Title element per record according to the guidelines that follow.
2. Transcribe title from the resource itself, such as book title, photograph caption, artist's title, object name, etc., using same punctuation that appears on the source.
3. When no title is found on the resource itself, use a title assigned by the holding institution or found in reference sources. If title must be created, make the title as descriptive as possible, avoiding generic terms such as Papers or Annual report. Use punctuation appropriate for English writing.
4. When possible, exclude initial articles from title. Exceptions might include when the article is an essential part of the title or when local practice requires use of initial articles.
5. Capitalize only the first letter of the first word of the title and of any proper names contained within the title.
6. Consult established cataloging rules such as *Anglo-American Cataloguing Rules (AACR2)* or *Archives, Personal Papers, and Manuscripts (APPM)* for more information.

### Examples:

1. Channel crew poling ice blocks
2. DH4 battle plan and Wright Model C Flyer share air space
3. Exhibition flight over Lake Erie
4. Great Ballcourt

**Maps to DC Element:** Title

**Figure 1.** Title element

Although the Task Force agreed that Title should be mandatory, the occurrence was revised more than once. The Task Force disagreed about whether or not Title should be repeatable or non-repeatable, and whether or not alternate titles should be included in the core elements. If alternate titles were included, should the alternate title be part of the Title element, thus requiring Title to be repeatable, or a separate element? If alternate title was a separate element, should it be a core field? All of these decisions had to be in place before the input guidelines could be finished and the Title element finalized. The Task Force eventually decided to make the Title element non-repeatable and to include any other titles in the additional fields. Additional fields are non-core fields needed for a specific project and are beyond the scope of the application

profile document. Figure 1 shows the Title element.

The second mandatory element is Creator, which includes authors, artists, photographers, collectors, or organizations primarily responsible for producing the content of the resource. Entities with a secondary role in the creation process such as editors, illustrators, and performers are included in the optional Contributor element. Both Creator and Contributor are repeatable fields. Project implementers are instructed to enter names according to established rules (for example, *Anglo-American Cataloguing Rules*, 2nd ed. (AACR2), and *Archives, Personal Papers, and Manuscripts*) or use the guidelines outlined in the DMC Metadata Application Profile.<sup>89</sup> The General Input Guidelines state that the same rules or guidelines should be used for names throughout the project

profile. The recommended scheme for both elements is the Library of Congress Authorities file.<sup>90</sup>

The Date element contains the creation or modification date or dates of the original resource. Date is required (if applicable) and repeatable. A resource may have several dates associated with the original resource such as creation date, copyright date, revision date, and modification date. The Digital Creation Date element records the date of creation or availability of the digital resource and may be approximated by the agency of creation. This element is required (if available) and non-repeatable. Date maps to DC.date while Digital Creation Date maps to DC.date.available, a refinement of DC.date. The recommended scheme for both elements is ISO 8601, the International Standard for the representation of dates and times.<sup>91</sup>

The Description element is an account of the content of the resource and may include an abstract, table of contents, provenance, or other descriptive text. The Description element holds specialized information that is not included in other elements. Description is required (if available) and repeatable. The Subject element, or topic of the content of the resource, is required (if available) and repeatable. The application profile strongly recommends selecting a value from, or creating values according to, a controlled vocabulary, name authority file, or formal classification scheme to ensure consistency, reduce spelling errors, and improve the quality of search results. Examples include the *Library of Congress Subject Headings (LCSH)*, *Medical Subject Headings (MeSH)*, and the *Thesaurus for Graphic Materials I: Subject Terms*.<sup>92</sup>

Spatial Coverage describes the location or locations covered by the intellectual content of the resource, not the place of publication. Examples include place names, longitude, and latitude. Recommended schemes for

Spatial Coverage include the Getty Thesaurus of Geographic Names, DCMI Box, DCMI Point, ISO 3166, and *LCSH*.<sup>93</sup> Temporal Coverage refers to the time period covered by the intellectual content of the resource, not the date of publication or digital creation date. The recommended schemes for Temporal Coverage are ISO 8601 and *LCSH*. Both coverage-related elements are optional, repeatable, and map to DC.Coverage, which includes refinements for spatial and temporal coverage.

The Language element records the language of the intellectual content of a resource and is required (if available) and repeatable. Some resources may contain multiple languages while others, such as images, may not contain a language component at all. The recommended scheme for Language is ISO 639-2, a three letter code set for the representation of names of languages.<sup>94</sup>

Work type refers to the manifestation of the original element and is required (if available) and repeatable. The application profile suggests applying terms from an established scheme such as the Art and Architecture Thesaurus or the *Thesaurus for Graphic Materials II: Genre and Physical Characteristics* to ensure consistent usage.<sup>95</sup> Asset Source records the immediate parent or manifestation of the digital object and often will be the same as Work Type. This element is optional and repeatable.

Repository Name lists the organization or institution that holds the original physical object, if applicable. Repository ID holds a number or other identifier for the resource from which the present resource was derived, such as a local accession number. Both of these elements are optional, because some digital resources do not have a repository, and both are repeatable. The Collection Name element records the formal or informal group of objects to which the item belongs. This element is optional and repeatable.

The Digital Publisher is defined as the entity responsible for making the resource available to OhioLINK. Examples include an academic department, corporate body, publishing house, or museum. This element is mandatory and repeatable. If Digital Publisher is the same as Creator or Contributor, the application profile instructs users to enter the information in both elements. This element may or may not be related to the entity listed in the OhioLINK Institution element, which is a consistent reference to the OhioLINK member that contributes the material. OhioLINK Institution is required (if available) and repeatable. Like Creator and Contributor, the recommended scheme for Digital Publisher is the Library of Congress Authorities File.

The Digitizing Equipment element records the equipment or tools used to create the digital object. This element is optional and repeatable. The Rights element records information about rights held in and over the resource. This optional, repeatable field typically contains a rights management statement for the resource or a reference to a service providing the information. Rights information often encompasses Intellectual Property Rights (IPR), copyright, and property rights. The application profile states that if the rights element is absent, no assumptions may be made about any rights held in or over the resource. The Permissions element lists the audience that the publisher agrees to allow access to the content. This mandatory, non-repeatable element has three options—world, state of Ohio, or OhioLINK.

Asset Type records the manifestation of the resource. The software automatically captures this mandatory, non-repeatable element. Values include image, audio, video, or text, and related properties such as file format, file size, and dimensions. This element maps loosely to both DC.Type and DC.Format. Object Identifier (OID) is a mandatory unique identifier automatically assigned to the digital object that is subsequently used to form a persistent URL.

Each element in the application profile contains eight different specifications. Four of the specifications are presented in the condensed view of the DMC Core elements in table 2. “Element Name” represents a single characteristic or property of a resource. The “Definition” specifies the type of information required for the named element. In most cases definitions are taken directly from the Dublin Core Element Set. A definition may also contain comments providing additional information or clarification. “Obligation” indicates whether or not a value must be entered. Three types of obligations are used in this application profile. “Mandatory” is defined as a value that must be entered even if it requires the creation of an arbitrary value. “Required (if available)” is defined as a value that must be included if it is available. “Optional” means that it is not necessary to include a value for this element. “Occurrence” indicates whether a single value or multiple values can be included. Two occurrences are used in the DMC Core—repeatable and non-repeatable.

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“Recommended Schemes” refers to established lists of terms or classification codes from which a user can select when assigning values to an element. Two types of schemes—vocabulary-encoding schemes, which are controlled lists of words such as *LCSH*, and syntax encoding schemes, which indicate that the value must be formatted in accordance with a formal notation, such as how a date is to be entered—may be used. “Input Guidelines” list common conventions and syntax rules used to guide the data-entry process. In the case of system-supplied elements, a brief



**Table 2.** DMC core elements (condensed view)

Element name	Obligation	Occurrence of values	Mapping
Title	Mandatory	Non-Repeatable	DC.title
Creator	Mandatory	Repeatable	DC.creator
Contributor	Optional	Repeatable	DC.contributor
Date	Required (if available)	Repeatable	DC.date
Description	Required (if available)	Repeatable	DC.description
Subject	Required (if available)	Repeatable	DC.subject
Spatial Coverage	Optional	Repeatable	DC.coverage.spatial
Temporal Coverage	Optional	Repeatable	DC.coverage.temporal
Language	Required (if available)	Repeatable	DC.language
Work Type	Required (if available)	Repeatable	DC.type
Repository Name	Optional	Repeatable	n/a
Repository ID	Optional	Repeatable	DC.source
Digital Publisher	Mandatory	Repeatable	DC.publisher
Digital Creation Date	Required (if available)	Non-repeatable	DC.date.available
Digitizing Equipment	Optional	Repeatable	n/a
Asset Source	Optional	Repeatable	DC.relation.HasFormat
Rights	Optional	Repeatable	DC.rights
Collection Name	Optional	Repeatable	DC.relation DC.relation.IsPartOf
OhioLINK Institution	Required (if available)	Repeatable	n/a
Asset Type	Mandatory (system supplied)	Non-repeatable	DC.format DC.type
OID (Object Identifier)	Mandatory (system supplied)	Non-repeatable	DC.identifier
Permissions	Mandatory	Non-repeatable	n/a

Source: OhioLINK DMSC Metadata Task Force, "OhioLINK Digital Media Center (DMC) Metadata Application Profile" (May 11, 2004), [http://dmc.ohiolink.edu/docs/DMC\\_AP.pdf](http://dmc.ohiolink.edu/docs/DMC_AP.pdf) (accessed Aug. 11, 2006).

explanation of the process is provided. Two types of input guidelines are provided—general and element-specific. General guidelines that apply to more than one element are located near the beginning of the application profile to cut down on repetition and length of the document. Input guidelines specific to an element are located on the

page for that element. "Examples" are provided for each element to illustrate the types of values, conventions, and syntax used for the element. "Maps to DC Element" gives the DC element equivalent, if applicable.

Input guidelines are included to provide a relatively simple way to promote data consistency and assist with

data creation while still allowing some flexibility. The application profile was created to accommodate an audience beyond catalogers and others familiar with metadata creation. The Task Force attempted to anticipate questions and to help those unfamiliar with the metadata process plan their projects by providing decision points up front. While anticipating all situations was impossible, every effort was made to assist contributors in metadata creation. External content standards are also referenced as appropriate.

### Current Status of the Digital Media Center and the Application Profile

New collections are no longer being added to the DMC and the collections contained in the DMC are being migrated to a new platform called the Digital Resource Commons (DRC), funded by a 2003 Technology Initiatives grant from the Ohio Board of Regents. The OhioLINK DRC is part of the Ohio Commons for Digital Education, a collaborative effort by OhioLINK, the Ohio Learning Network, and the Ohio Supercomputer Center/OARnet to develop digital education resources, services, and capabilities in Ohio. As part of the DRC, OhioLINK is building a general-purpose digital object repository that will accept and share a wider variety of collections and digital objects than the DMC can accommodate. The DRC will be a collection of research and courseware digital repositories connecting to a wide array of existing systems, including Collaborative Learning Environments, portals, and integrated library systems.

All OhioLINK member institutions are entitled to contribute content to the DRC, eliminating "the need for redundant and costly local investments by enabling Ohio colleges and universities to utilize OhioLINK's hardware, software, and staff to create



their own repositories.”<sup>96</sup> Individual repositories are customizable, allowing institutions to define how content is contributed and presented. The contributing institutions maintain ownership of the work and control access, allowing rapid dissemination to worldwide audiences or to a single person. The DRC will enhance the quality of education by providing a shared point of access to Ohio’s scholarly knowledge. Students will have “a versatile resource for sharing and showcasing . . . research projects as well as accessing course materials, research and learning objects to support their learning.”<sup>97</sup> Further collaborations between OhioLINK, Ohio’s K–12 community, and other Ohio institutions will enable the DRC to be a foundation of the Ohio education system in the twenty-first century.

