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Cost Savings to Canadian University and Large Urban Public Libraries from Their Use of National Library of Canada MARC Records

Jamshid Beheshti, Andrew Large, and Pat Riva

The authors present a study to determine the savings incurred by Canadian university and large urban public libraries as a result of using Canadiana printed monograph cataloging records generated by the National Library of Canada (NLC) rather than cataloging these items themselves. The study employed three methodologies: questionnaires were sent to 90 Canadian university and college libraries and to 30 member libraries of the Council of Administrators of Large Urban Public Libraries (CALUPL); follow-up telephone interviews were held with 18 university and 12 public libraries; and a sample of 100 bibliographic records for Canadiana printed documents was selected by the NLC from its catalog and then compared with records in a sample of 20 university and 10 public library OPACs to determine the extent to which NLC records form the basis for copy cataloging by other libraries. The saving per library through using NLC records as the basis for copy cataloging rather than originally cataloging items was $16,400 per annum for university libraries and $7,800 for large urban public libraries. An extrapolation to all university and large public libraries suggests an annual saving of $1,476,000 for all Canadian university libraries, and $249,000 for all Canadian large urban public libraries. Many libraries make use of NLC name or series authority data, and use NLC copy in their acquisitions processes or for other bibliographic purposes. The monetary benefits accruing to the libraries from these services and activities have not been quantified.

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The authors would like to acknowledge the librarians who commented so helpfully upon the pilot questionnaire, who took time to complete the questionnaire with such care and thought, and who despite their hectic work schedules volunteered to be interviewed, whether or not they were finally included in our interview sample. Marc Richard of McGill University Libraries and France Bouthillier of McGill's Graduate School of Library and Information Studies generously gave their time and expertise to translate the English-language questionnaire and accompanying letter into French. Liz McKeen of the NLC was a source of encouragement, support, and help at various stages of the project. Finally, Amy MacLean and Valerie Nesset, our research assistants, as is often the case, did the bulk of the day-to-day work, and we are greatly indebted to them.

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Cataloging with copy has become a ubiquitous process in all but the very smallest of North American libraries. Much has already been written about the rapid expansion of shared cataloging since LC card sets first appeared. Instead of undertaking original cataloging of all acquired materials, libraries now make every effort to obtain catalog records that have already been created elsewhere. These records are then integrated into the library's own database, probably with various degrees of modification to meet the specific needs of the library. One such source of cataloging records in many countries, including Canada, is the national library. Full-level source records are particularly sought as they constitute authoritative records created according to national standards,

and carry full authority work for all access points. The National Library of Canada (NLC) generates approximately 30,000 catalog records annually, and these are made available to other libraries directly or indirectly through a variety of services. A major motivation for copy rather than original cataloging is the expectation of cost savings that the library will reap. The library generating the original record, of course, does not make any such saving from this transaction, although it may in turn obtain other libraries' cataloging records on a cooperative and mutually beneficial basis.

The NLC is a major source of cataloging records, especially for Canadiana—documents published in Canada, by Canadian authors, or about Canada. Many libraries make use of its catalog records. But the NLC itself must expend considerable resources in producing these records. In late 2001 the NLC contracted the Graduate School of Library and Information Studies, McGill University, to determine the dollar value of savings incurred by two types of Canadian libraries—university and large urban public—as a result of using Canadiana printed monographic and federal government cataloging records generated by the NLC rather than cataloging these items themselves. Other types of libraries and materials were excluded, for the time being at any rate, to make the study manageable and realizable given the time and financial resources available. The study was conducted between January and March 2002.

Previous Studies

A number of studies have been undertaken in various countries to identify cataloging costs in general, and more specifically to compare copy cataloging with original cataloging costs. A recurrent theme in these studies, however, is the difficulty of establishing a satisfactory methodology that meets the four criteria established by Orr (1973) for measuring library services: reliability (identical results will be generated from identical situations); validity (appropriate for the situation); precision (capable of taking into account all relevant internal and external factors that might modify the results); and feasibility (can be undertaken with the kind of human and other resources available in a library). Lancaster (1973) points out that cost analyses of library technical processing generally suffer from two limitations: it is not clear exactly how data were derived, and there are no generally accepted standards for what should be measured and how costs should be derived and presented.

In response to the need for standardization to facilitate inter-institution comparisons, and the importance of basing local management decisions on sound cost analyses, the ALCTS Technical Services Costs Committee (1991) created a comprehensive checklist and formula to "help the technical processing manager determine the unit cost for any acquisitions or cataloging function." (49) However, many published cost studies predate the ALCTS guidelines, and as Morris et al. (2000) have more recently stated: "the literature on cost studies for technical services operations is extensive . . . but for the most part it is fragmentary, limited in scope, and short on detail." (70)

Deriez and Giappiconi (1994) provide an interesting discussion of methodological problems and possible solutions. Cost calculations reported in the literature may be based on a calculation of direct costs only, or include certain elements of indirect costs and overhead. Although a comparison between two workflows at the same institution can be made by looking only at direct costs, as indirect costs and overhead likely would be the same for each workflow, comparisons between institutions generally need to look at indirect as well as direct costs. The difference in results between differing methodologies is illustrated by LC's adoption of a "full costing" methodology that is in compliance with the U.S. Federal Accounting Standards Advisory Board's "Management Cost Accounting Concepts and Standards" as decreed in July 1995 and beginning in fiscal year (FY) 1996. As described in *LC Cataloging Newsline* (1996), full costing includes direct labor costs, personal fringe benefits, and indirect costs such as salaries of office personnel, equipment, and facilities. The FY 1995 cost per record (including decimal classification) had originally been calculated as $48.34, but was recalculated as $93.19 using full costing. In FY 1996, the cost per record for full original cataloging was $107.52, and for copy cataloging, $45.15. Few studies use as comprehensive a full costing method. The Iowa State University longitudinal study is one of the most comprehensive, but focuses on personnel time and cost; costs for equipment and facilities are not included. In Morris (1992), the per-item cataloging costs (for 1989/90) of $9.02 for copy, and $32.99 for original, are calculated with such "overhead" items as administrative tasks, staff participation in nontechnical services tasks, and vacations, holidays, and sick leave; but without other unavoidable associated tasks such as "training, procedure and policy documentation, revision, or separate authority work activity."

Many studies have been confined to an investigation of a single library's operations, mostly academic libraries, and frequently ARL members. U.S. libraries are represented in Leung (1987) (University of California, Riverside), El-Sherbini (1995), Rider and Hamilton (1996) (both Ohio State University), Morris (1992), and Morris et al. (2000) (Iowa State University). These deal either specifically with monographs or blend costs for all types of materials. As Osmus and Morris (1992) and Morris et al. (2000) point out, however, serials cataloging is far more expensive than monograph cataloging, taking one-third more time per title.

Blended costs mask this because the proportion of cataloging that is serials cataloging is generally low. In the Iowa State study, Morris et al. (2000) report copy cataloging costs per title that were appreciably lower than original cataloging costs (in 1989–90, $9.02 and $32.99 respectively, and in 1997–98, $12.22 and $88.24 respectively). The copy cataloging is broken down into 60% DLC/CIP and 40% member records (in 1997–98).

Rider and Hamilton (1996) at Ohio State University examined the cost savings when using the OCLC PromptCat service as a distribution vehicle for cataloging copy. PromptCat was able to supply a record for all 200 books in the sample, using 65% CIP, 25% full DLC, 8% member records, and 2% UKMARC.

Actual cost figures are highly sensitive to technology and procedural factors. An example is the study by Jenda (1992), carried out from 1985 to 1987 at the University of Botswana which was using a card catalog at that time, to estimate costs incurred when cataloging a title using Library of Congress card sets compared to the cost of original cataloging (the former was 40% less than the latter). The cost comparison included both staff time and the cost of materials and services.

Several studies have attempted to gather data more widely. Kantor (1986) took a detailed look in 1984 at the costs of choosing, ordering, and cataloging monographs in 8 U.S. academic and major research libraries. He noted significant differences in the average performance of the libraries, but overall found that original cataloging was more than three times as expensive as copy cataloging. McCain and Shorten (2002) conducted a survey of ARL libraries, based on FY 1998/99. Statistics gathered were extensive, but only 27 (including 2 Canadian) of 111 libraries (24%) were able to respond. As the focus was on defining "best practices," taking both efficiency and effectiveness into account, per-item cost figures for copy and original cataloging were not reported. In assessing the benefits of BIBCO for LC, Wiggins (2000) calculates that LC was able to use 5,585 records created by BIBCO libraries between October 1995 and September 2000. Taking into account the LC cost per record for full original cataloging ($138 in 2000), and also including the tasks that LC still needed to perform to add the records, Wiggins estimated a saving of $577,377 for LC. This figure suggests that the aggregate savings for many libraries due to copy cataloging could be substantial.

The Western Australian Group of University Librarians (WAGUL), with four members, undertook in 1996 a Collaborative Cataloging Project to look into cataloging operations (Wade and Williamson 1998). Specifically, information was sought on original and copy cataloging costs. Average overall cataloging costs ranged between the four libraries from $23.11 to $37.06, but when weightings were introduced to reflect variations between different kinds of cataloging (original, clone, difficult copy, copy, and additional copies) the new range was between $14.25 and $21.90. Among the member libraries full original cataloging accounted for only 8% to 12% of all titles.

A few studies of Canadian academic libraries have focused upon or touched upon cataloging costs: Oldfield (1987) (University of Waterloo), Carter (1997) (University of Alberta), and Partington and Talbot (1997) (University of Manitoba). None specifically indicates the proportion of NLC records among the sources of copy. Oldfield (1987) reports unit costs for 1984–85 in four categories: copy with MARC records, $6.12; copy (i.e., "manual copy"), $13.27; original, $21.70; and abbreviated, $3.29. In volume, the manual copy represented less than 5% of the copy cataloging total, but was still significant enough to track separately. In later studies, manual copy has disappeared as a category; all copy is assumed to be derived from MARC records.

Methods

Unlike such detailed case studies of specific libraries, the study reported in this article sought an aggregate response to the question of cumulative savings due to the use of NLC MARC records as a source of copy for cataloging. This aggregate figure is arrived at without comparing details of procedures, practices, policies, and technology available at each participating library. In addition, by applying the same methodology to two quite distinct types of libraries—academic and large urban public—some observations relating to the similarities and differences between the two groups can be made. Of existing studies, only Deriez and Giappiconi (1994) considered the case of public libraries, which they felt to have quite different collection profiles and cataloging priorities than university libraries. In particular, Deriez notes that academic libraries are co-contributors to shared cataloging with their national bibliographic agencies to a greater extent than public libraries, a factor that increases their costs.

Three methodological approaches were used to determine cost savings. These approaches were deemed to be the most effective and efficient methods of collecting information given the financial and time constraints confronting the researchers.