The transfer of DMC collections to the new DRC platform is scheduled to be completed by March 2007. The application profile developed by the DMSC Metadata Task Force and described in this paper will continue to be a foundational document for project development in the new system. Contributing members are encouraged to use the application profile during the planning and implementing stages of new projects. The current application profile will be updated in to reflect the DRC environment.

### Final Recommendations

Eight recommendations were presented to the OhioLINK Database Management and Standards Committee centering around three broad categories: the need for continued leadership, a call for high-quality metadata development, and the necessity of knowledge sharing. The first recommendation addressed the need for leadership, oversight, coordination, and continuity for DMC metadata. The Task Force recommended that the DMSC develop and document

an overarching metadata strategy to provide a framework for all the metadata related initiatives at OhioLINK. Furthermore, the Task Force recommended that OhioLINK form a body to coordinate metadata-related projects and initiatives, to guide software and tool development, to facilitate metadata harvesting and federated searching, and to keep OhioLINK metadata documentation up-to-date.

The Task Force recognized that the identification of a core set of metadata elements is only a first step. The need for high-quality metadata development will increase in the future. Therefore, the Task Force recommended that OhioLINK develop extended element sets with supporting documentation for various subject and format areas. The Task Force also recommended that OhioLINK develop policies to address legacy data issues to ensure continued usability of older collections.

A group of recommendations addressed issues of training, marketing, and knowledge sharing. The Task Force recommended that OhioLINK host a workshop or conference on metadata and digital collection practices where participants would begin to form a viable OhioLINK metadata practice community. Concurrently, the Task Force recommended the creation of an electronic discussion list for sharing information among this emergent community and current DMC/DRC contributors.

The Task Force proposed the creation of an online, locally developed, wizard-type tool to assist digital collection managers with project planning. After some mildly heated, mostly humorous debate about what to call this tool, the name “MetaBuddy” was chosen. In concept, MetaBuddy is an interactive version of the OhioLINK application profile that could help potential contributors determine the metadata needs of the collection in question. MetaBuddy would lead the project manager through the applica-

tion profile, facilitating the preliminary mapping of existing data structures to the core metadata elements. The collection-specific application profile created in MetaBuddy would then assist OhioLINK programmers with the data mapping of the local collection into the DMC or DRC. The online tool would promote the use of the application profile through its ease of use and adaptability to local needs, promote the use of the DMC or DRC to mount digital collections, and ensure that the standards in the application profile provide consistent, reliable access to OhioLINK’s digital collections. The MetaBuddy online tool is currently in development.

The final recommendation addressed the need to expand knowledge of the DMC and DRC throughout the OhioLINK community. The Task Force saw a need to develop and implement a formal marketing strategy to recruit contributors and content and increase end-user awareness and use. The OhioLINK Database Management and Standards Committee is represented on the steering committee of the DRC and the development of the repository is being closely monitored. DMSC members are currently discussing opportunities to increase the awareness and use of the DRC.

### Lessons Learned

The Task Force’s work was accomplished over twenty months. During that time, a group of people from different institutions and backgrounds collaborated to build a foundation for OhioLINK digital collections metadata. Many lessons were learned. Here are a few of the most significant:

- Standards are still important. Like anything that requires a certain level of compatibility between systems, metadata is standards-driven. Standards provide the foundation for

interoperability. Anyone who wants to increase access to their digital collections—whether through a collaborative project, metadata harvesting, or Google—needs to be aware of a variety of metadata-related standards.

- Standards do not eliminate the need for local decisions. An application profile can help narrow the choices by making recommendations and providing guidelines. However, local decisions will still need to be made for each project.
- It is not necessary to reinvent the wheel with every project. Even though local decisions need to be made for each project, most projects will have common aspects. Find an example of a locally defined application profile or data dictionary for a similar project and adapt it.
- The best and worst thing about metadata is that it does not come with content standards. Traditional MARC is a package deal, complete with a set of standards that are designed to work for everyone. Few people would think of using MARC with a standard other than AACR2. The same can not be said about nontraditional metadata. One can pick and choose from a variety of content standards or even create a local variation. This freedom is good when trying to meet locally defined needs; it is bad when aiming for interoperability.
- The metadata universe is large and subject to change. This might be stating the obvious, but keeping this in mind when planning a new project is important. Standards are supposed to provide a certain amount of stability and users may be tempted to become complacent. However, one

should remember that metadata is standards-based, and new standards and technologies are rapidly appearing on the scene that will need to be reconciled with the current standards and technologies. No matter what standards are adopted, being aware of new developments is important. If collections are to be accessible now and in the future, metadata cannot be created in a vacuum.

- Metadata can be as simple or as complex as wanted or needed. Ideally, the need for interoperability, which requires a core of universal elements, is balanced with the needs of a specific collection, project, or community. One way this can be accomplished is through the use of application profiles and extended element sets. However, research shows that few small or independent projects with limited resources have application profiles. Remember that any attempts to standardize the metadata will help with information retrieval and limited access is better than no access.
- Having a cataloging background is useful. The group decision-making process is complex. Catalogers bring certain assumptions to the table about the importance of standards and guidelines that can jumpstart the metadata process, even if they have little knowledge of non-traditional metadata.
- Identifying a set of core elements is an important first step, but it is only the first step. The work accomplished thus far will serve as a foundation for related initiatives within the OhioLINK community. Continued refinement and expansion of this work must continue to meet the changing needs of the consortial community.

## Conclusion

After five years of expansion, the OhioLINK DMC metadata needed some standardization to facilitate access to the collections and future growth. Although procedures to submit new collections were in place, no metadata standards or guidelines were available to assist contributors. One of the tenets of the DMC was to eliminate barriers to institutional participation. The legacy of this principle demonstrates one challenge facing consortial repositories. A series of subject-specific databases based on various metadata standards had been created for different audiences. This variety of resources ultimately hindered access to more than one collection at a time. A Task Force was appointed by the OhioLINK Database Management and Standards Committee to investigate metadata schema and best practices documentation. While the Task Force was unable to discover standards and best practices that could be adopted wholesale by OhioLINK for the DMC, the examination of various best practices documentation and standards helped define a core of cross-disciplinary metadata elements. The development of the OhioLINK DMC Metadata Application Profile and subsequent recommendations by the Task Force helped lay a foundation for the creation of quality, consistent, and compatible metadata for future collections contributed to OhioLINK's online repositories. This application profile will help define projects, schemas, and standards for the new OhioLINK DRC to facilitate access for users and training for contributors.

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# Notes on Operations

## **FRBR Principles Applied to a Local Online Journal Finding Aid**

**By Chew Chiat Naun**

*This paper presents a case study in the development of an online journal finding aid at the University of Illinois at Urbana-Champaign (UIUC), with particular emphasis on cataloging issues. Although not consciously designed according to Functional Requirements for Bibliographic Records (FRBR) principles, the Online Research Resources (ORR) system has proved amenable to FRBR analysis. The FRBR model was helpful in examining the user tasks to be served by the system, the appropriate data structure for the system, and the feasibility of mapping the required data from existing sources. The application of the FRBR model to serial publications, however, raises important questions for the model itself, particularly concerning the treatment of work-to-work relationships.*

The University of Illinois at Urbana-Champaign's (UIUC) Online Research Resources (ORR) registry ([www.library.uiuc.edu/orr](http://www.library.uiuc.edu/orr)) is a database-driven, alphabetical list of online resources similar in principle to comparable lists provided by vendors such as Serials Solutions and TDNet. ORR is, in effect, an alternative or supplementary catalog for specialized access to online resources, especially electronic journals. Like other tools of its kind, it was designed partly to overcome some of the drawbacks of online catalogs in dealing with this class of material. Antelman says that such tools "are potential sources of innovation because they are amenable to experimentation in ways that our current integrated library systems are not."<sup>1</sup> UIUC's experience with ORR is a case study of a home-grown system built to local specifications.

ORR was not the first system of its kind developed by the UIUC library. An earlier electronic resources registry had been in existence for some years, but the acquisition of a data feed from TDNet in 2003 provided the impetus to redevelop the service. The TDNet service monitors a range of provid-

ers and notifies the library of any change either in content or location (URL, or uniform resource locator). Although TDNet normally supplies a public interface, the library chose to develop its own. The development work was undertaken by the library's systems office with the guidance of a committee comprised of staff from systems, public services, and technical services. The new version was built on a redesigned data structure capable of incorporating additional data from external sources. While the redevelopment was primarily intended to facilitate maintenance of the data by library staff, it also made possible significant improvements in the public interface.

ORR is not intended to be a comprehensive catalog of the library's electronic holdings. Its scope is limited to online article databases, journals, and reference works. The majority of electronic books were excluded on the principle that book-like objects were more appropriately represented in the library's online catalog. Each of the categories of resources covered by ORR presented its own metadata and interface design challenges. However, the most urgent—and in some ways

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the most complex—task for the developers of ORR was to facilitate access to online journals. Jones describes this class of publications as “the subset [of continuing resources] characterized by issues containing contributions by individual authors, the subset that is most often analyzed in abstracting and indexing services.”<sup>2</sup> They will be the main focus of this paper.

At the time of writing, ORR listed 42,640 online journals, 1,344 reference works, and 439 article databases. These totals are for unique titles; the number of unique URLs is much higher. In each of the two years ORR has been operational, it has logged between four and five million hits, counting only links through to full-text content. ORR is a key resource for the library’s patrons.

The technical and logistical aspects of ORR’s development have been described by German, Shelburne, and Norman, and the reader is invited to consult their publications for additional information about this project.<sup>3</sup> The literature on the management of online journals is extensive, including the provision of access through online journal finding lists similar to ORR. Although several articles provide illuminating details about the database structures employed in these systems, relatively little appears to have been published dealing with the bibliographic relationships in particular.<sup>4</sup>

This paper examines the data structures employed in ORR with respect to bibliographic relationships among serial works, versions, and aggregates. These relationships are described in the International Federation of Library Association’s (IFLA) *Functional Requirements for Bibliographic Records (FRBR)*.<sup>5</sup> Although ORR was not designed with the FRBR model specifically in mind, its development was informed by many of the same considerations that underlie that model. The FRBR model provides a context to understand specific decisions made in creating ORR,

including the compromises involved and areas where improvements may be sought in future.

This paper does not attempt to cover all aspects of ORR’s design. For example, since its launch, ORR has been augmented with a rights management module and now more closely resembles a comprehensive electronic resources management system. These newer developments, and their relationship to the cataloging data in ORR, are beyond the scope of the present paper.

### User Tasks

The FRBR report ascribes to the end-user the following tasks: to find documents matching a given set of criteria, to identify those that are relevant, to select the desired or available versions, and to obtain them.<sup>6</sup> FRBR also recognizes the need in some contexts to navigate between resources.<sup>7</sup> This breakdown is useful for understanding the purposes served by various elements of ORR’s design. Before attempting an analysis, one must ask the question: exactly what is the user supposed to be trying to find, identify, select, and obtain?

ORR is primarily concerned with bibliographic control and access at the level of the serial publication, not at the level of the individual article. This emphasis reflects that of the traditional library catalog, where Tillett observes, “We cannot afford to always describe and identify every work although that may be the ‘ideal’—(sometimes leaving such levels to abstracting and indexing services, sometimes to bibliographies, finding aids, and reference tools).”<sup>8</sup>

This point is well understood by librarians, but not self-evident to patrons. Most of the time, what a patron is interested in is the specific content of a journal article, and an inexperienced patron naturally approaches a tool like ORR with the expectation of finding individual articles directly.

As Antelman puts it, “library users’ sense of a serial work diverges significantly from the way it is currently implemented in library systems.”<sup>9</sup> The identity of a serial work is not always a matter of indifference to the end user. To look no further than their utilitarian role, scholarly journals are an institutionalized part of the system for scholarly dissemination, review, and recognition. ORR includes at least two data elements at the serial-work level that reflect this role: the Institute for Scientific Information impact factor for each title and its peer review status. Nonetheless, the serial title is the primary unit of representation in ORR because it helps users obtain relevant documents. The serial publication is the vehicle of distribution for article content. Data relating to the manifestations and copies (or, in FRBR terminology, items) of the serial publication, including the URLs for available sources, coverage dates, and (for print holdings) location and call numbers, enable patrons to obtain copies of the articles they seek.

The role that ORR plays in supporting user tasks may be better understood in the context of concurrent plans at the UIUC library to introduce a broadcast search facility and link resolver. Broadcast searching will facilitate finding and identification tasks by enabling users to search for articles and citations in multiple databases simultaneously. The link resolver will act, where required, as a bridge between the results found in these databases, whether searched simultaneously or separately, and the selection and obtaining tasks jointly supported by the link-resolution knowledge base, serials management system, library catalog, and document delivery service. Part of the original plan for ORR was to serve as a knowledge base for reference linking. This plan was later modified when the library decided to acquire a commercial link resolver with its own knowledge base. Although not completely integrated,



these systems will provide mutually complementary access to the library's online collections.

ORR serves the core function of allowing users to find and identify known serial publications by title, view details of all the available sources (including coverage dates and access restrictions), and make an appropriate selection from among them. The difficulty is that no existing database contains all the requisite data. Even where the data are available, the necessary linkages between them do not always exist. For example, if a complete set of back files is not available for a given journal, the data necessary to locate a library's print holdings may not be obvious from a vendor's database. In order to support the desired user tasks, a system has to pull together disparate data from a range of otherwise unrelated sources and assemble them into a structure that will make displaying and navigating the relevant relationships possible. The data must be easily maintained so that keeping ORR complete and up to date is practical.

ORR is designed around a strategy that satisfies both of these requirements. The strategy is, where possible, to import data from existing sources and use them to populate ORR records according to a quality hierarchy at the level of each individual field. The quality hierarchy ranks the preferred sources for each data element, an approach that allows the database to be populated to the fullest extent possible, while ensuring that data in each field are drawn from the most authoritative, complete, or current source. Thus, while titles are available from both TDNet and the Voyager integrated library system (ILS) data feeds, the ILS source is preferred for title information. Conversely, the TDNet data receive priority for URLs. Automated processes alone cannot ensure the completeness and integrity of all the data; maintaining ORR still requires manual data entry and cleanup.

## Functionality and Data

The biggest drawback of the UIUC online catalog as a discovery tool for the library's online collections is its size. At the time of writing, it contains just fewer than five million bibliographic records, compared to 45,000 titles listed in ORR. Although searches may be scoped in various ways, the proportion of unwanted hits inevitably remains high.

The online catalog's functionality has significant limitations, as well. Its proprietary design makes updating using external non-MARC data sources difficult, particularly with the degree of granularity needed. Certain entities conceptually important to the management of electronic resources, such as content providers, are difficult to represent adequately within the confines of the MARC format. The online catalog's ability to manipulate a variety of data into a desired Hypertext Markup Language (HTML) display format is strictly limited. It can collocate alternative versions of a title only to the limited degree that the *Anglo-American Cataloging Rules*, 2nd ed. (AACR2) record structures and the system's own relatively inflexible filing and display algorithms permit it to do so.<sup>10</sup> Although the MARC format has provisions for linking between alternative versions of a work and between successive titles in a journal's history, these linking mechanisms are only imperfectly implemented in the catalog's public interface.

The advantages of ORR as an alternative to the online catalog may be seen from a brief outline of the functionality of the system's public interface and some of its specific data elements and design features. Users consulting ORR may search all resources together, or scope their searches by resource type, the latter being recorded in a field in the ORR resource record (figure 1). Titles may be searched for an exact match with

implied right truncation or by keyword, with a further option for implied truncation of each word within the title. This latter option is particularly useful for finding abbreviated titles. Searches match on variant titles as well as titles proper, thanks to cataloging data pulled in from the 24X title fields of MARC records.

The interface also allows the user to navigate between earlier and later titles in the serial work's history, providing linked title displays drawn again from MARC data, in this case from the 780 (previous title) and 785 (succeeding title) linking entry fields. Certain other work-level data elements are drawn from a variety of potential sources. International Standard Serial Number (ISSN) data, for example, are compiled opportunistically from TDNet, EBSCO, ILS, and Ulrich's *Periodicals Directory*. Ulrich's is also the usual source for the ISI impact factor and the peer-review status.

ORR's approach to subject access reflects the same priority given to access at the serial-work level. The decision was made very early not to offer generic keyword searching of the database, in spite of the prevalent practice of supplying a keyword option in almost any context. It was decided that keyword searching was suited mainly to the fine-grained subject access and article-level retrieval offered by article and citation databases. The broadcast search interface would be the appropriate place to encourage generic keyword searching. In contrast, the ORR interface was designed to allow very broad subject browsing using an in-house subject descriptor list. To assist in the assignment of these subject descriptors, the ORR database performs mappings from Library of Congress Subject Headings (LCSH) so that the UIUC descriptors are derived automatically on the basis of data in MARC records. UIUC reference librarians may change or add descriptors. They also may add

## Online Research Resources RSS

Article Indexes & Abstracts
Journals & Newspapers
Reference Tools
All Resources
Help

Search All Online Resource Titles:

☒ Title Keywords 
 ☐ Start of Title 
 ☐ Title Abbreviations

Browse All Online Resources Alphabetically: [0-9] A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

**All Online Resources Subjects**

<b>General Interest &amp; Reference</b> Biography General Interest & Current Events Government Documents Maps Multi-disciplinary Newspapers Statistical Resources See also the Online Reference Collection	<b>Arts &amp; Humanities</b> Architecture Art History Arts Classics Dance Film Germanic Languages History Linguistics Literature Music Philosophy Poetry/Fiction	<b>Science &amp; Technology</b> Agriculture Astronomy Audiology & Speech-Language Pathology Biological Sciences Chemistry Computer Science Engineering Environmental Studies Food Science & Nutrition Geology Kinesiology & Sports Mathematics Medicine	<b>Social Sciences</b> Anthropology Business City Planning & Landscape Arch. Communication Economics Education Geography Global Studies Government Labor & Industrial Relations Law Leisure, Recreation, & Tourism Library and Information Science	<b>Area Studies</b> African Studies Afro-American Studies Asian Studies Latin American & Caribbean Slavic & East European Studies Women & Gender Studies
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Use Multiple Subjects: ☐

Figure 1. ORR's main search page

natural-language descriptions viewable by the public for some ORR resources (figure 2).

The database schema for ORR may be seen in figure 3. The data elements previously mentioned reside in the resource record, which is one of ORR's three main building blocks (the other two are the instance record and the interface record). These are invoked to display relevant information about the online sources or providers available for each title (including the dates covered by each source), any access conditions that may apply, and other related information such as current availability. ORR's public display groups information about sources directly under the entry for the relevant title. ORR thus offers a hierarchical display that is supported by a hierarchical record structure (figure 4). The user may toggle to a detailed display (figure 2). These displays are similar to the grouped catalog displays advocated by commentators such as Yee.<sup>11</sup>

The system has three building blocks but only two levels in the display. Most of the pertinent data at the

level of the particular source or provider, such as the URL, are stored in the instance record. However, the existence of the interface record reflects the fact that online journals are typically acquired as part of a package that is licensed or purchased together and hosted on a common platform. The interface record often represents a provider, such as Wiley InterScience, but may sometimes represent instead a collection packaged by the provider, such as Wiley InterScience's chemistry back files. While a patron viewing ORR at the serial-title level seldom cares where the content comes from, this information is essential to a range of management tasks, including collection development and maintenance. The interface record makes providing an alternative view of the database possible, thus supporting these tasks and enabling librarians to view and deal with, for example, all the SilverPlatter databases or each of the various JSTOR collections together. In addition to data elements identifying the provider and, where applicable, the collection, the interface record also includes other

information relevant to those entities, such as an identifier referencing the provider in the TDNet data feed. Data specific to a given title offered by the provider, such as URLs and coverage dates, are stored in the instance record. A few data elements, such as status (i.e., availability), are found in both the instance and the interface record. In these cases, the instance record supplies a default value that may be overridden or augmented for a particular title. The provider- or collection-level view of the database has a counterpart in the public interface where users can obtain similar listings by choosing the provider or collection from a drop-down list on the search page for all resource types. The user interface also displays and links to any print holdings that are available for each title in the local online catalog. This feature, and the structural issues it raises, will be discussed later in this paper.

Several commercial products are comparable to ORR in purpose, design, and functionality and some are highly innovative. Ex Libris' SFX-based journal list, for example, real-

Title Variations:	[Main] <i>Applied organometallic chemistry</i> [Abbrev] <i>Appl. organomet. chem.</i> [Abbrev] <i>Applied organometallic chemistry (Print)</i>
ISSNs:	Print ISSN: 0268-2605    Online ISSN: 0268-2605
Publisher:	John Wiley & Sons Ltd.
Print Holdings:	NONE
Full Description:	Applied Organometallic Chemistry publishes reviews, full papers, communications and the occasional reports on relevant conferences of applied work in the field of organometallics and metal/organic-ligand coordination chemistry. AOC publishes its content in three well-defined sections: (i) Environment, Biology and Toxicology; (ii) Speciation Analysis; (iii) Materials, Nanomaterials and Synthesis.
Subject(s):	Chemistry;
Peer Reviewed:	Y
Primary Language:	English

Applied organometallic chemistry in Wiley InterScience	
Link:	<a href="http://www.library.uiuc.edu/orr/get.php?instid=35752">http://www.library.uiuc.edu/orr/get.php?instid=35752</a>
Access:	UIUC
Online Coverage:	1996-Present
Current Status:	✓ Report an access problem with this specific resource.
Added/Modified:	Jan 15 2004 11:44AM; Feb 13 2006 02:47PM

Applied organometallic chemistry in Wiley InterScience - Chemistry Backfiles	
Link:	<a href="http://www.library.uiuc.edu/orr/get.php?instid=427180">http://www.library.uiuc.edu/orr/get.php?instid=427180</a>
Access:	UIUC
Online Coverage:	/1987-12/1995
Current Status:	✓ Report an access problem with this specific resource.
Added/Modified:	Jan 03 2005 02:16PM; Feb 13 2006 02:47PM