- Questionnaires were e-mailed to Canadian university and college libraries (henceforth called simply "university libraries") identified in the *Directory of Canadian Universities,* and to member libraries of Canada's Council of Administrators of Large Urban Public Libraries (CALUPL).
- Follow-up telephone interviews were conducted with a sample of respondents to the questionnaire.

- A sample of NLC records was matched against the holdings in a sample of university and large urban public library OPACs to determine the percentage of NLC records in these OPACs and the proportion of the records that have been copy cataloged using the NLC records.

Questionnaire

The questionnaire was intended to determine how many cataloging records are received annually by the target libraries, what proportion are copy cataloged rather than originally cataloged, and the sources of the former. It asked questions about the typical cost incurred in copy cataloging a record compared with undertaking original cataloging. It also offered an opportunity for librarians to comment upon NLC's cataloging service.

The questionnaire contained 14 closed questions (two questions included both an *a* and a *b* part), one open question, and one invitation to add any comments whatsoever about NLC cataloging policies and procedures. A draft English-language version of the questionnaire was piloted in 1 university and 1 public library. A copy also was sent to the NLC for feedback. The questionnaire was then modified in light of the pilot and NLC comments, and was translated into French. A second translator checked the French translation. An explanatory letter to accompany the questionnaire was also developed and translated into French.

Bearing in mind that for their own management purposes most libraries would not be tracking the detailed statistics that would enable an easy and precise answer to the research question, respondents were encouraged to supply either "actual" or "estimated" figures for many questions, qualifying them as such. Additionally, statistics were requested for the most recent completed fiscal year, as the exact months covered were not relevant to the result. No specific formula for calculating per-item costs was prescribed, but respondents were expected to use the same method for calculating both copy and original cataloging costs. These features were intended to allow libraries to participate with a minimum of recalculation of their in-house statistics and were certainly factors leading to a higher response rate than seen in other similar studies (for example, Bedford (1989) sent a survey instrument to 26 large academic research libraries but received full data sets only from 4 of them).

A list of 92 Canadian universities was obtained from the *Directory of Canadian Universities.* In 4 cases the libraries were affiliated with other libraries listed, and the questionnaire was therefore e-mailed to 88 university libraries. A list of the 32 members of CALUPL was also obtained from CALUPL itself, and the questionnaire was e-mailed to all of them with the exception of 2 libraries from which the message bounced back due to e-mail address problems. The e-mail therefore was received by 118 libraries (see appendix A for the English-language version). Two reminder e-mails were sent to all nonrespondents, and a copy of the questionnaire was attached to the second e-mail in case the original had gone astray.

Telephone Interviews

At the end of the questionnaire, respondents were asked to indicate whether they were willing to participate in a short follow-up telephone interview. Forty questionnaire respondents agreed to be interviewed. From these, 30 (75%) were selected for interview (18 university libraries and 12 public libraries). Selection was based upon the desire to represent technical services departments in different regions of the country, of varying sizes, both independent institutions and consortium members, and supporting French, English, and bilingual catalogs. The interviews were conducted with the technical services librarian of each library, 4 in French and 26 in English. Interviews lasted between 20 and 45 minutes. The primary purpose of the interviews was to verify and authenticate answers provided in the questionnaires, especially relating to cataloging costs. In addition, a preliminary analysis of the returned questionnaires identified a number of general questions to ask relating to procedures, record sources, and NLC services. All interviews were conducted by the same member of the research team to ensure consistency. The interviewer took detailed notes, but the interviews were not taped.

Record Matching

The record-matching process was intended to provide more reliable quantitative data than the questionnaires, but using only a small sample of NLC records and a subset of university and large urban public libraries. The intention was to extrapolate the results from the sample population to the entire population. Its objective was to determine what percentage of Canadiana titles cataloged by NLC are to be found in the sample libraries, and what percentage of these are cataloged using copy from NLC records.

NLC was asked to select a small sample of records for Canadiana printed monograph titles cataloged by it in 1999. In discussion with the NLC it was agreed to obtain two samples, one of federal government documents and the other of commercially published fiction and nonfiction monographs; all other types of publications were excluded. The initial NLC sample comprised 105 discrete records: 35 for government documents and 70 for nongovernment documents. Where bilingual publications were cataloged in both English and French (10 records representing 5 discrete government

documents), both records were included in the sample. The "E" and "F" suffixes in the 016 field denote these in the MARC records. For the purposes of matching the records against the libraries' OPACs, however, only one version of the bilingual record pair was used. The final record collection to be used in the matching process therefore comprised 100 records: 30 government and 70 nongovernment. The records were supplied by the NLC to the project team in full MARC format as well as in ASCII format.

The size of the library sample was largely determined pragmatically by the time available to conduct the record-matching procedure. An average of three to five minutes was estimated to compare each of the 100 sample records against the OPAC in each of the sample libraries. It was decided that a sample of 30 libraries (university and public) would be manageable, given the time and resources available to the research team.

Each of the public library Web sites was examined to determine if it offered a Web-accessible OPAC. Only 11 provided publicly accessible MARC records, and 2 shared the same catalog. This left therefore 10 public library catalogs providing accessible MARC records, and it was decided to include all of them in the sample. The university library OPACs were examined to eliminate those libraries that did not publicly display records in MARC format. This reduced the number of eligible institutions to 71. When several shared a common OPAC (e.g., NOVANET serves university libraries within Nova Scotia), one catalog was chosen to represent the consortium, as catalog practice and software constraints would be similar for all institutions belonging to the same OPAC network. This reduced by 30 the number of eligible libraries. A random sample of 20 then was selected from the remaining 41 university libraries, to give the total of 30 OPACs for record sampling that had been determined as manageable (10 public and 20 university).

Each sample MARC record supplied by NLC was matched against the MARC records in the chosen university and public library OPACs using 3 distinct access points. An initial search was carried out on the ISBN. If a match was not found, the title and personal name fields were then searched. In the case of government documents, the NLC record number was searched if the OPAC offered this search key, but this rarely was the case. When the record was found in the OPAC, the MARC format was examined to see if the library's record was derived from the NLC record in the sample. In MARC21 field 040 (Cataloging Source), either subfields *a* (Original cataloging agency) and *c* (Transcribing agency), or *d* (Modifying agency) were expected to contain the MARC21 code for NLC (CaOONL) or the OCLC participant code (NLC). However, lack of field 040 does not conclusively indicate that the record was produced by original cataloging, as some redistribution vehicles for NLC records do not retain field 040. In all cases, MARC21 field 016 (National Bibliographic Agency Control Number) subfield *a* (or MARC21 field 015 in the case of OCLC records) had to match with the 016 from the sample record to be counted as an exact match. For bilingual records, target libraries were expected to hold only one record of each pair for a full match. A true match was counted only if the library held the exact item represented by the target record (for example, the precise edition).

Data Analysis

This article presents the data collected only in so far as it relates to the question of cost savings. Both the questionnaires and telephone interviews collected librarians' opinions about the NLC's cataloging service (in general, very positive) together with some suggestions for enhancements. These opinions, however, have not been included here.

Questionnaires

Of the 118 questionnaires mailed, 69 (58% response rate) were returned, 48 from university libraries (55% response rate) and 21 from public libraries (70% response rate). While all returned questionnaires were valid and could be analyzed, some respondents did not answer all the questions. Answers from the 14 closed questions were entered into SPSS. The answers to the open questions, along with any general comments added at the end of the questionnaire, were assigned to subject topics by two members of the research team.

Table 1 shows the quantitative data collected from the questionnaires. The diversity of the libraries in terms of their size and, to a lesser extent, their mandates results in a wide range of data. The collections of the public libraries in the sample are relatively large, with an average of more than 333,000 (median 295,000) printed monographic titles. The university libraries are much more varied in collection size, ranging from 15,000 to more than 2,000,000 printed monographic titles, with an average of 572,000 but a median of 240,000.

The number of titles cataloged in the last fiscal year (in almost all cases 2000–01) on average was close to 14,000 across all the libraries, but there were marked differences between the university and the public libraries. The mean for the former is around 11,000 whereas for the latter it is almost 20,000. The gap between those libraries undertaking a lot of cataloging and those undertaking little is great: the number of titles cataloged in the last fiscal year ranged from just under 200 to 45,000.

Copy cataloging is a common practice among the libraries, with a mean of 85% of all cataloging being copy. The mean and median figures for copy cataloging are very similar (85% and 90% respectively), and there is little difference between the university and the public libraries in this respect. However, NLC-derived copy only constitutes a small part of the cataloging, although there are differences depending upon whether the copy relates to monographs or government documents. The mean for all copy cataloging derived directly from NLC records for monographs is 14%, of which 3% is for federal government documents. The use of NLC copy for monographs is little different between the university and public libraries, but public libraries are less inclined than university libraries to use NLC copy for federal government documents. As may be expected, the proportion of Canadiana publications that are not copy cataloged by the libraries is very low, at around 5%, with the university libraries handling more original than the public libraries. A large majority of libraries (87%) stated that these data represented a "typical" fiscal year.

Determining their costs of copy and original cataloging proved to be more problematic than assembling catalog production figures for the responding libraries. Only 4 reported the "actual" costs of copy cataloging, ranging from less than $1 per record to $50 per record (these and all subsequent figures refer to Canadian dollars). For the purpose of statistical analysis, these "actual" costs were combined with the estimated costs submitted by the other libraries. The average cost per document is slightly higher than $13 dollars for copy cataloging and almost $31 for original cataloging (with medians of $10 and $26.50). However, large differences are reported by the two categories of library. University libraries give an average cost of almost $17 for copy whereas public libraries only report just over $8 per record; in the case of original cataloging, again the discrepancies are large, with almost $38 for universities but less than $19 for public libraries.

Many libraries use NLC name or series authorities—47% indicated "occasional" use, while 35% are "frequent" users. Only 18% "never" use this particular service by NLC.

Libraries on average wait about 3.5 months for a record to become available before undertaking original cataloging. The length of time, however, differs significantly between university and public libraries ($t=3.23$, $df=56$, $p=0.002$). While university libraries on average may wait 4.8 months (median of 3 months), public libraries are willing to wait for only 1.5 months (median of zero).

Analysis of variance shows that cataloging costs for both the copy and original are dependent on the type of library ($F=5.154$, df 1,36, $p=0.029$; $F=6.457$, df 1,30, $p=0.016$). Since in many cases the data are highly skewed, the median may be a more accurate measure of the central tendencies than the arithmetic mean. Figures 1 and 2 show the median costs of copy and original cataloging for university and public libraries. The graphs illustrate the considerable differences between university libraries and public libraries in both costs. Further analysis based on nonparametric statistics and medians also confirms these results. Both the Kruskall-Wallis test and the Median test show significant differences between university and public libraries in terms of the cost of cataloging ($p<0.05$). They strongly suggest that in calculating cataloging costs, university and public libraries should be treated separately.