Figure 2. Record display in ORR's public interface

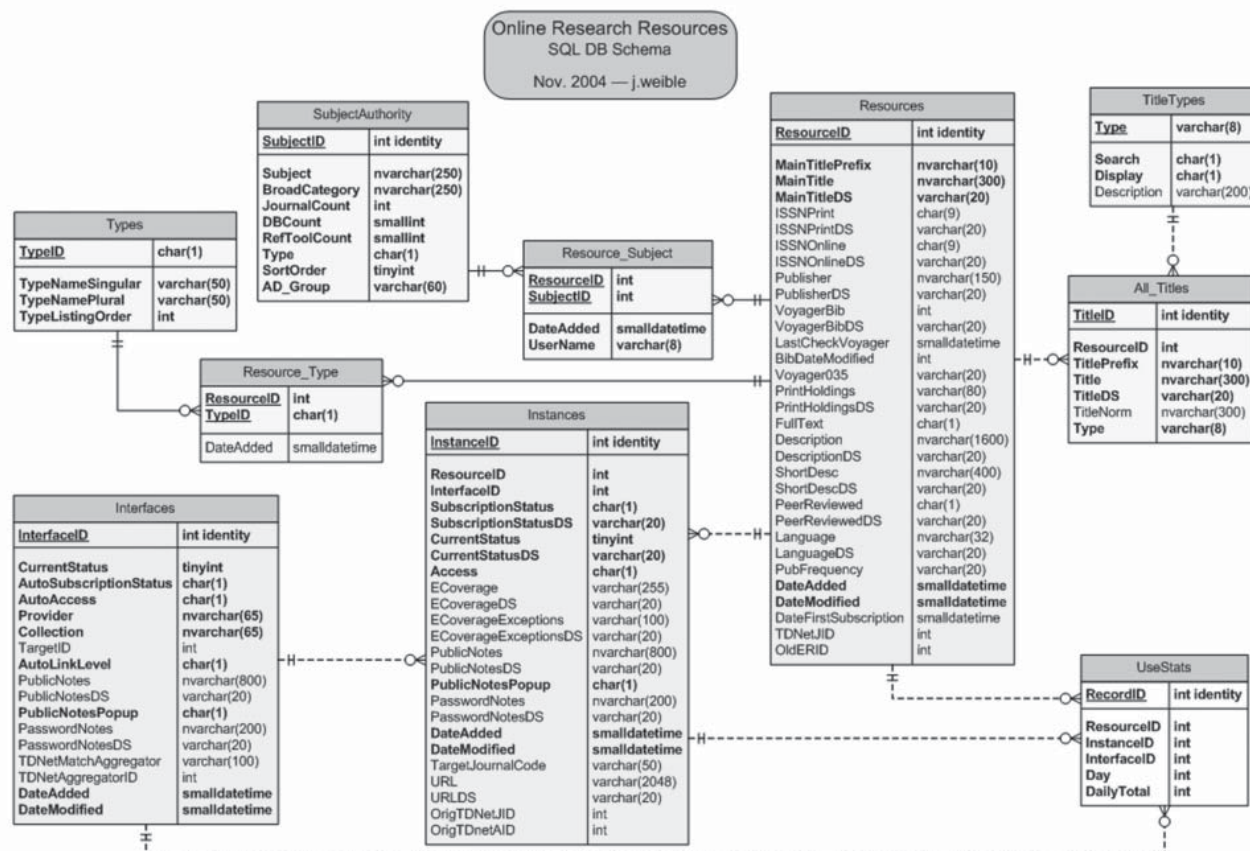


Figure 3. ORR's database schema













<b>i The Australian &amp; New Zealand journal of criminology</b>		See Catalog: v.1-29 (1968-1996)
 04/2006-Present in Gale Expanded Academic ASAP		
 04/2003-Present in Gale LegalTrac		
<b>i Australian &amp; New Zealand journal of statistics</b>		See Catalog: v.40 (1998) - present
 03/1998-Present in Blackwell Science Synergy		
 03/1998-Present in EBSCO(with a 12 month delay)		
 1998-2006 in Ingenta Select		
<b>i Australian and New Zealand Journal of Family Therapy , The</b>		See Catalog:
 12/2003-Present in EBSCO		
 12/2003-Present in EBSCO ( SocINDEX with Full Text )		
<b>i Australian and New Zealand journal of mental health nursing</b>		None — Online only.
Later title: International journal of mental health nursing		
 03/1998-12/2001 in EBSCO		
<b>i Australian and New Zealand Journal of Obstetrics and Gynaecology , The</b>		None — Online only.
 02/2002-Present in Blackwell Science Synergy - STM Collection		
 02/2003-Present in EBSCO(with a 12 month delay)		
<b>i AUSTRALIAN AND NEW ZEALAND JOURNAL OF OPHTHALMOLOGY</b>		None — Online only.
 02/1999-12/1999 in EBSCO		
<b>i Australian and New Zealand Journal of Ophthalmology</b>		See Catalog:
 02/1999-12/1999 in EBSCO		

Figure 4. Title list in ORR's public interface

izes ORR's original design objective of driving a journal list and link resolver from the same knowledge base. ORR, however, offers a number of features not generally found elsewhere. While most commercial journal finding lists now provide a display of available sources grouped by title, and several also offer a link to the online catalog, most do not yet have the ability to link between earlier and later titles, or to search by provider or collection.

### The FRBR Hierarchy

Librarians are most familiar with *FRBR* in its role as a lens through which to scrutinize a cataloging code, such as *AACR2*. The task in designing ORR was not to codify a set of cataloging rules, but to establish a data structure together with a set of procedures for populating it. These two tasks have the same objective of facilitating access to resources by creating a coherent and lucid representation of them.

The *FRBR* framework commends itself to the bibliographic management of online journals because of the overlapping needs to relate content from

various providers to a common work; to link related content across different platforms; to associate holdings in different formats; and to trace a publication's identity through successive title changes, splits, or mergers. A model articulating these relationships within a comprehensive framework holds promise for guiding decisions about the appropriate record structure and content, database schema, and display format for representing these resources.

Most discussions of *FRBR* relationships focus on the hierarchy of Group 1 entities: work, expression, manifestation, and item. This hierarchy easily fits some aspects of ORR's design, even if not all of the entities and attributes implied by the latter are listed in the *FRBR* report's ontology. The resource record contains work-level data such as titles and subjects. The instance record corresponds to the manifestation, recording such attributes as the provider (which may be likened to a distributor for a print publication), access address, and source for access authorization.<sup>12</sup> The presentation format of the text is determined at the level of the individual pro-

vider each time it is viewed or printed, allowing for variations introduced by style sheets or other branding or customization features. Accordingly, each online viewing or printing may be considered an item (partially) instantiating the manifestation.

Discerning expression-level attributes in ORR is difficult. ORR elides attributes that could be modeled as distinguishing characteristics of expressions, such as whether accompanying graphics are provided.<sup>13</sup> In effect, ORR assimilates all electronic versions to the one expression. In this respect, its practice closely resembles the Cooperative Online Serial (CONSER) program's aggregator-neutral record, which similarly elides expression- and manifestation-level data to collocate all online versions under a single record.<sup>14</sup> Several recent analyses in the literature suggest that the appropriate treatment of expressions may be dependent on the nature of the works represented.<sup>15</sup> The *FRBR* report's statement, that "on a practical level, the degree to which bibliographic distinctions are made between variant expressions of a work will depend to some extent on the nature of the work itself, and on the



anticipated needs of users,” supports this view.<sup>16</sup>

Finally, how does ORR's interface record fit into the *FRBR* model? The interface represents an aggregate entity that exists at an intersecting plane to the main hierarchy. Such aggregates are not peculiar to continuing resources. Structurally, they are like certain types of aggregates found in the monographic domain, such as “bound together” titles and collected editions, which share attributes at the item and the manifestation level respectively. Mimno, Crane, and Jones offer the following analysis of a collected edition: “At the work level, one play by Aeschylus is clearly a distinct entity from another play, but at the manifestation level, the publication information for every translated play in the volume is the same, and therefore should be kept in a single record.”<sup>17</sup> They tentatively advocate linking a single manifestation-level record for the collected edition to multiple expression-level records for the individual titles. The interface record plays an analogous role in ORR, recording in one place manifestation-level data that apply to multiple serial works.

### Identifiers and FRBRization

The ORR project combines aspects of two kinds of undertakings. It resembles certain *FRBR* implementations in that it populates its database by taking existing data and reconstructing them, via a predetermined algorithm, into a unified hierarchical structure. This is a process sometimes known as FRBRization. ORR also resembles a link resolver in that it is built around a massive consolidation of subscription- and holdings-related data, leveraged to facilitate effective linking and discovery among different content providers. In some ways, the ORR project resembles a specialized serial counterpart of OCLC projects like OpenWorldCat, which combine the two foregoing strategies by first

FRBRizing an existing data set and then using a database of holdings to identify available copies.

In ORR, FRBRizing the ingested data organizes the links. Content from various providers is brought together under a single title. Links are supplied from the electronic versions to the print versions, and also between earlier and later titles. In one respect, the task of bringing together the relevant data is easier than with large-scale efforts, such as those undertaken by OCLC to FRBRize monograph records. Those projects rely on complex work keys such as author/title and author/uniform title combinations to create clusters of works, expressions, and manifestations with varying degrees of success.<sup>18</sup> By contrast, much of the desired clustering of data in ORR can be achieved through the simpler process of matching ISSNs from different sources and mapping selected data elements into the relevant fields in ORR records. ISSN is widely used and is assigned at the right level of granularity to serve adequately as a work identifier in most situations, at least relative to a given language and physical format. The availability of ISSN as a work key is fortunate because the uniform title headings (MARC field 130) characteristic of serial records are designed to distinguish titles rather than to collocate them, and are consequently of limited value as work keys.<sup>19</sup>

ISSN in its present form is far from ideal as a work identifier. Like other extant identifiers such as International Standard Book Numbers (ISBN) and Digital Object Identifiers (DOI), it addresses the need of publishers to identify distinct entities, but not the need of users to navigate between related ones. Knowing the ISSN of the print version does not help one find the online version, and vice versa, unless one has access to some kind of dictionary. This characteristic of identifiers is a consequence of the Principle of Functional Granularity, promulgated by the Indexes e-commerce body, which states that “it should be possible

to identify an entity whenever it needs to be distinguished.”<sup>20</sup> The principle says nothing about identifying related entities. At the time of this writing, a proposal was before the International Organization for Standardization (ISO) to introduce a mandatory Medium-Neutral ISSN (MNI) into the ISSN standard. This measure, if adopted, may ameliorate the existing difficulties considerably. Even in its present form, ISSN enjoys the important advantage of being uniform across different providers and through changes of publisher, something not true of ISBNs or DOIs. Each ORR record has two ISSN fields: one for the online version and one for the electronic version. These two fields jointly suffice to identify the title for most purposes. To establish the correspondence between print and online ISSNs, having sources of data that can associate the two, such as MARC records with ISSNs in their 022 and 776 fields, is valuable.

### Serial Work Relationships

Seriality encompasses a much greater range of relationships than those of the *FRBR* Group 1 hierarchy. Serials change attributes such as titles, ISSNs, publishers, and physical format over time. Some changes give rise to new works or expressions bearing specific relationships to their immediate siblings or ancestors. Serials also break down into various kinds and levels of constituent subunits, such as issues, volumes, articles, indexes, and supplements. Some of these relationships are outlined in the *FRBR* report, including “successor” and “supplement” relationships between works, and whole-part relationships between serial works and their constituents.<sup>21</sup> These relationships define aggregates, and a comprehensive theory of serial aggregates would do much to put the design of serials-management systems on a sounder footing. Aggregates are a relatively undeveloped area in *FRBR*, receiving barely a page of direct dis-

cussion in the final report. Some progress has been made since the report's publication. A *FRBR* working group on aggregates now exists, and members of the *FRBR* community are developing general taxonomies of aggregates and their properties. For example, Albertsen and van Nuys identify a set of aggregate classes among which are several that are applicable to continuing resources: the "extension" class, which subsumes successively issued resources, including most conventional serial publications, the "update" class, which roughly corresponds to the notion of an integrating resource, and the "variant" class, which encompasses alternative versions of a publication.<sup>22</sup> In its present state, however, *FRBR* offers only limited guidance to the developers of a tool like ORR.

The question arises as to whether the aggregate is itself another work—a "super-work"—or indeed whether it is only the aggregate that may properly be identified as the work. Shadle advocates the latter position, arguing that the serial work should not necessarily be identified with any one record and, unless there is a merger or a split, the serial work should be considered to persist.<sup>23</sup> Although Shadle's position has strong intuitive appeal, Delsey's position, which allows the boundaries between works to be drawn by the prevailing cataloging code, can suffice.<sup>24</sup> Until a theory of aggregates is more fully developed, the position taken on this issue is not critical. The structure of ORR is compatible with both positions, and Delsey's approach has the advantage of simplifying the ontology. From a practical viewpoint, the important thing is less which title-level entities are called works and which are called manifestations, but more how well the relationships between the entities are captured. For the same reason, referring to aggregates as "super-works" is not crucial at this juncture, so long as works standing in specific relationships may form aggregates with definable properties.

The most important relationship that ORR must deal with is the successor relationship, or what serial librarians call title changes. This issue, and the related question of how ORR handles print holdings, highlights some unresolved issues with ORR's current data structure.

ORR follows the *AACR2* practice of successive entry cataloging. Each title change (or rather, each *major* title change) in a publication's history triggers the creation of a new record representing a related but distinct work. Each record contains links to the records for its predecessor and successor, but no structure represents the complete title history. In this respect, ORR exactly replicates the type of structure in *AACR2* catalogs. It also inherits one of the weaknesses of such catalogs, namely the fact that one's ability to reconstruct a complete title history is contingent upon the library owning a sufficiently unbroken run of holdings for that publication. If a serial publication has the title history S1, S2, S3, and the library owns issues of S1 and S3 but not S2, the bibliographic data in its catalog will not allow users to connect S1 with S3. This is the "missing link" problem. Although some feel that a full title history is not always desirable, it is invaluable in a distributed environment where complementary coverage may be available from different sources.<sup>25</sup>

This structural shortcoming overlaps with the problem of representing different formats. The *FRBR* report suggests that alternative formats are to be represented at the manifestation level.<sup>26</sup> That approach is not taken in ORR. The visual cues in the public display present any print holdings that are available, not as one version among others, but rather as a link to the online catalog. The display reflects the database schema, which locates print holdings data (as well as the ILS record identifier used to generate the link to the online catalog) not in the instance but in the resource record.

The differing treatment given to electronic and print formats can partly be explained by ORR's design objectives. The primary purpose of ORR is to represent available online content. For most users, the catalog link exists to provide a fallback should the desired full-text content not be available online—for example, if the issue sought predates the available back files. Accordingly, the instance record is optimized for online content. The library catalog remains the main source of information about print holdings and, rather than attempt to replicate its content in detail, ORR simply links to it.

This approach, however, equivocates between works and larger aggregates. The equivocation is often evident in the holdings data displayed in conjunction with the links to print and microform records in the online catalog. In some cases, holdings data are displayed for the specific journal title; in others, holdings data are displayed for the entire title history, including titles predating any available online content. In other words, the holdings data displayed in some cases represent another manifestation of the same work and in others represent a larger aggregate including that work and others. This inconsistency is partly the result of historical UIUC serials cataloging practice, which for a time followed latest entry, but it also reflects an unresolved tension in ORR's treatment of serial aggregates.

Locating the link at the work level does not solve the missing link problem. The problem arises in a particularly acute form in this setting. Returning to the example of a title history S1, S2, S3, consider a case where the S1 and S2 are issued in print, but the journal moves to an online-only format with S3. The ORR entry will naturally be for S3. In such a case, no print equivalent exists to which the ORR record can link. The same problem arises where a print version continues to be issued but the library

cancels its print subscription in favor of online access before a change of title. For example, the UIUC library cancelled its print subscription to *Archives of Otolaryngology* in 1975, but later regained access to this journal via an online subscription with coverage beginning in 1995. In the meantime, the journal had changed its title to *Archives of Otolaryngology—Head and Neck Surgery*, with a new ISSN. Again, the link between electronic and print holdings is lost. The problem compounds over time as each successive title change puts further distance between the latest online incarnation and its print predecessors. Until now, this problem has arisen only with a small number of titles, but ORR's developers will need to address it as more journals move toward online-only access.

The UIUC catalog uses a single record to represent print and online versions of a title. The problem would take a somewhat different form in catalogs that use multiple records. At UIUC, using the same record identifier to reference the bibliographic description for the work and to link to the print holdings is possible. Had UIUC used multiple records, the issues raised by aggregates would have been confronted at a much earlier stage of ORR's development. A library using multiple records would need to define explicitly an alternate relationship (defined in section 5.3.4 of the *FRBR* report) between the manifestations represented by the two records and, presumably, to enter both record identifiers in the database.

## From Relationships to Families

Rules for title changes in the past may have been too strict. The cataloging rules may not adequately capture the notion that a work may persist through changes, even major changes, in title. The long-running debate in the serials cataloging community between

successive and latest entry cataloging may reflect conflicting views about the identity of a serial work over time. Shadle's position on serial aggregates similarly gives expression to the desire to capture the nature of the serial work as a persisting entity.<sup>27</sup>

Why is there no record structure in ORR representing the aggregate's title history? A convenient source has yet to be found for the required data. To remain complete and current, ORR depends on external data sources and could not otherwise exist on its present scale. The same dependence also means that ORR is constrained by the quality of the available data, and by the data structure of the source. As with identifiers, ORR to some degree inherits the characteristics and underlying assumptions of existing standards. Had latest-entry rather than successive-entry cataloging been the norm, extracting the complete title history from the MARC record in hand would have been relatively easy.

A number of proposals coalesce to suggest a way forward. A 1993 study by Alan showed that more than 70 percent of "title-change record sets" within a sample of CONSER-authenticated MARC records were linked together by a combination of ISSNs, LC classification numbers (LCCN), and OCLC numbers in the 780 and 785 linking entry fields.<sup>28</sup> Antelman suggests that the same data could be used as the basis of a work-set algorithm that would create "bibliographic families" showing relationships between works.<sup>29</sup>

Tillett has advocated the use of authority records to show relationships among bibliographic entities, and Rosenberg and Hillman have proposed a structure for doing so with serial works.<sup>30</sup> Building authority structures based on data harvested using a strategy similar to Antelman's may be possible. Ideally, this authority file would be a large-scale shared enterprise, but even a local project within the limited context of ORR may

be feasible. These authority records would record data—especially identifiers like ISSNs—relating to alternative formats, title changes, merges, splits, and other relationships. This approach would differ from the existing strategy used in ORR for linking title changes in that it would encompass a wider range of relationships and would allow all relationships to be shown to the user, overcoming the missing link problems. The same data would have other potential applications. It could be used to effect linkages between catalogs in a shared environment, for example, or to enhance link resolution.

The work-set algorithm suggested by Alan and Antelman could be supplemented by other sources of data, such as MARC 776 additional physical-form information and a subscription to the ISSN register. A proposed development by the ISSN International Centre promises an alternative model for implementing an authority structure.<sup>31</sup> The plan is to implement the ISSN database as a lookup and resolution service. A service of this kind would make possible the building of extremely powerful and flexible tools for discovering and accessing serial publications, and would allow the developers of systems such as ORR to overcome many current obstacles.

Given the pace of change in the current environment and the vagaries of journal publishing, a service resembling one of those outlined previously in this paper already may have been developed by the time this paper is published.

## Sources and Targets: Other Issues

In ORR's distributed environment, many other issues arise with both the quality of the available data and with the characteristics of the resources to which ORR provides access. Data sources present particular problems.

- The TDNet data feed does not have a separate field for tracking title changes, instead giving this information in free text within the title field. Title changes have to be caught by library staff members, who then create a new record manually.
- Ulrich's *Periodicals Directory*, although it indicates if an electronic version is available, does not always provide the corresponding electronic ISSN. This information has to be supplied from other data feeds, or else by a human operator.
- The UIUC catalog uses the single record approach to represent the print and electronic versions of each journal. This approach can result in the omission of electronic ISSNs necessary for matching and linking. Best practice is to include 776 fields providing the ISSN in subfield x and other identifiers (OCLC number, LCCN) in subfield w.
- A single consolidated statement of print holdings is not usually available. Instead, the catalog breaks down the holdings for print copies by the various library locations. As already noted, the practice of successive entry is another obstacle to the provision of a single summary of holdings. ORR's print holdings field was initially populated partly with summary holdings data fortuitously available from another, unconnected project, but a different solution will need to be found for the longer term. In the future, data may be parsed from the 866 field of MARC-holdings records.

The targets to which ORR links can present a further layer of structural complexity. Just as each source of data has its own structure that must

be mapped into ORR, each provider's manifestation of a title has its own implicit structure for presenting the constituent units of each work or group of works. Most examples fall into one of following categories:

- The entire history of a journal is entered on a single page under its current title alone. Earlier titles are not given, unless they happen to be reproduced on the scanned pages of the earlier issues themselves. An example, cited by Jones, is *Online Information Review*, which does not appear anywhere on the Emerald site under its earlier title, *Online and CD-ROM Review*, even though some of the issues available on the site were originally published under that title.<sup>32</sup> Because individual titles are searchable within ORR, it provides better title-level access than the vendor's own site. This is a decided advantage, since journal articles are cited using the title of the journal at the time of publication.
- All titles are accessed via a single page, with prominence given to the latest or current title. Individual titles are listed with their respective publication dates, but it may not be possible to retrieve them by a search within the native interface. Examples of providers following this format include Springer and the Royal Society of Chemistry. Again, title-level access is better in ORR than through the vendor's site, but with the further advantage, at least in the examples given, that a link to a page representing each distinct title is possible.
- Each title in the sequence is entered separately on its own page, with links provided between them. This is the

most common arrangement, and most closely reflects successive entry practice. EBSCO, JSTOR, and many others follow this approach. In these cases, the ORR record for each title simply links to the corresponding page.

- No title-level page is given and content is available only by searching for articles by means of a search form. An example is OCLC FirstSearch, for its Wilson Select Plus collection. In these cases, ORR shows the user an icon indicating that a further search will be required after linking to the vendor page. Whether the icon is displayed is determined by a field called "AutoLinkLevel" in the interface record. This field indicates whether the link points to a page for the title or whether a further search will be required.

## Conclusion

This paper has presented a case study of the cataloging issues involved in the creation of an online journal finding lists and serials management system. Although an a posteriori analysis, *FRBR* concepts are strongly applicable to this project. The Group 1 hierarchy is an obvious model for organizing content from different providers, while the application of the larger *FRBR* framework to serial relationships raises important issues regarding aggregates. The discussion also touched briefly on Group 2 and Group 3 entities—content providers and subjects respectively.

In hindsight, conducting a *FRBR* analysis in the early stages of the ORR project would have been advisable. Such an analysis might have helped to clarify some of the issues that emerged during ORR's development, especially the treatment of title histories and



print holdings. However, although the *FRBR* model provides a framework for conceptualizing the problems, it does not, at present, offer a complete blueprint for a solution. The challenge of applying *FRBR* to a serials system raises as many questions for the interpretation and future development of the *FRBR* model as it does for the design of the serials system itself.

This study suggests a number of possible topics for further consideration. The *FRBR* approach of relating user tasks to entity relationships may help to clarify what is needed to build interoperable services in a distributed environment. One potential line of inquiry, hinted at but not pursued in any depth here, is how *FRBR* may help to model algorithms for link resolution. Much of the effort in this project went into mapping data from outside sources into ORR. *FRBR* analysis should help rationalize the consolidation of data from various sources by ensuring that they map to entities at the right level of the *FRBR* hierarchy. More fundamentally, *FRBR* should be helpful in guiding the design of database structures for serials-management systems.