As figures 3 and 4 indicate, the cost of original cataloging for university libraries ranges from $2 to $100 with a mean of $38, while for public libraries the range is from $2 to $35 with a mean of $19. Q-Q probability plots were used to determine whether the distribution matched a normal distribution. As a result, in the case of the university libraries one outlier was eliminated and the cost figures were recalculated. The average cost of original cataloging for university libraries is $37.6 (median of $30) with a 95% confidence interval of $25 to $44. The figure for public libraries remains the same at $19 (median of $15.50), with a 95% confidence interval of $11 to $26.

Figures 5 and 6 show the estimated costs of copy cataloging for university and public libraries respectively. The cost for university libraries ranges from $1 to $50, whereas for public libraries it is from $1 to $30. Q-Q probability plots were used to eliminate the outliers. The mean cost of copy cataloging based on the modified data for university libraries is $16.9 (median of $13) with a 95% confidence interval from $9 to $18, and for public libraries $8.3 (median of $6) with a 95% confidence interval from $4 to $11.

Differences in currencies, fluctuating exchange rates, labor costs, and inflation prevent any direct comparison of the absolute costs of cataloging reported here with those provided in the previous studies. The ratio of copy to original cataloging, however, indicates that the results of this study are comparable to those reported in the literature. The cost of copy cataloging is 41% of the cost of original cataloging for university libraries and 37% for public libraries.

Cost Savings for Libraries

The potential cost saving for the libraries is calculated as follows (figures are rounded to the nearest one-hundredth dollar): total number of published print monographic titles in collection cataloged in last fiscal year, multiplied by percentage of published print monographic titles in collection that were copy cataloged using NLC bibliographic records in last fiscal year, multiplied by cost per bibliographic record for full original cataloging of published print monographs, minus cost per bibliographic record for copy cataloging of published print monographs.

Table 1. Questionnaire Data Analysis Overview

Questions	All Libraries			University			Public	
	Mean	Median	N	Mean	Median	N	Mean	Median
Monographic title holdings	501,272	269,422	45	572,033	240,000	19	333,679	295,000
Titles cataloged (last fiscal year)	13,948	10,853	45	11,269	6,773	20	19,976	16,751
Total titles copy cataloged	85%	90%	44	84%	87%	21	88%	90%
Total titles copy cataloged using NLC	14%	10%	36	14%	11%	16	14%	10%
Gov. titles copy cataloged using NLC	3%	1%	33	4%	2%	15	1%	1%
Canadiana titles cataloged originally	6%	4%	28	7%	5%	15	3%	2%
Cost per record—copy cataloging	$13	$10	23	$17	$15	19	$8	$6
Cost per record—original cataloging	$31	$26.50	21	$38	$30	12	$19	$15.50
Months will wait for copy to be found	3.5	3	40	4.8	3	19	1.5	0

N=number of libraries answering the relevant question

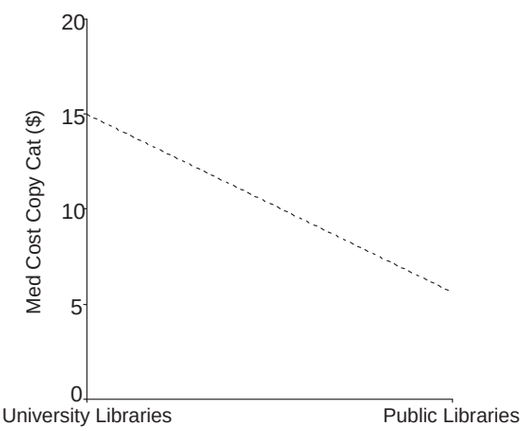

Figure 1. Median Cost (CAN $) of Copy Cataloging for University Libraries and Public Libraries

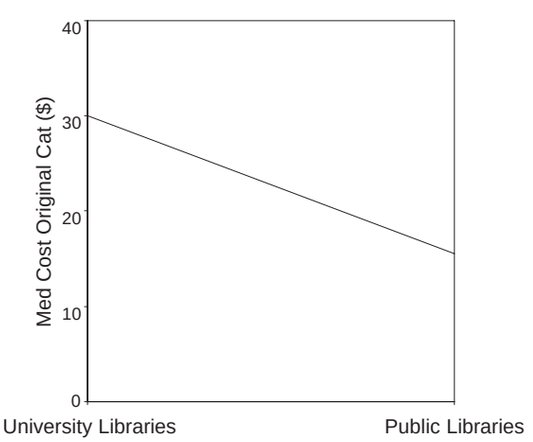

Figure 2. Median Cost (CAN $) of Original Cataloging for University Libraries and Public Libraries

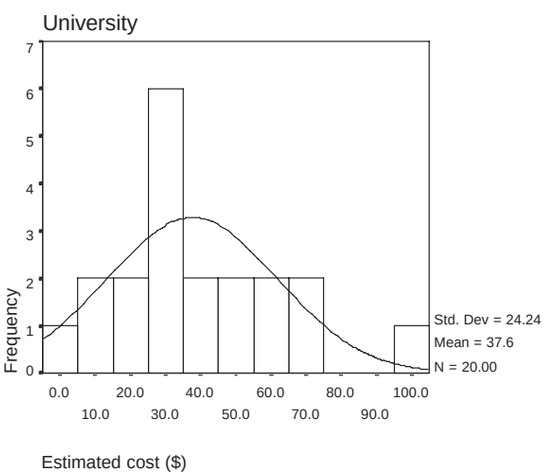

Figure 3. Cost of Original Cataloging for University Libraries

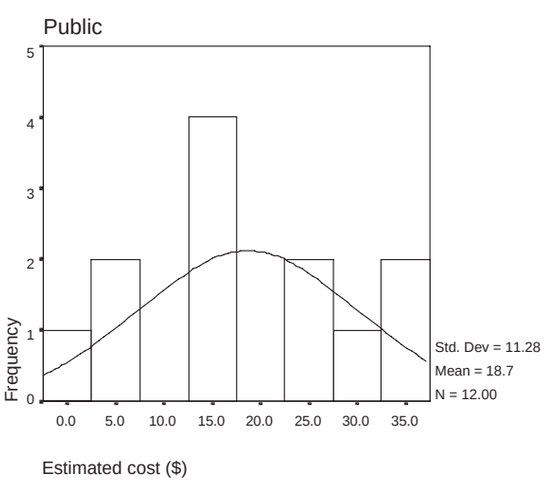

Figure 4. Cost of Original Cataloging for Public Libraries

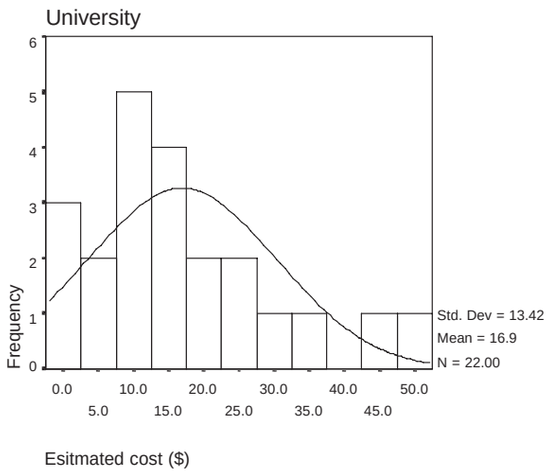

Figure 5. Cost of Copy Cataloging for University Libraries

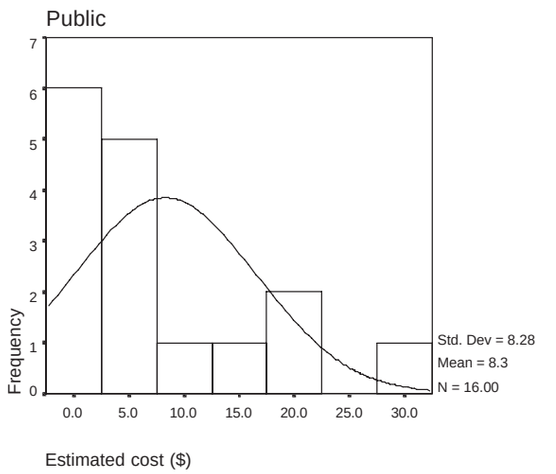

Figure 6. Cost of Copy Cataloging for Public Libraries

The total cost savings for the 20 (22% of total population) university libraries that responded to *all* the questions pertaining to the formula is $572,800. The mean cost saving for a university library is $28,600 (median of $20,700) with a 95% confidence interval of $9,700 to $47,600. As figure 7 shows, however, several outliers are skewing the data, which were then removed with Q-Q probability plots. The modified mean cost saving for an academic library based on 18 responses is then $16,400 (median of $16,500), with a 95% confidence interval of $8,700 to $24,200.

If we extrapolate from these figures, the mean total cost savings for university libraries in Canada as a result of using NLC MARC records is $1,476,000. A 95% confidence interval around the mean ranges from $783,000 to $2,178,000.

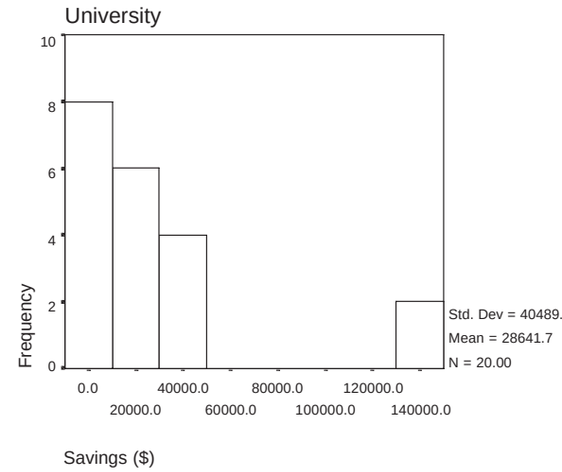

Figure 7. Cost Savings by University Libraries

The cost savings for the 9 (28% of total population) public libraries that responded to all the questions pertaining to the formula is $137,600. The average annual saving for a public library is $15,300 (median of $6,100), with a confidence interval of zero to $33,400. Figure 8 shows that one response is an outlier. Recalculating the mean without this outlier results in an average cost saving for public libraries of $7,800 (median of $5,400). The 95% confidence interval around the mean is from $1,200 to $14,500. The wide range of the confidence interval reflects the small sample size and the diversity of the responses.

If we extrapolate from these figures, the mean total cost savings for large urban public libraries in Canada as a result of using NLC MARC records is $249,600, with a 95% confidence interval of $38,400 to $464,000.

Bibliographic Sources

Figure 9 shows the bibliographic sources used by all the libraries for cataloging Canadiana (n = 68). The most frequently cited *single* source is Amicus Online (75%). Web OPACs including Z39.50 servers are used by 76% of libraries, followed by printed CIPs (56%). These data demonstrate that the majority of libraries opt for those bibliographic sources that are free of charge and readily available. The most cited commercial sources are AG Canada (40%) and OCLC Online (35%). Amicus, alone or in combination with one or more other sources, is by far the most used bibliographic resource for cataloging Canadiana; more than 33% of libraries indicated that they rely on it.