The emphasis of this paper has been largely conceptual. The creation of ORR has been, above all, a practical matter, and many aspects of its development are amenable to empirical study. This author and his UIUC colleagues hope to publish a more detailed examination of the process of populating the database and its outcomes.

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# Notes on Operations

## Linking Print and Electronic Books

### One Approach

By Betsy Simpson, Jimmie Lundgren, and Tatiana Barr

*Library catalog searchers expect to retrieve information for all resources in the catalog that matches their search strategy. They expect keyword searching to retrieve a rich array of resources. In an effort to enhance service to users, the University of Florida Smathers Libraries acquired table of contents data to enrich bibliographic records for print books with publication dates from 1990 to the present. Many of these books have also been acquired in electronic format. Because the record for the same book in electronic format did not include the enhancements, catalog users were likely to retrieve the catalog record for the print version only and remain unaware of the availability of the electronic version. The authors, using insights from discussions surrounding the Functional Requirements for Bibliographic Records (FRBR) initiative, developed a method for serving users more effectively by linking these records to leverage the enhancements for both versions (two manifestations) of the same title.<sup>1</sup>*

### Introduction

The proliferation of electronic resources and increasing expenditures on electronic resources have had a profound effect on library services. Librarians have been forced to rethink assumptions about basic library operations as well as long-held notions about user needs and behavior. Within the cataloging community, the *Functional Requirements for Bibliographic Records (FRBR)* has fostered a renewed commitment to creating library catalogs that allow users to find, identify, select, and obtain library material, and to navigate through the catalog database more effectively. *FRBR* inspired the authors to look for ways to improve the link between library catalog records for corresponding print and electronic book (e-book) titles. The impetus for creating these links was the presence of table of contents (TOC) data only in the records for print materials. Searches by keyword in the online catalog that matched data in the TOC retrieved only the records for print books. As

e-books become more accepted as alternatives and supplements to their print equivalents, users will benefit from efforts to enhance access to them through the library catalog.

### Background

A major thrust of current national cataloging initiatives is toward improving the display of connections and relationships among bibliographic entities. The *FRBR* conceptual model promotes a framework that highlights the interrelatedness of works and allows users to navigate easily among expressions, manifestations, and items.<sup>2</sup> Embracing the underlying tenets of *FRBR*, libraries have been motivated to explore changes that leverage bibliographic data in new ways. The Research Libraries Group's (RLG) RedLightGreen service was an early, large-scale, innovative application of *FRBR* principles. Launched in 2003 (and ended November 1, 2006), RedLightGreen sought to mine RLG's union catalog for "conceptu-

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al relationships and holdings data.”<sup>3</sup> OCLC’s Fiction Finder also employs automated means to find and collocate material in order to present users with a clear summary of various editions of fictional works and which libraries own them.<sup>4</sup> Advances in data harvesting as well as semantic interoperability hold promise for dramatically improving user interfaces.

Three obstacles stand in the way of libraries fully FRBRizing catalogs. First, typical library management systems do not adequately manipulate the links that currently exist among bibliographic records. Referring to the inherent problems associated with record linking within the library environment, Gradmann speaks of the “library automation applications and the data architecture underlying these, which strangle libraries, creating a structural lack of technical flexibility” and discusses the need to “free librarian bibliographic data from its golden catalogue-cage.”<sup>5</sup> Yee also decries the state of library catalog software, stating that libraries are forced to “choose among undesirable alternatives” when seeking a system that has an adequate search engine with helpful displays.<sup>6</sup> Strong words, but justified given that much data created by librarians sits essentially unused due to system limitations.

Second, catalogs lack the data necessary to reflect relationships because catalogers frequently have not provided it. Catalogers have not entered all data necessary to reflect relationships due, in part, to increasing pressure for catalog departments to economize operations and improve throughput. This has resulted in workflows in which downloaded copy is accepted as is, and original records are created with less detail.

The third deterrent to more thorough recording of relationship data is that library management systems are not able to make use of all data. Yee notes that the trend toward deprofessionalization has reduced the number of highly trained, knowledgeable

catalogers, and suggests that this void leaves the profession without a voice that understands the nuances of bibliographic description and can advocate successfully for change.<sup>7</sup>

Links between records may be missing entirely, not consistently applied, or entered in a way that is difficult to extract. The labor that would be required to create links manually on a record by record basis seems unthinkable in an age of shrinking budgets and staffs. Bowen discusses the possibilities for cataloger-created collocation, but acknowledges that the additional effort is likely prohibitive and will necessitate selective adoption.<sup>8</sup> Catalogers, however, using the technological tools at hand and working closely with systems professionals, public service librarians, and vendors, can develop more ways to provide and utilize relationship data, and play a key role in making library collections more accessible to users.

What should catalogers do during this time of transition when developing a *FRBR*-like catalog portends a significant outlay of time, money, and technical expertise? The authors suggest that catalogers can begin by taking whatever small steps are possible while also collaborating with vendors and colleagues to institute more sweeping changes. Librarians can follow Bowen’s recommendation to “look for opportunities to implement some aspects of the *FRBR* model within other activities that are more under the library’s immediate control.”<sup>9</sup> In this spirit, the authors approached a local experiment to link e-book records to their print equivalents. A literature search did not produce evidence of similar projects elsewhere.

NetLibrary, a division of OCLC, is a leading provider of e-content. It is one of a growing number of companies offering access to e-books and, often, the corresponding files of MARC bibliographic records for downloading to local library catalogs.<sup>10</sup> Since 2001, the University of Florida Smathers Libraries (UFL) has

batchloaded approximately 250,000 e-book records from NetLibrary, Early English Books Online, Eighteenth Century Collections Online, History e-Books, Past Masters, Gale Virtual Reference Library, and Books24x7. With this level of activity, UFL wanted to maximize its investments by improving the ease with which users can find these resources. Other libraries are likely experiencing similar needs. The library catalog can provide a solution by alerting users when the electronic version of a title is available along with the print version.

UFL, like many other libraries, has loaded separate catalog records for e-books rather than attempting to utilize a single-record method of access. As a result, users often are presented with multiple entries for the same title, which they must examine individually to discover the alternative format option. Since MARC e-book records usually replicate their corresponding print records in key access points, “browse” catalog searches retrieve both formats next to each other in the index. The TOC enhancements, which also provide access through browse searches to chapter titles for UFL’s print books, do not retrieve the corresponding e-books because they lack the same TOC data. If a user, through any search option, retrieves a record for the print version, the burden is on him or her to go back to the catalog index to note the existence of a record for the e-book, and vice versa. Often that index (because of the search strategy used) does not include the other record at all and calls for a new search (not based on TOC enhancement data) to determine whether or not another version is available. Figure 1 illustrates the problem. UFL owns both the print and e-book versions of *Social Cognition: Making Sense of People*. When the term “hot cognition” is searched, only the print version record is retrieved because that term is present in the TOC.

To better serve UFL users, the authors sought a means to improve



searching. Although the authors' project led to the use of a system-specific field not widely available at other institutions, this paper seeks to highlight a creative and collaborative approach to a linking problem that resulted in a solution—an approach that might be adopted by others coping with imperfect user interfaces.

## Linking Project

Because the authors recognized that UFL holds many titles in both print and electronic forms and, through FRBR, had a heightened awareness of the value of relationships in the catalog, they wanted to find a good way to connect users to the two manifestations represented by the print and e-book versions of the same title. In describing future practice in "Draft Interim Guidelines for Cataloging Electronic Resources," the Library of Congress (LC) made a distinction between the collocating function and the linking function.<sup>11</sup> LC advised using the added entry technique for

collocating and the linking function when appropriate. The 776 linking field (additional physical form entry) was designated to represent horizontal relationships. In 1999 Florida's State University Libraries, including UFL, required the use of the 776 field in its "Access and Cataloging Guidelines for Electronic Resources" for its cooperative digitization program.<sup>12</sup> This proved advantageous when LC wanted to know which of UFL's holdings had been digitized. These were identifiable through the 776 field in catalog records. Critical to the success of the project described here is the fact that NetLibrary distributes catalog records for e-books that include 776 linking fields with both the Library of Congress Control Number (LCCN) and the OCLC number for the print version. Unfortunately, not all e-book vendors do.

Initially, the authors explored making the 776 field a functional linking field in the catalog as are 780 (preceding entry) and 785 (succeeding entry) fields in the UFL catalog. For those fields, a hidden search is trig-

gered by clicking on the linking field, which leads the user to a results list that includes the related serial record. Such indirect linking or "pseudo-hyperlinking" is described in detail in a 2005 report issued by the Task Group on Linking Entries of the Program for Cooperative Cataloging (PCC) Standing Committee on Automation.<sup>13</sup> This option, while definitely valuable, is less than ideal because it might lead to no results or force the user to select the related record from an often ambiguous display list. Many libraries use this kind of solution for connecting serial records based on either title or ISSN (International Standard Serial Number) searches, although not as many as the authors expected.

The authors conducted a small, informal analysis in spring 2006 to determine how large academic libraries make use of the earlier and later serials titles linking fields. The authors searched ten serial titles in the catalogs of twenty-one libraries randomly selected from those represented in the Association for Library Collections & Technical Services' Technical Services

Directors of Large Research Libraries discussion group. They observed the options provided to facilitate users' ability to connect between the earlier title (780 field) and later title (785 field) records. Results fell into four categories (see table 1). In some cases, the presence of multiple 78x fields apparently prevented the clicking function of both fields. This exploratory survey, while limited in scope, did uncover typical patterns of service for this function in at least five integrated library management systems. More extensive research along these lines could be both interesting and useful. Recording earlier and later titles of bibliographic records for serials appears to be the most consistent practice; other methods for connecting users to related

The screenshot shows the University of Florida Libraries Catalog interface. At the top, there are navigation links like 'Retrieval Help', 'Ask a Librarian', 'E-Journals', 'Online Requests', and 'UFL Libraries'. Below this is a search bar with 'You are searching: - UFL Library Catalog'. The search results are displayed in a list format. The first result is for 'Social judgments: implicit and explicit processes /'. The second result is for 'Social cognition: making sense of people /'. The third result is for 'Widening the scope of cognitive therapy: the therapeutic relationship, emotion, and the process of change /'. Each result shows the title, author, format, year, location, and a link. The interface includes a 'Jump to #' button and 'Previous Page' and 'Next Page' buttons. At the bottom, there is a 'Report a Problem' link and a copyright notice for 2004 University of Florida.

Figure 1. Search results for "hot cognition"

**Table 1.** Use of linking fields in online catalogs (*N*=21)

Presence of Link	Description of Functionality	Libraries	% of total
No clickable link	Display of journal record does not include clickable link to earlier or later title.	Duke University, Harvard University, Indiana University, Princeton University, University of Chicago, University of Minnesota, University of Pennsylvania, University of Texas at Austin	38
Clickable link to search screen	Display of journal record includes clickable link for earlier or later title, and clicking leads to search screen with browse and keyword search options for related title. Clicking there leads to results list for chosen search.	University of California at Berkeley, University of Michigan	10
Clickable link to results list only	Display of journal record includes clickable link for earlier or later title, and clicking leads to results list for journal title search for related title.	Cornell University, New York University, Pennsylvania State University, Stanford University, University of California at Los Angeles, University of Illinois at Urbana-Champaign, University of Virginia, University of Wisconsin at Madison, Yale University	42
Clickable link to related record or results lists	Display of journal record includes a clickable link that leads either directly to the related record or to a results list when the entry is not unique.	Ohio State University, University of Washington	10

titles appear lacking. This falls short of the ideal of providing complete information for catalog searchers as they seek to identify and locate relevant resources.