As more than half of respondents had reported using CIP printed in books as a source of cataloging, the nature of that use was clarified during the interviews. Libraries were divided as to whether a record created by transcribing CIP should be counted as copy cataloging or original cataloging, but all reported that printed CIP is used much less frequently than formerly, as the MARC records generated by the CIP program normally now are rapidly distributed.

The frequency of use of bibliographic sources is relatively evenly distributed between the university and public libraries, with the exception of three sources: OCLC online is used significantly more by university libraries at 47% versus 10% in public libraries; Canadiana CD-ROM (19% versus 4%) and BiblioFile (33% versus 13%) are used more by public than by university libraries.

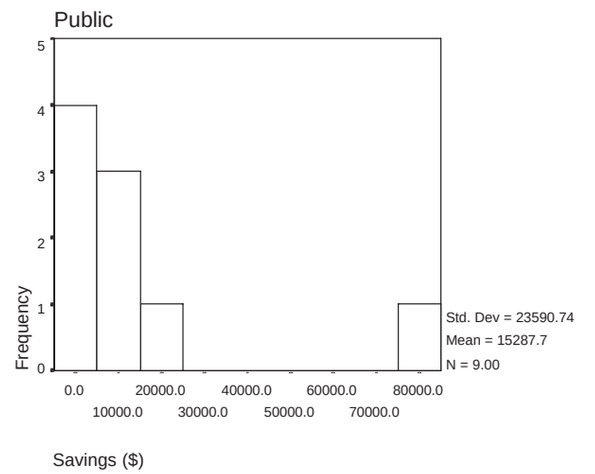

Figure 8. Cost Savings by Public Libraries

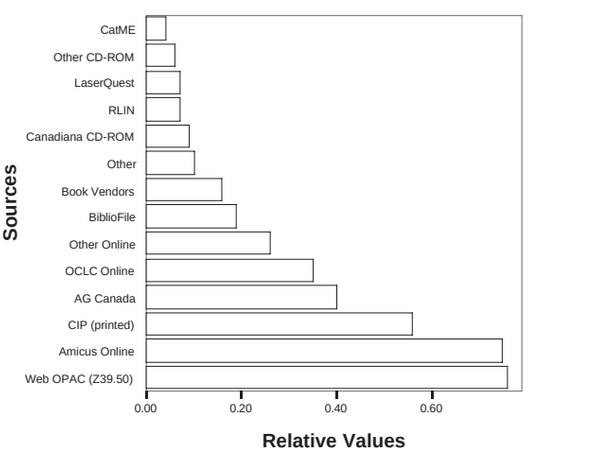

Figure 9. Bibliographic Sources for Cataloging Canadiana

Discussion of Questionnaire Analysis

The high overall response and reply rate indicates that libraries are sufficiently interested to participate in this sort of survey. However, as the follow-up telephone interviews clearly revealed, respondents were not necessarily able to provide answers to all the questions requiring actual or even estimated statistics. For this reason, the number of respondents to any one question differs; table 1 (above) shows that the total number of university and public libraries responding to the specific questions analyzed in that table ranged from 33 to 65, even though 69 libraries did return questionnaires. In practice it proved difficult to unambiguously frame questions without converting each question into an essay—which would have greatly reduced the chances of anyone returning a completed questionnaire! Some survey questions, even after pre-testing, remained open to varying interpretations by respondents. One example relates to outsourcing. Some libraries that outsource did not know whether they should report on all additions to their catalog or only their in-house cataloging. Furthermore, the original source of records supplied by the outsourcers were generally not known by the client libraries.

In some cases libraries responded to questions, particularly those dealing with the costs associated with either copy or original cataloging, with a range of figures. At the data entry stage the decision was made to enter the high figure of each range rather than to use the low figure or an average figure. This inevitably has affected the mean and median figures as calculated above. The reasons why some libraries felt the need to report ranges for cost figures has not been explored, but possible factors include:

- The question asked for all types of copy, but the library has separate figures for "good" source copy (the low end), and "partial" copy (the high end), and so reported both rather than an average.
- Copy may be divided into workflow streams by difficulty and these are handled by different levels of staff, with different salary scales (libraries specifically cited non-Roman alphabet material).
- For original cataloging, again, the difficulty of the material being cataloged may result in different levels of staff handling some categories, and these staff may have different salaries.

We found a correlation between the cost of original cataloging and the type of library (university or public). It is not surprising to find that university library costs are higher,

because of the nature of the materials being collected and cataloged by those libraries. We asked for costs for the library's overall cataloging operation, not just in regard to Canadiana, or English- and French-language monographs (our reason for this was an acceptance that libraries simply would be unable to allocate costs either for copy or original cataloging only to Canadiana in their collections). However, material requiring original cataloging in university libraries may well overrepresent other languages, rare material, and formats other than regular print monographs (serials, music, maps, electronic resources, etc.), all of which generally take longer to catalog, and may require more specialized staff. Even material handled by copy cataloging may include a significant proportion of more difficult documents and of poorer copy for non-North American imprints.

Attributing staff time specifically to cataloging also is complex whenever staff spends more than a negligible amount of time on any noncataloging duties. Copy catalogers may be involved in acquisitions, processing, database maintenance, or other tasks. The definition of which technical services tasks are an intrinsic part of the cataloging process is open to interpretation. The duties of original catalogers can also be very varied, including significant amounts of authority work, or training, or policy setting. The allocation of costs for sources of copy when those same databases are also used for ILL and reference and acquisitions is equally complex. All these factors mean that costs in practice are unlikely to be directly comparable between institutions.

In using the mean cost for all types of copy cataloging in our calculation, we are not making any allowance for the fact that some forms of copy cataloging are significantly less costly than other forms. The staff time and knowledge needed to complete the processing varies a great deal for different forms of copy cataloging. Specifically, using full source records found in the first source searched requires the least time and the least checking, while resorting to an incomplete record (particularly one that lacks elements of subject analysis) after a number of searches costs the most. Using full-level NLC source bibliographic records involves less expensive workflow, while alternative sources of copy would tend to be more expensive.

Timeliness in the availability of records also produces a saving for libraries, but this figure is difficult to calculate. If a full record that can be used for copy cataloging is found in the first source checked, then the library saves the staff time and per-search costs that would be incurred in searching through multiple sources for the record. As we elicited only a global average for copy-cataloging costs, we cannot put a figure on the cost savings resulting from the early availability of records for use in copy cataloging.

For libraries using copy in their acquisitions processes, there is an additional financial saving as the availability of records reduces the cost of inputting bibliographic information for ordering purposes. In addition, libraries are realizing savings through other uses of bibliographic records and through their use of authority records, which could not be quantified by the data collected in this study.

As a result of these considerations, the cost savings estimate as calculated from the questionnaire data may represent only a portion of the impact that the use of NLC bibliographic and authority records has on the respondents' total savings.

Record Matching

Since libraries were unsure about the exact amount of copy cataloging for which NLC MARC records were used, the record-matching procedure was intended to provide an alternative means to estimate use of NLC-derived cataloging records and the resulting cost savings to libraries. Figure 10 shows the distribution of NLC records in the 30 OPACs examined. Of the total 100 NLC records, the mean percentage hits per library is 4%, with a range for all libraries in the population between 2% and 6% in 19 out of 20 instances. If these results are extrapolated to the population, then we may conclude that the mean number of NLC hits per library is 1,200, with a 95% confidence interval of 600 to 1,800 (this wide range is a consequence of the relatively small sample size and the wide quantitative range of responses from the sample).

The average number of hits for NLC monographic records in the university libraries (7%) is significantly higher than in the public libraries (2%). Similarly, the average number of hits for NLC government publication records in university libraries (11%) is higher than in public libraries (2%).

Figures 11 and 12 show the mean number of NLC sample records found in the 30 OPACs. Of the randomly chosen sample of 70 monographic records, on average only 2 NLC records are found per library. An equal number (2 per library) is found with MARC records derived from other sources. In the public libraries, however, the number of hits for non-NLC-derived records is 2.2 per library versus 0.5 for NLC-derived records (figure 11). For government publication records, the average number of hits for academic libraries is 3.8 for non-NLC records and 3.4 for NLC copy records per library. For public libraries the average number of hits for government records per library are 1.3 for non-NLC and 0.7 for NLC-derived records (figure 12).

The mean number of documents per university library for which the copy cataloging were derived from NLC was reported in the questionnaires to be 1,203 with a 95% confidence interval of 721 to 1,684. The record-matching data show that on average 5% of the records (95% confidence interval of 4% to 7%) in university OPACs are derived from

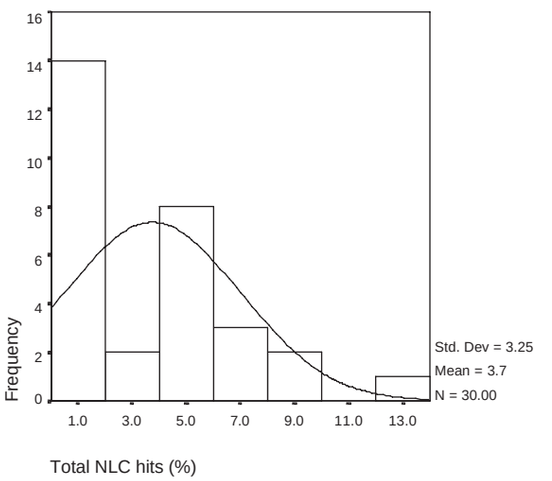

Figure 10. Percentage of NLC Sample Hits in 30 OPACs

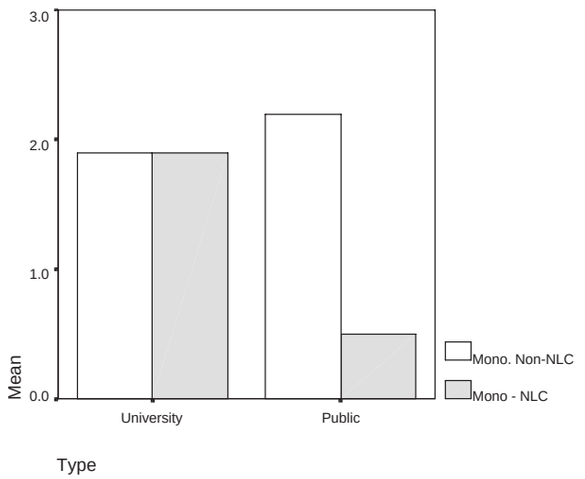

Figure 11. Mean Number of Hits in 30 OPACs-Monographs

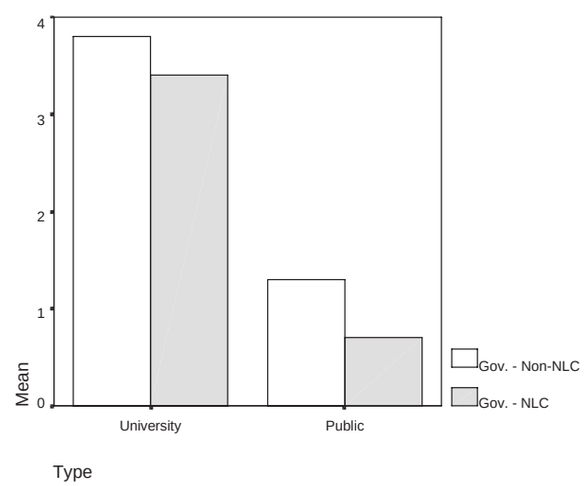

Figure 12. Mean Number of Hits in 30 OPACs-Government Publications

the NLC. Converting the average from percentage to an absolute number using the approximate figure of 30,000 documents cataloged by NLC per year yields 1,500 records. Therefore, the data provided by university libraries in their questionnaires approximately matches the result calculated from the record matching. The mean number of documents per public library with NLC-derived cataloging records was reported in the questionnaires to be 2,109 with a 95% confidence interval of 1,223 to 2,995. Record-matching data, however, indicate that only 1% of the records (95% confidence interval of 0.3% to 2%) in public libraries are derived from NLC. When this figure is converted to absolute numbers, the mean number of records derived from NLC by public libraries is only 300. Public libraries' responses regarding their usage of NLC-derived records, therefore, may be overestimates.

The number of hits per document is measured by examining the data for 70 monographic and 30 government document records when searching the 30 OPACs. For monographs, only 28 documents out of 70 (40%) could be located in these OPACs, with an average hits per document of 3.5, with a 95% confidence interval of 2 to 5 hits per document. Of these records, 18 were derived directly from NLC. Although these records were not distributed evenly among all the OPACs, the average number of derived NLC records per document is 2 with a range of 1 to 3 in 95% of cases. Proportionally, the average number of derived NLC records per document out of the total retrieved is fairly high at 61%, with a range of 45% to 78% in 19 out of 20 instances.

In the case of government documents, 20 out of the 30 records were located in the OPACs. The average hits per document is 8 with a range of 4 to 12 in 95% of cases. Of the retrieved records, 13 were derived from NLC. While these records were not distributed evenly among all the libraries, the average number of derived NLC records per document is 6 with a range of 2 to 9 in 95% of cases. Proportionally, the average number of derived NLC records per document out of the total retrieved is relatively high at 49% with a range of 36% to 61% in 19 out of 20 cases.

The record-matching procedure was designed to avoid any involvement from the library whose OPAC was being examined. In this way it cost the libraries in the sample nothing, which is an attractive feature of this study. It is also a weakness, because the determination of the source of the record had to be made by someone who (in all but one library) was not familiar with the integrated library system

used by that library or with the institutional history relating to cataloging policies. In the surveys and interviews, libraries pointed out characteristics of their databases that would complicate the determination of source; an insider would know how to compensate reliably, while an outsider may only be able to make an educated guess. One example is the 040 fields. At least two of the OPACs use software that seems to move the original 040 into a (locally defined) 046, and insert a new 040. The researcher can spot this visually, but will not know if the software does this for all sources of records or only some sources.

Another effect of lack of local involvement is that we were unable to exclude from the population of candidate libraries those whose collection or cataloging policies result in a lack of interest in copy cataloging for significant segments of the record sample. Actual library collections are not random, but are selected in response to the mission of the library, and the subject areas and formats of material collected vary a great deal. None of the libraries whose collections were examined have as their mission to exhaustively collect Canadiana.

Questionnaire and interview responses showed that some libraries are controlling either paperback fiction or government documents only with brief records. This form of cataloging control can be very inexpensive, but it does not provide a comparable level of access to the material as would full or core cataloging. Responses that grouped such minimal level records with other original records make original cataloging appear much cheaper in comparison with copy cataloging than really is the case. Several libraries held some of the target government documents, none of whose records were NLC copy, but these turned out to be brief control records and not full original cataloging nor derived cataloging from other sources.

Conclusions

The Canadian university and large urban public libraries reported in the questionnaire survey that about 10% of their cataloging is derived from NLC MARC records. The university libraries' responses match closely the results of the record-matching methodology used in the project. On average approximately 1,200 records are derived from NLC per year by this category of libraries. Matching a sample of Canadiana records to the public libraries' collections, however, suggests that the data reported by the libraries in the questionnaires may be overestimated. While the result from the record matching indicates that public libraries on average only use about 300 NLC records per year, their responses to the questionnaire show an average of more than 2,000 records. In both cases, the average number of hits per record derived from NLC is high, indicating that certain Canadiana publications are popular among all libraries.

The average annual cost saving for a university library when using NLC MARC records for derived cataloging for Canadiana monographs and federal government documents is $16,400, while the average saving for a large urban public library is $7,800. In general, the reported data show that large urban public libraries spend significantly less on cataloging than academic libraries while acquiring a smaller proportion of Canadiana, particularly government documents, for their collections. If we use the data provided by libraries to extrapolate the range of cost savings for all academic and large urban public libraries, we may conclude that NLC is saving the libraries approximately $1,725,600 (with a range of $821,400 to $2,642,000) per year.

Libraries rely heavily on two additional services provided by NLC. The major single source of the derived MARC records is Amicus Online, and 82% of libraries in the study reported using NLC name and series authorities. The savings outlined above do not take account of the financial benefits accruing to Canadian libraries from these services.

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Appendix A: Questionnaire (English-language version)

The Use of NLC Source MARC Records in Canadian Libraries

The objective of this questionnaire is to collect information about the extent to which Canadian university and large urban public libraries make use of MARC catalog records generated by the National Library of Canada.

The questionnaire is being sent to the libraries of all institutions listed in the *Directory of Canadian Universities,* and to all members of the Council of Administrators of Large Urban Public Libraries (CALUPL). The analyzed and aggregated data will be incorporated in a final report to be submitted to the National Library of Canada, and may also form the basis of published articles or conference papers. The responses will be treated with full confidentiality. Individual libraries will not be identified in any reports, conference papers, or publications.

This research is being undertaken under contract by the Graduate School of Library and Information Studies, McGill University, on behalf of the National Library of Canada.

The questions below relate to published print monographic titles only: fiction and nonfiction; adult and children's; commercial and government publications. Please exclude all electronic and other nonprint materials.

As each institution is receiving one questionnaire only, please answer these questions for your entire library system. If you are unable to do this, please specify the branch library or other part of your library system for which you are responding:

_____

1. Name of your library:
   _____
2. Total number of published print monographic titles in your collection: _____
3. Total number of published print monographic titles in your collection, cataloged in the last fiscal year for which you have data (excluding RECON):
   (a) Number _____
   (b) Year _____
4. Percentage (%) of published print monographic titles in your collection, copy cataloged (whether using either partial or full copy, from all sources) in the last fiscal year for which you have data (excluding RECON). (Please give estimate if complete data unavailable.) _____
5. (a) Percentage (%) of published print monographic titles in your collection, copy cataloged (whether using either partial or full copy) using NLC bibliographic records in the last fiscal year for which you have data (excluding RECON).

(Please give estimate if complete data unavailable.)_____

(b) Of these, what percentage are Canadian federal government documents? (Please give estimate if complete data unavailable.)_____

6. Percentage (%) of Canadiana published print monographic titles for which you undertook full, original cataloging (excluding RECON) in the last fiscal year for which you have data. (Please give estimate if complete data unavailable.) _____

   For the purposes of this question, the term "Canadiana" refers to publications that meet any one of the following four criteria: publications from a Canadian publisher, by a Canadian author, on a Canadian topic, or any Canadian (federal and provincial) government publications.
7. Was the fiscal year used in your previous answers a typical one for your cataloging activities? If not, please elaborate.
8. Average cost per bibliographic record for copy cataloging (whether using either partial or full copy) of published print monographs. Please incorporate all direct costs: personnel, subscriptions, etc.
   (Please give estimate if complete data unavailable.)
   actual _____ OR estimate _____
9. Average cost per bibliographic record for full original cataloging of published print monographs. Please incorporate all direct costs: personnel, subscriptions, etc. (Please give estimate if complete data unavailable.)
   actual _____ OR estimate _____
10. Please list any categories of published print material
    (e.g., fiction, government documents) for which you almost never use copy cataloging.
11. Please list any categories of published print materials for which you almost always use copy cataloging.
12. (a) Which sources does your library actually use to find bibliographic records for cataloging purposes? Only answer for published Canadiana print monographic titles. For the purposes of this question, the term "Canadiana" refers to publications that meet any one of the following four criteria: publications from a Canadian publisher, by a Canadian author, on a Canadian topic, or any Canadian (federal and provincial) government publications.
    Indicate as many as necessary
    ____ Amicus Online
    ____ AG-Canada
    ____ OCLC Online
    ____ RLIN
    ____ Other online sources (please specify)
    ____ Canadiana CD-ROM
    ____ CatME
    ____ LaserQuest
    ____ BiblioFile
    ____ Other CD-ROM sources (please specify)
    ____ Web OPACs (including Z39.50)
    ____ Book vendors
    ____ CIP as printed in books
    ____ Other (please specify)
    ____ Not applicable

    (b) Which of these is your major source for bibliographic records for Canadiana?
13. On average (excluding high priority, rushed, or urgent items), how many months will you wait for a bibliographic record of a published print monograph title to become available before cataloging the title originally? _____
14. Do you make use of NLC name or series authorities?
    Never_____ Occasionally_____
    Frequently_____
15. How might the NLC's bibliographic records be of more use to you for cataloging purposes? Please answer in as much detail as you wish.

Please add any other information relating to your cataloging practices for Canadiana material or about NLC cataloging practices that you think relevant.

We should very much like to hold a short follow-up telephone interview with you in March. If you are willing to participate, please give your name and telephone number.

Thank you for your help.

The Preservation Evolution

A Review of Preservation Literature, 1999–2001

JeanAnn Croft

The literature representing 1999 to 2001 reveals that the preservation field is absorbed in an evolution. The literature demonstrates that trusted practices are changing to improve outcomes and further advance the preservation field. Simultaneously, in the wake of the digital revolution, preservation professionals dream about merging traditional and digital technologies in the hope that both long-term preservation and enhanced access will be achieved. This article attempts to relate the values of the discipline in order to inspire further research and persuade more work in formulating hypotheses to integrate preservation theory and practice. Finally, this overview of the literature will communicate the scope of the preservation problem, clarify misconceptions in the field, and document areas that warrant further investigation and refinement.

The literature representing 1999 to 2001 reveals that the preservation field is continually absorbed in an evolution. This literature review examines the trends and customs of the preservation field as documented in the literature, and attempts to relate the values of the discipline in order to inspire further research and persuade more work in formulating hypotheses to integrate preservation theory and practice. Finally, this depiction of the literature will communicate the scope of the preservation problem, clarify misconceptions in the field, and document areas that warrant further investigation and refinement. Following up the preceding preservation literature reviews that have been published in this journal, this work provides a sampling of the preservation literature and will not include book reviews, annual reports, preservation project announcements, technical leaflets, and strictly specialized conservation literature. Exclusion of these works does not indicate any censorship, but is necessary to keep on target with the goals of this article and ensure a succinct and concise overview of the preservation literature.