The Florida Center for Library Automation (FCLA), which provides automation services to the libraries of Florida's publicly funded universities, was unable to identify any type of similar capability for 776 fields in UFL's ALEPH integrated library management system (implemented in May 2004). ALEPH, however, offers a non-MARC field that can be used to connect records directly. This ALEPH system-specific field allows direct functional connections among bibliographic records, holdings records, and item records. It is useful for connecting bound-together titles, analytics for collection or set level records, and (as the authors discovered) has other interesting possibilities. The PCC Task Group on Linking Entries discussed the benefits of creating such logical links, even suggesting a possible 7XX subfield utilizing local system

or standardized numbers, although the group voiced concern about the limited availability of data in catalogs to support linking and the lack of cataloging staff to enter it.<sup>14</sup> The group focused primarily on complex linking among serial records rather than on the straightforward one-to-one relationship between equivalent print and e-book records.

Use of a local non-MARC field could be called "guerilla cataloging" for several reasons. While one can enter and save the field in the local system, this cannot be done when cataloging in OCLC. It may or not be retained upon migration to another system. However, the authors hope that the greater awareness of the value of bibliographic relationships, which has been highlighted by FRBR discussions, will result in improved online catalog systems that will continue to use this data.

Because this field is system-specific to ALEPH, it is not addressed in AACR2, MARC 21, or OCLC cataloging and coding rules. This leaves

local catalogers without guidance as to how and when to utilize new tools such as this, and (at UFL) is leading to open-ended discussions among public and technical services staff. The UFL Cataloging and Metadata Department charged a committee to evaluate local use of this field. The Task Force focused chiefly on serials and special collections materials, but staff are encouraged to explore other possibilities. When used for parallel bibliographic records, this field generates a reciprocal note about the other form available in the public displays of both matched records. These can be clicked to directly connect a user to a matched record. No intervening index displays as it does with the 780 and 785 field linking.

Worthy of note is the way in which UFL leveraged investment in the TOC records. The TOC enhancements were acquired, in effect, as a "two for the price of one" bargain because catalog users retrieve both records (for the print and electronic versions) in searches even though the

TOC are loaded only in the records for the print version.

## Implementation

Project implementation was possible without costly investment of staff time to implement the changes and sustain the new steps for linking records. UFL's technical coordinator designed a highly automated, multi-step process. The first step was to identify the pairs of records for alternate versions. This was done by generating system reports of the NetLibrary records with the LCCN in 776 subfield w (record control number). A system-specific loader software (GenLoad) available from FCLA was run to find any matching print version records using an LCCN search. The system numbers were extracted and merged into an Excel spreadsheet. A macro was then used to insert the local field in one record of each pair. While either record could contain the local field, the authors decided to place it in the NetLibrary record because the library was still in the process of adding the tables of contents to the print version records and did not want to risk overlaying the linking data. The flowchart in figure 2 shows the steps involved.

After the field is inserted in one of a pair of records, a user who retrieves one of the records is both informed about the related item and supported in easily connecting to the other record by a simple click. Thus, a remote user who retrieves the record for the print version will easily benefit from connecting to the electronic version, which can be viewed without leaving the computer. Similarly, a user who first retrieves the e-book record but desires to borrow and use a print book will be connected to the record giving shelf location and availability. Figures 3 and 4 show the OPAC views for the linked records.

This process, in addition to the advantage of using little staff time,

can be applied retrospectively to records that may have been in the catalog for years. While UFL has already begun connecting new bound-together items and analyzed sets of various kinds, there is also interest in identifying other methods for better presenting other related materials to users. The process of identifying the record pairs using the LCCN in the 776 field may be replaced, at some point, by a more sophisticated process that could use author-title combinations to relate many of the varied formats and editions held by the library. Such methods already are being used else-

where by the larger-scale *FRBR* projects and library catalog systems to process existing catalog data to enable new indexing and display options. The authors observed that Duke University makes use of a feature in their catalog that creates an author-title entry for each record. When clicked, the author-title entry opens a window populated with matching records, although versions are not differentiated. While not quite as intuitive as a clickable note on the record that says "Available in other form: E-book" and links directly to the corresponding record, the author-title link allows the user to navigate among different versions. The authors encourage others to explore creative solutions that will overcome the absence of data (for example, uniform titles)

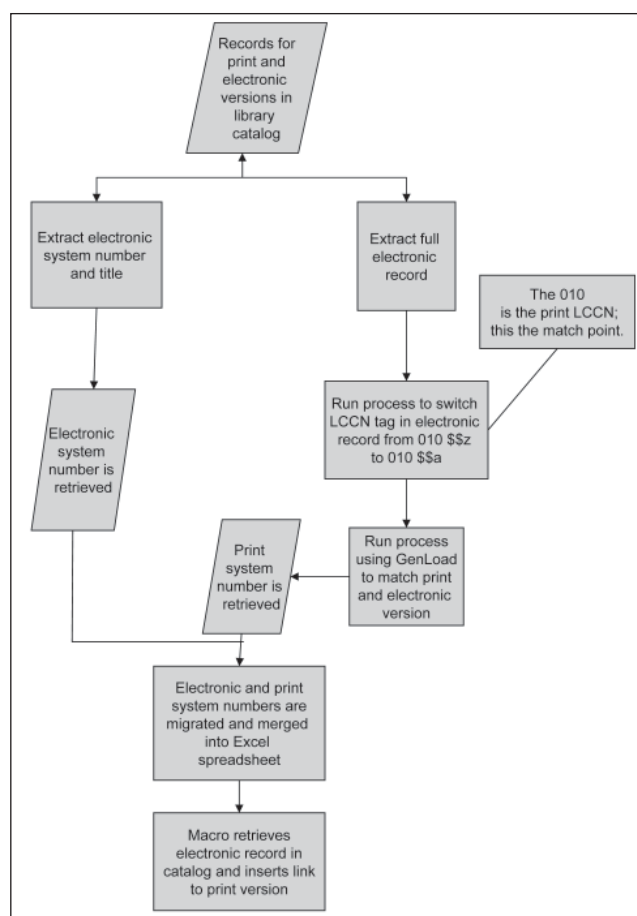


Figure 2. Flowchart for creating link between print and e-book

that might have facilitated navigation among different versions, but which were not added to records for cost reasons in the past.

## Conclusion

Linking between NetLibrary and print version records has provided an exciting new way to connect users to materials they need in the format they prefer. It extends the benefits of TOC enhancements that were only in the records for print versions to the records for matching electronic versions. It does so in a way that facilitates better user awareness of and connection between the two versions. Additional access thus gained includes browse searches for authors

University of Florida Libraries Catalog

Retrieval Help | Ask a Librarian | E-Journals | Online Requests | UF Libraries

basic search | advanced search | past searches | view list | search results | display options

sign in | end session | your account | search help

FULL CATALOG | JOURNALS/SERIALS | COURSE RESERVES | ONLINE RESOURCES | CHANGE DATABASES

You are searching: - UF Library Catalog

Add to e-Shell | Results List | Add to List | Save Mail

Full View of Record

Choose format: Standard format — Citation — MARC tags

Record 2 out of 3

Location: LIBRARY WEST — 1A-Z Call Numbers in West Request 0-999 from Storage — BF323.S63.K96.1999 [Regular Load]

Author, etc.: Kunda, Ziva

Title: Social cognition : making sense of people / Ziva Kunda

Published: Cambridge, Mass. : MIT Press, c1999.

Description: xi, 602 p. : ill. ; 23 cm.

Notes: "A Bradford book."

Notes: Includes bibliographical references and index.

ISBN: 0262112410

Subjects, general: Social perception

Format: BK

Material type: <Book>

Also available: Available in other form: E-book

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Figure 3. OPAC view of print version

University of Florida Libraries Catalog

Retrieval Help | Ask a Librarian | E-Journals | Online Requests | UF Libraries

basic search | advanced search | past searches | view list | search results | display options

sign in | end session | your account | search help

FULL CATALOG | JOURNALS/SERIALS | COURSE RESERVES | ONLINE RESOURCES | CHANGE DATABASES

You are searching: - UF Complete

Add to e-Shell | Results List | Add to List | Save Mail

Full View of Record

Choose format: Standard Citation MARC tags

Location: ONLINE — See Link to Connect

Links: Read this E-book  
Licensed for UF students, faculty and staff

Author, etc.: Kunda, Ziva

Title: Social cognition : electronic resource / making sense of people / Ziva Kunda

Published: Cambridge, Mass. : MIT Press, c1999.

Description: xi, 602 p. : ill. ; 23 cm.

Notes: Includes bibliographical references and index.

Notes: Electronic reproduction. Boulder, Colo. : NetLibrary, 1999. Available via the World Wide Web. Available in multiple electronic file formats. Access may be limited to NetLibrary affiliated libraries.

ISBN: 0595077627 (electronic bk.)

0262112410

0262011430

Subjects, general: Social perception

Genre/form headings: Electronic books

Other author(s), etc: NetLibrary, Inc.

Format: BK

Material type: <Book>

Also available: Available in other form: Print

End Session | Display Options Help | Basic Search | Advanced Search | Results List | Previous Searches | Databases | View List

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Report a Problem

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Figure 4. OPAC view of e-book version

and titles of chapters, and key-word access to terms included in the TOC fields of those records. This project enables users to access their preferred format for a given content regardless of the retrieval method and, in so doing, promotes what Tillett refers to as the fifth function of the catalog—to support navigation.<sup>15</sup> Better navigation options are necessary if libraries are to satisfy users' growing needs and expectations. While the authors' preferred method for linking was, and continues to be, through the established MARC standard linking fields, in the absence of that possibility, an alternative process served the immediate need.

This exploration of system-specific functionality had many other beneficial outcomes. The authors identified a function of the bibliographic record, thought in terms of the user's tasks, and then translated it into reality. This process led to a deeper understanding of the uses of linking fields and how they can be incorporated into local workflow and thinking. The process itself expanded awareness and knowledge of the many issues that arise when librarians today try to offer users specific improvements to navigational and display capabilities in their catalogs. It was a learning experience that brought a refined understanding of *FRBR* terms. The catalogers' collaboration with FCLA and UFL's technical coordinator that made this project possible benefited from using the *FRBR* model as a conceptual tool—one that enables various partners in the world of online information to communicate with each other effectively. The project made clear that today's catalogers must go beyond their traditional functions, explore new options in



technology, and communicate their ideas to those who can implement them and to those who benefit from the outcome. It highlighted the need for more consistent and coordinated practices by the cataloging community, system vendors, and suppliers of cataloging services. The next stage of the project will be to speak with public services staff at UFL about moving the linking note to a higher level of visibility near the top of the record and in the brief view. Collaborating across library divisions and with systems designers to improve the navigability of the catalog for the users is in the best tradition of cataloging and represents the greatest hope for realizing the spirit of *FRBR*.

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# Book Reviews

Edward Swanson

**Essential Thesaurus Construction.** By Vanda Broughton. London: Facet Pub., 2006. 296p. \$65 paper (ISBN 978-1-85604-656-0/1-85604-565-X).

**The Thesaurus: Review, Renaissance, and Revision.** Eds. Sandra K. Roe and Alan R. Thomas. Binghamton, N.Y.: Haworth Infor. Pr., 2004. 209p. \$39.95 cloth (ISBN 07890-1978-7); \$19.95 paper (ISBN 07890-1979-5). Published simultaneously as *Cataloging & Classification Quarterly*, 37, nos. 3/4.