Preservation-Related Literature Reviews

There have been several preservation literature reviews describing trends, convictions, and practices during their respective time periods. Coinciding with the observations that Drewes made in a previous review of preservation literature, current articles from 1999 to 2001 continue to integrate preservation management into the overall organizational structure of a library or archive (Drewes 1993). However, there is an attempt to take this assimilation a step further by

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incorporating secondary storage facilities and including digital technologies. Publishing case studies, presenting an overview of projects, and providing examples of how a procedure and practice are developed at a specific institution also remain constituents of the corpus of preservation literature as during the time of Drewes's review. Sophia Jordan conducted a review of preservation literature covering 1993 to 1998 and observed that the preservation field experienced a "refinement" and "maturation" (2000). The author reviewed a multitude of works and categorized them into subgroups including: Review of the Literature; Binding and Bindings; Physical Treatment, Reformatting (Microfilming and Photoduplication); Audio-Video, Film, and Photographic Materials; The Digital Arena; Environment Control; Disaster Planning; and Management. Jordan's examination concluded that "preservation librarians have reflected upon themselves and have developed an historical perspective of themselves" (2000, 10).

Consistent with both Drewes's and Jordan's literature reviews, preservation literature continues to thrive at this time (Drewes 1993; Jordan 2000). The fact that literature reviews are being conducted on digital documents and music collections, focusing specifically on the preservation issues relating to these mediums, is evidence of a blossoming of literature. These reviews testify to both Drewes's observation of a "widening circle" (1993, 315) and Jordan's noting "refinements in established preservation concerns" (2000, 5). The authors represent specialized fields outside of preservation and recognize the mortality of digital documents and music collections. Smith claims that the literature "signifies an urgent appeal . . . to preserve the priceless musical heritage" (2000, 135), while Parkes observes that the literature has "identified the major preservation issues as being the physical deterioration of digital media and the rapid rate of technological obsolescence" (1999, 374).

Jordan recognizes that "If the literature of the early 1990's reveals an explosion of information . . . then the preservation literature covering 1993–1998 shows refinements in established preservation concerns and a maturation and leadership in the new frontier" (2000, 5). Consequently, the literature representing 1999 to 2001 reveals that the preservation field is continually absorbed in an evolution and is on the verge of a revolution. The literature demonstrates that trusted practices are continuously evolving to improve outcomes and further advance the preservation field. Simultaneously, in the wake of the digital revolution, preservation professionals dream of merging traditional and digital technologies in the hope that both long-term preservation and enhanced access will be achieved. This technological revolution will continue to influence preservation services in the future and lead to a collaboration of resources across disciplines.

Clarifying Preservation Misconceptions

The journey to achieve both preservation and access has not been an easy one, and chosen paths have been challenged. Library and archives professionals recognize microfilm as the most dependable preservation medium; however, the public does not embrace this technology as a satisfying tool for access. Nicholson Baker's publication *Double Fold: Libraries and the Assault on Paper* (2001) has stirred up controversy in the library and archival world, specifically in the area of preservation and destruction of original text for preservation purposes. Reviews and articles in publications such as the *New Yorker, The New York Times Book Review,* and *Washington Post Book World* have contributed to the work's notoriety. Baker chastises libraries for their microfilming practices of not retaining original materials such as newspaper in their permanent collections, and contends that the "brittle book crisis" is not as critical as it has been portrayed in the library and archives world. Although Baker's interest in preservation is admirable, he is critical of many practices that are now obsolete and does not tell a complete story. Libraries and archives often seek funding and support from the public and are quite concerned about the fallout of such negative and uninformed publicity. Consequently, librarians and archivists are attempting to mitigate the negative press received with the publication of the book by addressing issues that were raised and offering an explanation of what practices are implemented today and what can realistically be accomplished within the means of an institution. Libraries and archives realize that they must do a better job in pleading their case to the public and increasing awareness of current preservation initiatives. Baker's publication provides a rallying point for preservationists to reassert their value and effectiveness. *Double Fold* inspires the necessity for expanded education in preservation, as well as constant evaluation of these practices set forth by the preservation community to ensure that collections are accessible for the future.

Michèle Valerie Cloonan challenges preservation professionals to look critically at their role and the profession as the trend toward the decline in preservation programming in Association of Research Libraries (ARL) and schools teaching library and information sciences indicates a weakening of the field (2001). Sophia Jordan believes that a review of literature demonstrates "that the work in the field suggests a 'coming of age' for preservation. Preservation has been a part of libraries both as an administrative unit and as a unified practice long enough now to have developed a history, methodology, a series of sub-specialties, and, yes, even philosophical schools" (2000, 5). However, Cloonan (2001, 239) disputes this viewpoint because social issues concerning the survival of cultural

heritage materials are not discussed in the literature included in that review. The author explains that preservation is more than prescribed treatments and solutions and requires a better understanding of the cultural context that surrounds an object (Cloonan 2001).

Importance of the Artifact

As if in response to the concerns presented by Baker and Cloonan, the recent literature reveals a renewed and refocused commitment on the part of the pubic to the original artifact. Cloonan points out that public interest is a driving force in establishing preservation as a priority when or while the public looks to cultural institutions to preserve their heritage (2001). Tools such as eBay, Bibliofind, Abebooks, auction sites, and various other Web sites facilitate researching the availability and value of an item and increase preservation awareness in the public domain. Reminded of the preservation challenges posed by digital technology and recognizing the public demand for original items, professionals are cognizant of the virtues of the artifact, thus placing a new emphasis on preserving these items. With an awareness that it isn't feasible to preserve everything, the literature shows how librarians and archivists are mindful that decisions about the final disposition of an item cannot be made in a vacuum. Professionals representing diverse branches of learning must offer perspective and advice to assist in making intelligent decisions about which items should be saved and preserved for posterity. Furthermore, Cloonan believes that these stakeholders will address the social issues essential to the preservation of cultural heritage materials (2001). The literature provides a representation of the work that assorted professionals are engaged in and the direction that the profession is taking in regard to cultural artifacts.

Various professionals across disciplines have presented a united front in justifying the preservation of artifacts. In 1995, the Modern Language Association (MLA) authored the "Statement on the Significance of Primary Records" to facilitate discussions concerning the responsibility of libraries in an increasingly electronic environment. ARL took up this cause, which resulted in the creation of the Preservation of the Artifact Task Force. The ongoing directive of this group is to provide awareness and insight regarding the preservation implications of the original format and to create strategies to address these issues (Enniss 1999). Another group researching and investigating the role of the artifact is the Council on Library and Information Resources (CLIR). CLIR established a task force of scholars, academic officers, librarians, and archivists, which yielded several recommendations including campaigning for the development of repositories for artifacts, promoting good stewardship, and investigating best preservation practices for the artifact (Nichols and Smith 2001). CLIR also commissioned a study to concentrate on research concerning preservation and conservation of analog and archival materials. Paper, film and photographic materials, and magnetic tapes illustrate the technology of the nineteenth and twentieth centuries and serve as the focal point of research. The report summarizes significant developments in preservation and conservation research conducted in the last five years and identifies various trends in the profession, recognizing areas that require additional work and research, such as active conservation of individual artifacts, standards for mass deacidification and accelerated-aging tests, determination of the life expectance of magnetic tape, and effects of solvents and solvent residues (Porck and Teygeler 2000).

Organizations such as the National Preservation Office (NPO) in the United Kingdom and the National Centre for Conservation and Restoration (NCCR) in Chile are engaged in devising national preservation plans to protect their cultural heritages. The NPO developed a forum to coordinate a national preservation effort to include information and referral service, preservation education and training, and the coordination of research and evaluation. Various committees of professionals and commercial sponsors provide for and support this effort (Marshall 1999). The NCCR also sought counsel from advisors, preservationists, and conservators throughout various institutions in Chile as well as representatives from CLIR. Its directive was to set the groundwork for the creation of a library network and offer seminars in preservation training (Palma 2001). Furthering this pursuit is the Landerestaurierungsprogramm (State Restoration Program) in Germany, which increases public awareness through consulting and training efforts about the importance of preserving cultural heritage in danger of extinction. This program consolidates resources and experts in conservation to serve the regional libraries and archives via microfilming and conservation services (Haberditzl 2001). These organizations illustrate the power of collaboration: each draws resources and expertise from among different disciplines and professions to formulate committees, working groups, and organizations, realizing that each faction delivers a different strength and point of view to these ventures.

Mark Herring provides a slightly different perspective on preserving the artifact. Herring's concern for the cultural artifact brings forth the bold realization that if an institution cannot properly preserve an item, then it shouldn't accept this responsibility in the first place (Herring 2000). Arguing the merits of deaccessioning, Herring demonstrates that depositing the artifact in an institution with the appropriate resources will bring about more space, financial revenue, and improved preservation for the items that require specialized care. Supporting Herring's arguments, Gehret advocates that collection developers incorporate

preservation into their overall collecting and purchasing scheme and discard items when their use and importance to the mission of the institution diminish (Gehret 1999). Conversely, Baker believes that everything should be saved and recommends that institutions make available a discard list so that the public can hold them accountable "to act responsibly on behalf of their collections." Believing that libraries and archives have failed in their preservation responsibilities, Baker constructed a newspaper warehouse to safeguard materials from disposal (2001, 270). CLIR's task force acknowledges that it is not possible to save everything and that formulating a preservation strategy is necessary to contend with the notion that it is difficult to predict an item's value and worth into the future, and that materials must be carefully selected for preservation and access (Nichols and Smith 2001). Librarians and archivists enable the lines of communication between the present and the past through collection and preservation by avoiding an attempt to save the same kinds of materials, but rather by identifying which materials should survive from each period.

Remote Storage

In addition to preserving cultural artifacts, a documented and well-known problem that libraries and archives encounter every day is the lack of adequate space to accommodate their growing collections. Jan Merrill-Oldham and Jutta Reed-Scott's ARL SPEC Kit #242, *Library Storage Facilities, Management, and Services,* surveyed fifty-eight ARL member libraries to compile information about building design, environmental conditions, fiscal and personnel management, materials handling, and document delivery (Merrill-Oldham and Reed-Scott 1999). This survey reveals the severity of the space problem and confirms that the majority of ARL libraries use secondary storage facilities to house collections. These remote storage facilities have also presented other opportunities, such as providing climate-controlled storage and housing collections at a cost savings. For example, the State Library at Queensland designed and constructed two cold storage vaults located in close proximity to the library in the parking lot to house a portion of the photographic collection. The design of these vaults includes strict environmental conditions, security, and appropriate shelving and storage furniture to prevent further deterioration of film-based collections (Egunnike 2001).

Remote library storage is further discussed in the literature and touches upon the logistics of incorporating this facility into the overall institution while maintaining easy access to the collection. Two examples of such facilities are the Five-College Library Depository in Massachusetts and the Preservation and Access Service Center for Colorado Academic Libraries (PASCAL). The Five-College Library Depository consists of five colleges (Amherst College, Hampshire College, Mount Holyoke College, Smith College, and the University of Massachusetts at Amherst) that have agreed to create a shared library in a centralized location. Assuming joint responsibility of a combined collection created through the deaccession of duplicates, these five institutions reap the benefits of cost savings, better environmental conditions for materials, and increased security (Bridegam 2001).

Following the Harvard model, institutions in Colorado also participate in a joint effort to acquire and maintain a high-density remote storage facility (Fry 2000). Similar to the Five-College Library Depository, PASCAL experiences the challenges in shared ownership and managing the logistics of operating an off-site storage facility, while maintaining quality service for their patrons. Interestingly, remote storage is not only seen as an answer to the space predicament, but is also viewed in the literature as an option to preserve cultural artifacts and an opportunity to create last copy depositories for both print and electronic publications (Kisling, Haas, and Cenzer 2000).

Nicholson Baker recommends that the Library of Congress (or another entity designated by Congress) create an off-site depository to accommodate everything that is sent to it by publishers (Baker 2001). It is not possible for one entity alone to shoulder so great a responsibility, because the resources and funding needed to operate such a facility are colossal and almost impossible to secure. CLIR's Task Force on the Artifact in Library Collections advocates the creation of regional repositories to jointly preserve artifactual collections, which is a more realistic solution. In addition, this task force proposes that an American imprint repository be fashioned at the national level to ensure that at least one copy of copyrighted material will endure (Nichols and Smith 2001). The evidence of research and development, collaborative efforts to investigate and preserve cultural artifacts, and planning for the storage of these objects presented in the literature demonstrates the value and dedication of the profession to ensure that these materials will endure.

Mass Deacidification

The preservation field is making strides in developing standards and implementing codified best practices. The emergence of standards represents ongoing discussions, debates, and communications among practitioners in the library and archival fields to address universal concerns. Traditional preservation topics such as physical treatment and binding continue to flourish in the literature as well as the standards that are developed to support these endeavors. Preservation managers explore mass deacidification projects and are

attempting to incorporate mass deacidification into the overall preservation program. Worthy of mentioning, the literature shows that deacidification is usually conducted in tandem with another preservation option such as commercial binding or reformatting. The literature discusses issues such as paper degradation, evaluation of the deacidification processes, selection, workflow, and quality control that contribute to designing best practices.

Penn State University Libraries combines commercial rebinding of monographs in the circulating collection with mass deacidification (Kellerman 1999), while Johns Hopkins University selects items that are considered to be at risk and deemed as possessing long-term research value for mass deacidification. These monographs are sent directly to the plant for mass deacidification, while the commercial binder routes acidic journals to the deacidification facility (Drewes, Smets, and Riley 2000). The Library of Congress conducted extensive testing on mass deacidification, endorsed the work of Preservation Technologies, L.P. (PTLP) in Cranberry, Pennsylvania, and continues to work with PTLP to improve the Bookkeeper mass deacidification system. In addition to researching the Bookkeeper system, LC devised selection criteria and procedures for preparing selected materials for shipment (Harris 2000).

Robert Strauss discusses the role of deacidification within a preservation program by indicating that mass deacidification should not necessarily replace but should complement other preservation activities (2000). Combining various techniques such as commercial rebinding and/or reformatting with deacidification highlights the importance of preservation and access to materials and at the same time utilizes resources efficiently. Deacidification presents a less expensive alternative to creating a preservation facsimile and microfilm and has the potential for cooperative resource sharing (Drewes, Smets, and Riley 2000). These articles demonstrate that research on deacidification transformed from evaluating and perfecting deacidification technologies to establishing policies and procedures to implement a mass deacidification program and expand it to include reformatting, binding, and planning for collaborative efforts.

Physical Treatment and Commercial Binding

The preservation field is persistent in introducing innovative techniques and procedures in the literature. Hingley conducted research to determine if conservators were utilizing suction tables to treat parchment and further discussed the specifications used for purchasing a suction table, treatment processes, and the conclusions drawn from this research (Hingley 2001). In addition, paper splitting is developing as a preservation option for embrittled paper. Although paper splitting dates back to the nineteenth century, new technology and equipment demand a reexamination and consideration of this process (Smith 2000). Kerstin Forstmeyer researches the topic of minimal conservation intervention to reaffirm "the most extensive retention of the original substance" (72). This case study explored the restoration practices and techniques conducted on a manuscript containing the *Estate Register Accounts Book* (Forstmeyer 2001).

Moving away from single-item treatment is the management aspect of rare book conservation. Pauline Kamel discusses various options available in treating rare books, how to select a conservator, and the importance of establishing priorities (Kamel 1999). In addition, the development of the ANSI/NISO Standard, *Guidelines for Information about Preservation Products,* encourages vendors to use accurate and consistent language and suggested data elements when describing all products (National Information Standards Organization 2000a). As a result of this standard, librarians, conservators, and archivists can better evaluate and review preservation products and communicate to the vendor the most appropriate product to suit their needs.

Complementing the articles on or about physical treatment are those articles that focus on binding. Standards benefit the field because they are reviewed and maintained regularly in an ever-changing environment. The ANSI/NISO/LBI Z39.78-2000 standard, *Library Binding,* was recently revised and put into effect in 2000 and will again be reviewed in 2005. The most recent version of the standard incorporates allowances for flat-backed text blocks, recognizing that this process may be less expensive than rounding and backing (National Information Standards Organization 2000b). This standard provides guidelines for a very effective preservation treatment by providing a glossary of terms and specifications for the technical processing and materials used in binding. These specifications allow binders and institutions to negotiate a mutually beneficial and understood binding contract to ensure that all parties involved are familiar with the binding process and vocabulary. There is a series of articles that examine different types of bindings or attributes of these bindings and another category that investigates the managerial aspect of a binding program and the binding program itself. Werner Rebsamen authored several articles on binding aspects that are featured in *New Library Scene.* The comparison of edition bindings to library bindings leads to the conclusion that the quality of edition bindings has decreased steadily and does not measure up to the quality of library binding (Rebsamen 2001a).

The literature also discusses other styles of binding such as pamphlet binding. Shannon Zachary's article provides guidelines in selecting items to bind, the type of supplies and equipment that are necessary in pamphlet binding, and workflow (2000). New challenges that will

make an impact upon library binding programs and practices appear in preservation literature. For instance, the question of binding and maintaining paper journals while investing in electronic versions of these periodicals is continually being evaluated (Anderson 1999). The fate of library binderies is brought to question as binderies are disappearing from the scene. George Cooke argues that library binders serve as resources to extend the life of collections and offer services for circulating and rare books and preservation photocopy reformatting (1999). Reiterating that hand bookbinding is not a dying art, Werner Rebsamen discusses the history of the bookbinding craft and talks about the successful program "Bookbinding 2000," an event that honored Bernard C. Middleton (Rebsamen 2001b). These articles on physical treatment and bindings solidify the dedication to conservation and preservation by examining challenges that face the field, investigating best practices, and revisiting traditional techniques that can be improved upon to ensure proper preservation and the best use of resources.

Contingency Planning, Environmental Control, and Integrated Pest Management

Literature about contingency planning, environmental control, and integrated pest management further demonstrates support for traditional preservation programming. This category of literature appeals to a varied audience with different specializations since the periodicals in which they are featured represent management, archives, and public, academic, and research institutions. These articles are proactive and reactive in nature, not only illustrating preservation awareness, but also proving that experience, trial and error, and mistakes serve as a strong reminder about the importance of careful planning. Some of the literature is didactic and provides instructions for disaster prevention and planning that can be instituted at a home institution. Kim Kane discusses how the San Diego County Public Law Library wrote a disaster plan shortly after attending a workshop on disaster preparedness and gives pointers and tips on how to go about creating a disaster plan (2001). Page offers a very in-depth look at disaster planning by reminding readers that disaster prevention and preparedness is a role for all library staff, providing resources to assist in initiating or revising disaster planning, and discusses lessons that had been learned through disasters (1999).

However, some authors share what they have learned through their disaster experiences in the literature in hopes that other institutions can build upon their knowledge for an expedient recovery. Mary Reinerston-Sand describes how archival training enabled her to salvage irreplaceable personal memorabilia during a flood in 1997. She provides details of the salvage operation and discusses what was learned from this experience, as well as emphasizing the importance of creating back-up photocopies of important papers and storing them off-site (Reinertson-Sand 1999). The Colorado State University Libraries survived a water disaster in 1997 when heavy storms smashed a hole in the basement and saturated the collections. The recovery effort continues today, and even though the university maintained a disaster plan, they admittedly were not prepared for an emergency situation of this caliber (Lunde 1999). Following the disaster, offers to help through gifts in kind, monetary contributions, and services overcame the university. The university is replacing the materials and rebuilding the collections with gifts in kind instead of attempting to restore damaged materials (Johnson 1999). Other examples include the National Library of Australia barely escaping a fire in March 1985, which inflicted smoke damage to the building and collections and water damage to the collections. Throughout the salvage and recovery efforts, the library realized that it was unprepared to deal with such an emergency, and it established a disaster-planning committee to create a plan and a register of collection priorities of nationally significant materials and to continue to review and update the plan based on what was learned during subsequent disasters (Preiss 1999).

War and terrorism devastate libraries and archives. Disaster planning quickly changed in the United States when the terrorist attacks on September 11, 2001, destroyed special libraries operating in the World Trade Center (WTC) in New York City. DiMattia emphasizes the need for a contingency plan that incorporates flexibility, teamwork, duplication of data, and networking (2001). Such a catastrophic event reinforces the necessity of contingency planning to respond and salvage collections; however, the terrorist attacks rendered an inconceivable emergency a reality. As a result, institutions are revising their plans to address terrorism. Shortly after September 11, several high profile institutions such as Los Angeles's central library, Las Vegas/Clark County Library, and Boston Public Library heightened security measures and now conduct bag inspections, monitor entrances and exits, and increased the presence of security officers. These institutions are working collaboratively with agencies located within close proximity to coordinate evacuation plans (Kenney 2001).

Other institutions are still recovering from the spoils of war and terrorist acts. A conference in Sarajevo presented a model encouraging improved relations among Bosnians, Croats, and Serbs, and offered educational programming such as workshops in conservation and restoration and courses in disaster management (Mader 2001). The International Committee of the Blue Shield continues to develop initiatives to protect endangered cultural heritage from armed conflict by prioritizing records and creating

finding aids, conducting risk assessments, establishing evacuation procedures, and examining the characteristics of the building (MacKenzie 2000).