As stated in the subtitle of Sandra Roe and Alan Thomas's collection of essays, the thesaurus may indeed be experiencing a renaissance in our digital era. Many information professionals continue to insist that access to electronic full-text is the only important precondition for resource discovery on the Web. At the same time, others, including professionals outside librarianship proper, have come to understand that the mediation provided by expertly developed and maintained controlled vocabularies is a basic requirement for service to populations of all sorts (including impatient undergraduates), and not an unwarranted interference with the end-user's autonomy. The two volumes under review, together, address this topic in complementary fashion.

Vanda Broughton, lecturer in library and information studies at the School of Library, Archive and Information Studies, University College London, has written a valuable manual for students and practitioners. *Essential Thesaurus Construction* is concerned with both the principles and practice of thesaurus construction, "with rather more emphasis than is usual on the latter" (1). She has at the same time provided a practical and detailed introduction to taxonomy construction, outlining the basic methods for building a subject vocabulary. This is useful not only for the student, but also for the information professional who must create a thesaurus in-house.

Broughton's book, while emphasizing practical application in real-world situations, does not slight theoretical issues. Instead, chapters with either theoretical or practical emphases are integrated in a single logical sequence. The opening chapters discuss fundamentals, such as the nature of a thesaurus and how it is distinguished from other subject access tools, uses of thesauri and their advantages, types of thesauri, and the different displays typically provided. Practical steps are then described, beginning with five chapters on aspects of vocabulary selection and simple vocabulary control, a process that results in the needed raw material from which a thesaurus is constructed. Chapters

on thesaural relationships, facets and arrays, hierarchies, and the complex issues surrounding compound subjects and citation order, demonstrate the development of the thesaurus from a mass of unstructured terminology to a logically developed system. The final chapters concern conversion of a classified arrangement to alphabetical format, creation of thesaurus records, and methods for maintenance and updating. The entire process is illustrated at every stage through the actual development of a thesaurus on animal welfare, beginning with basic vocabulary sources such as scholarly journal articles and Web resources, through to the presentation of fully structured entries. It becomes clear that, while the thesaurus and taxonomy construction may not be for the timorous, there is a well-marked path to success for the determined and careful beginner.

Clear expositions of often difficult concepts enhance the text. These include the thesaurus as indexing tool versus organizational or navigational tool (34) and the relationship of polyhierarchy to notation (179). The discussion of compound terms, and the circumstances under which they should be factored into simpler terms (beginning on page 90), prepares the reader for the complex question of whether to provide Broader/Narrower Term (BT/NT) relationships, or Related Term (RT) relationships, to thesaurus terms which are retained as compounds (180).

Valuable pedagogical features complement Broughton's lucid prose. Glossary terms, when first appearing in the text, are in bold face. The glossary itself is written for non-specialists, with an emphasis on "helpful explanations . . . rather than precise technical definitions" (208). Most chapters feature several summaries, allowing for a quick review of new material. Exercises, with answers, are introduced beginning with chapter 11, concerning term extraction from document titles. Following the glossary, six appendices allow the motivated reader to examine the development of the sample thesaurus in detail.

There were very few errors noted in this well-produced volume, which is convenient in format and easily lies flat. On page 219 there is the phrase, "one of the Ranganathan's fundamental categories." The reference on page 248 to the animal product "fu" is baffling, until one realizes that "fur" is meant. On page 261, the class notation GAP seems out of order and probably should have been GP instead. These could be easily handled in an updated printing or revised edition. Finally, one of the incidental pleasures of this sort of book is how it expresses, even through the examples given, the vastness and complexity of the spheres of knowledge

and human activity. (See, for example, the terms *screaming hairy armadillo*, *clog dancing*, *coastal erosion*, and *Biblical hermeneutics*, found on pages 88–89.)

Roe and Thomas's *The Thesaurus: Review, Renaissance, and Revision*, published two years prior to Broughton's work, nevertheless benefits by being read in conjunction with the latter. (Disclosure: the reviewer is presently a member of the *Cataloging & Classification Quarterly* editorial board, but was not at the time of this volume's publication.) The editors describe three motivations for producing this volume: "to acquaint or remind the Library and Information Science (LIS) community of the history of the development of the thesaurus and the standards for thesaurus construction . . . to provide bibliographies and tutorials from which any reader can become more grounded in her or his understanding of thesaurus construction, use, and evaluation . . . [and] to address topics related to thesauri but that are unique to the current digital environment" (1–2). As with all such volumes of collected essays, it is almost inevitable that readers will find different contributions to be of greater or lesser value or interest, but all three of the editors' motivations are successfully addressed to different extents.

"The Thesaurus: A Historical Viewpoint, with a Look to the Future," by Jean Aitchison and Stella Dextre Clarke, appropriately opens the volume. Aitchison, who compiled the pioneer work *Thesaurofacet* in 1969, and is responsible for many faceted thesauri, is coauthor of *Thesauri Construction and Use*, now in its fourth edition and frequently cited by Broughton.<sup>1</sup> Following a historical review of the development of the thesaurus as a type of tool, Aitchison and Dextre point out the "two major trends in thesaurus development today . . . for adaptations that will make a controlled vocabulary much quicker, easier, and more intuitive to use . . . [and for] interoperability" (14). The cry for more intuitive tools, however, runs into the contradiction between more loosely defined popular taxonomies on the one hand, and the need for "much more precisely defined term relationships" (16) for Semantic Web use on the other.

The next three articles address the intention to provide background readings and exercises for the novice. Alan R. Thomas's "Teach Yourself Thesaurus: Exercises, Readings, Resources" provides readings grouped in topical categories, to serve as a basis for "self-instruction in thesaurus-making" (24). Specific exercises are not provided, but examples published elsewhere are pointed out. Marianne Lykke Nielsen's "Thesaurus Construction: Key Issues and Selected Readings" is a more conventional bibliographic essay, with readings organized generally around the stages of thesaurus construction. "A Practical Exercise in Building a Thesaurus," by James R. Shearer, aims to cover in twenty-two pages what *Essential Thesaurus Construction* covers in nearly three hundred. It is difficult to picture how this extremely condensed exposition could really be of use to

the beginner. However, Shearer's essay, along with those by Thomas and Nielsen, could be of value as a supplement to Broughton's work.

"Thesaurus Consultancy" by Leonard Will and "Thesaurus Evaluation" by Leslie Ann Owens and Pauline Atherton Cochrane describe professional services of value in the construction, testing, and revision stages of thesaurus development. The breadth of the latter essay is worthy of note. Owens and Cochrane discuss multiple approaches to evaluation—the "comparative, observational, formative, and structural methods"—and their applications in myriad contexts, "online or printed [thesauri], machine or human-generated, stand-alone or integrated, monolingual or bilingual, standards-compliant or not" (99). End-user research is represented in this volume by Jane Greenberg's "User Comprehension and Searching with Information Retrieval Thesauri." Business school graduate students searching ABI/Inform were studied regarding their past experience with use of thesauri in online searching, their desire to use thesauri once introduced to them, and their preferred "processing methods" (112) when working with thesauri. One outcome is the conclusion that users prefer "either interactive or a combination of automatic and interactive thesaurus processing to completely automatic processing" (116).

Of the remaining contributions, Eric H. Johnson's "Distributed Thesaurus Web Services" and Patrice Landry's "Multilingual Subject Access: The Linking Approach of MACS" are of great interest. Johnson's forward-looking essay tackles the challenge of making the online subject thesauri much more useful for searching by the general Web-using public. He describes the Thesauro-Web, "a proposed network of thesaurus access and navigation services" (121), using a distinctly developed XML-based markup language and user interface. The idea that "you can search the Web more easily and effectively using specialized search applications, only using the Web browser to fetch and display the actual Web documents" (127) is intriguing. Finally, Landry's description of the European MACS (Multilingual Access to Subjects) project, while not primarily concerned with thesaurus development per se, is valuable in that it raises the issue of interoperability, not only among languages, but more broadly among disciplines and controlled vocabularies of different levels of granularity. Taken together, Johnson and Landry remind us of the work that still needs to be done to provide access to the digital universe, by means that are as intelligent as they are intelligible.—David Miller, *dmiller@curry.edu*, Curry College, Milton, Mass.

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***Cataloging Correctly for Kids.*** Eds. Sheila S. Intner, Joanna F. Fountain, and Jane E. Gilchrist. Chicago: ALA, 2006. 136p. \$32 (\$28.80 ALA members) paper (ISBN 0-8389-3559-1).

The editors of this fourth edition gathered leaders from all types of libraries to discuss the hows and whys of cataloging and accessing children's materials in public and academic libraries. A nice blend of historical background is coupled with daily operating tactics resulting in a readable text; this was a nice surprise considering texts written on the subject of cataloging are oftentimes filled mostly with rules and regulations. As with the previous editions, the narrow focus on children is transcended in about half the chapters—much of the book's information applies to best cataloging practices in general and so might be useful to a variety of cataloging professionals.

The first two chapters focus on the general thought processes for catalogers when producing records geared toward a young audience and what access points are needed for children to be successful when searching the online public access catalog (OPAC). Helpful reminders to the cataloger are sprinkled throughout, such as the routine inclusion of tag 586 to indicate a Caldecott, Newbery, or other award-winning title (9). Many cataloging records produced by the Library of Congress do not include this information, so these added data can be essential to locating all the previous winners with one OPAC search.

Next, general cataloging issues are discussed in chapters 4 through 6 on the topics of MARC, copy cataloging, and authority control. These subjects are often presented as scenarios in easy-to-understand summaries and examples of the rules and regulations. A prime example of the far-reaching arms of catalog records is illustrated when a hypothetical patron named John orders a book through interlibrary loan for his research paper; he receives a copy from your library; the information he needs resides in the introduction; your

copy lacks this section and John never uses the library again (45). Chapter 3 on copy cataloging includes a brief history of the development of MARC as well as an authoritative yet lighthearted step-by-step procedure for cataloging that begins with, "Here's how it works: Picture me with a book or video, or something other fascinating library resource in one hand" (26). Examples such as these are what make this edition stand out among other books on cataloging.

More focus on the children's and juvenile collections is found in chapters 7 through 9 that address Sears subject headings, Dewey call numbers, and cataloging of non-book materials. A brief historical background on Dewey and his classification scheme and the operating bodies involved with maintaining and overseeing changes are found in chapter 8.

The title of chapter 10, "How the CIP Program Helps Children," gave me a chuckle. I am not sure it helps children in a direct way, as the title implies. However, I feel certain it does assist the cataloger of children's material. The majority of chapter 11 discusses a 2000 study on how academic libraries handle juvenile collections. Most classify juvenile fiction and nonfiction together, use labels to identify the collection, and use both Library of Congress Subject Headings and Library of Congress Annotated Card Program Subject Headings when assigning subject headings.

Chapters on library automation and vendors that supply cataloging records complete the main text. A good list of questions to ask a proposed vendor as well as names and addresses are included at the end of chapter 12, and the text concludes with a glossary of acronyms, a bibliography, and an index. The heart of the book, from which all chapters seem to radiate, is to keep your audience in mind while following cataloging rules and regulations and if these rules allow, modify the cataloging record to give the young searcher the best possible chance of locating library materials.—*Deana Groves, deana.groves@wku.edu, Western Kentucky University, Bowling Green.*

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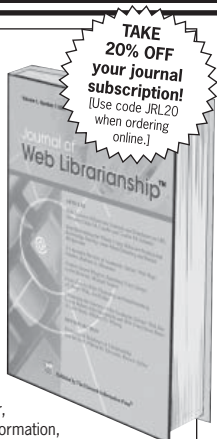
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