A key component in disaster response is working to stabilize the environmental conditions in an institution. Providing a suitable environment for collections proves extremely difficult, but is the most effective method in preventing mold outbreaks and pest infestations, and it impedes the chemical deterioration processes in books, paper, and film-based media. The Heritage Collections Council, Department of Communications, and Information Technology and the Arts are investigating the use of passive environmental conditions for small cultural institutions across Australia. Pearson and King recognize that not all institutions have the means or resources to effectively control environmental conditions, and provide creative ways of dealing with these challenges (2000). Environmental conditions permeate throughout all aspects of collecting and preserving, and making collections available for research and exhibitions is no exception. The ANSI/NISO Z39.79-2001 standard, *Environmental Conditions for Exhibiting Library and Archival Materials,* describes how to create the optimal environment for exhibits. The standard takes into consideration the type of materials exhibited, localization of climate and environment, technologies determining or impacting the environment, compromises for human comfort levels, limitations of exhibit space, and financial considerations (National Information Standards Organization 2001a).

Articles articulating the problem of mold and abatement techniques provide ammunition for institutions that will face this serious problem in the future. Mold infestation has plagued North Carolina, Arkansas, and Queensland, Australia, over the course of the past few years. Each author discussed the conditions that are favorable for mold; Eastern Carolina University and Arkansas achieved this environment when their heating, ventilation, and air conditioning (HVAC) systems went awry, while Australia experienced leaking around the library balcony windows. East Carolina University's Joyner Library hired a temporary team to clean each book with HEPA vacuums and dry sponges to remove the mold and cleaned the shelving units with a Lysol/water solution (Smith 1999). Arkansas State University followed a similar plan of attack in mold remediation, the only difference being that the university's housekeeping crew worked alongside library staff and teaching faculty executing the cleanup effort (Moore 1999). The Australian Institute of Marine Science in Queensland retained the services of a Brisbane-based company, Moisture Control Services, to rid the collection of mold with a chemical spray solution after unsuccessful attempts to eradicate the mold internally (Temby 2001).

Each author stresses the importance of monitoring environmental conditions to prevent any further outbreak of mold. In addition, pest infestations occur when environmental control is disrupted and also serve as an indicator that there is a problem with the climactic conditions. The Main Library of the University of the South Pacific in Suva, Fiji, and the Marciana National Library in Italy both implemented preventive pest control programs as a result of infestations. The University of the South Pacific required mass fumigation of larvae in the general collection. The library considered both chemical and nonchemical techniques, but the severity of the infestation dictated the use of methyl bromide gas to sterilize the materials (Fong 2001). The Marciana National Library experienced an infestation of woodworms and employed anoxic fumigation to kill the pests by removing oxygen from their environment (Plebani 1999). R. E. Child also emphasizes integrated pest management as a preventive tool to eliminate conditions that are favorable to pests, including good building design, housekeeping policies, environmental control, and careful monitoring (Child 1999).

Unique Formats

Institutions endeavor to maintain core preservation programs while expanding to include unique formats and services. Articles point out that preservation decisions are often made by either format or content. Furthermore, the literature narrates the emergence of new formats that require specialized preservation attention, and raises awareness of the challenges they pose. As in the case of the articles on physical treatment, these articles serve to broaden the knowledge base and promote information sharing. For example, the collection of visual ephemera is introduced and defined, and the conservation issues are discussed (Slate 2001), while access to three-dimensional collections is limited because of the fragile nature of these materials. The Web offers possibilities of expanding access to these collections, while protecting the original item from harm (Jarrell 1999). Architectural plans and film preservation continue to deteriorate and present challenges to collection institutions. The University of Dundee, Scotland, conducted a survey to address the conservation of architectural plans (Tait and Sterlini 1999), and discussed strategies for film preservation (Poole 1999). Impermanence and degradation of original formats often yield content- and information-driven projects. For example, McGlamery and Read discuss the latest computer technologies, such as digitization and print-on-demand equipment, which are utilized to preserve the informational content of maps (McGlamery 2000; Read 1999). The articles evaluate the nature of the information contained in maps and their use patterns in designing the most appropriate solutions. Other project-oriented articles dealing

with unusual formats include preserving oral history from audiocassette to digital archive (Hall 2000) and preserving the local history of an African American community on CD-ROM (Johnston 1999). Sophia Jordan observed that, "Preservation librarians have not been particularly adept at dealing with the preservation issues associated with non-book formats that populate our libraries" (2000, 7). Unfortunately, this trend does not appear to have changed, as the amount of literature pertaining to these formats is sparse, and more research is necessary to grapple with these issues.

Preservation Reformatting

Literature on or about preservation reformatting manifests itself in different ways, such as evaluating current reformatting procedures, surveys and assessments of materials already reformatted, overview of reformatting programs at various institutions, successes and challenges of specific projects, and migrating from an analog to a digital format for preservation purposes. As in the case of environmental control and contingency planning, experience is a valuable teacher. Most attention is given to microfilming as a reformatting option. Berger and Cybulski discuss project management, trends in reformatting, financial issues, and the quality assurance of reformatting projects (Cybulski 1999). Lane and Gudz provide an overview of reformatting showing an evolution from microfilming and photocopying to also include scanning and digitizing (Lane and Gudz 2000). Assessments of Yale's negative microfilm collection (Walls 2000) and the University of Kentucky's newspaper negatives (Teper 2001) provided examples of different assessment and survey techniques, and resulted in discoveries that include the need for improved bibliographic control, improved environmental conditions, continuation of polysulfide treatment for polyester-based film, a system of assigning reel numbers, different storage and arrangement techniques of film, and delegation of the film collection to a subject specialist or other librarian. These articles provide models for explaining different methods of conducting a survey and assessment of microform collections, the type of data that can be excluded from such studies, and conclusions and recommendations that can be surmised and shared within the profession. Reports documented the procedures, challenges, and successes of several microfilming projects that were undertaken (Johnson and Walter 2000; Bernthal and Walter 2000; Perushek and Smith 1999; Stoker 1999). Microfilm is deemed to be the most enduring preservation medium, lasting five hundred years with proper storage and handling. The ANSI/NISO Z39.62-2000 Standard, *Eye-Legible Information on Microfilm Leaders and Trailers and on Containers of Processed Microfilm on Open Reels* (National Information Standards Organization 2001b) provides useful instruction on the essential data necessary for identification, filing, and retrieval of information on microfilm. This standard helps to provide a foundation for preservation microfilming to enhance collaborative microfilming projects, define terminology and create a common language for institutions and vendors to share, facilitate resource sharing, and instill confidence that research materials are being preserved in a responsible manner for the long term. Reformatting technologies, such as the creation of preservation facsimiles and microforms, address the preservation aspects of deteriorating materials and pave the way to incorporating digitization as a preservation tool.

Educational Endeavors

As technologies revolutionize preservation programs and services, the need for collaboration among professionals will be more important than ever to ensure that limited resources can sustain new formats while maintaining traditional preservation programming. Cooperation between the interested parties within a given institution will guarantee that preservation is integrated throughout the archive and library systems. Because ignorance is a huge culprit in damaging library and archival collections, educational programming will foster learning and a sense of involvement by staff across the entire system. Some articles provide guidelines on how to conduct an educational program and others explain how preservation is a role and responsibility that every institution and employee should participate in (Henderson 2000; Schobernd 1999). Methods for assessment and evaluation are required to ensure that preservation education and programs are addressing the preservation needs of an institution (Eden et al. 1999; Wiseman and Darby 2001). The literature also shows that preservation schemes are derived from specific areas such as collection development. Preservation factors into decisions made by subject specialists regarding selection, acquisition, and budgeting (Gehret 1999). In addition, deterioration by subject category serves as an impetus in designing collection surveys and strategies (Wishard and Musser 1999; Schaffner and Baird 1999).

Digital Technology and Preservation

The literature also demonstrates that preservation professionals are attempting to bridge the gap between a scholar's desire for immediate and long-term access and the creation of current strategies designed to address these preservation challenges. The number of articles written about digital technology is staggering, and this review of literature pres-

ents only a sampling of the information available. Articles that focus on the digital world seem to follow a number of patterns including an overview of the benefits and drawbacks of digitization for preservation, case studies and reports on digital projects, and technical issues concerning the infrastructure of digital documents. It is interesting to note that these articles are featured in a broad corpus of library and archival sources. The potential and merits of digital technology are weighed against the challenges and limiting factors inherent in the technology, and the misconception that digitization is preservation is clarified.

These issues are evaluated and discussed in a variety of articles including: A. Smith (1999a and 1999b), Tennant (1999), and Larsen (1999). Digitization alone is not considered a preservation option because life expectancy, technological obsolescence, and longevity come into question (Gertz 2000). Furthermore, it is not possible to verify the authenticity of a digitized item (A. Smith 1999b). Both Gertz and Smith agree that digitization enhances access and research and exceeds traditional preservation reformatting tools. Digitization is often coupled with other preservation techniques. For example, Helsinki University combines the digitization of the newspaper collection with preservation microfilm (Bremer-Laamanen 2001).

As the library and archival communities continue to digitize materials for increased access on the Web, there is the hope that someday digitization will, in turn, constitute preservation. Projects employing digital technology are discussed in a multitude of articles. There is a shift in the responsibility of archiving as publishers and agents play a more prominent role in archiving electronic texts. Libraries and archives will not be able to justify the dual expense of retaining both paper and electronic journals, and discover that they are relying more on publishers to fulfill this role (Flecker 2001). There are several articles that pertain to electronic journal archiving. William Y. Arms explores the level of preservation required to sustain the Association for Computing Machinery (ACM) Digital Library, the *Internet RFC Series*, and *D-Lib Magazine,* and considers whether the publisher should serve as an archivist and take responsibility to refresh and migrate the information (Arms 2000). The *Canadian Architect and Builder* project aspires to provide online access to the full text and contribute this work to the Journal Storage (JSTOR) project. The article focuses on the preparation and scanning procedures utilized in this project and the problems that were encountered (M. Berger 1999). In addition, the National Library of Australia, in cooperation with the State Libraries of Australia, is also attempting to create an online archive of Australian publications in the PANDORA Project (Law 2001). The Royal Library of Sweden is following suit in creating a digital archive, which extends its collection policy to include electronic publications in Sweden. The library is devising strategies to take snapshots of the Web several times a year (Arvidson 2001). Digital archiving also presents other unprecedented challenges to information professionals. For instance, institutions that serve as a legal depository of records may have to incorporate digital publications into their collection and retention policies. However, this policy does not guarantee the long-term preservation of these digital archives (Muir 2001). Bearing responsibility for sustaining a digital archive is an expensive venture plagued with refreshing and migrating issues. Although publishers are currently taking a part in this role, cooperative planning and resource sharing are necessary to develop standards and successfully retain these records in the future.

Although solutions to the long-term preservation of electronic journals and other digital formats are in the offing, formats that have the greatest chance of long-term survival are a continued theme in the literature. Jeff Rothenberg dissected the issues concerning long-term preservation of digital technology and recommends the emulation strategy as the most viable solution compared to reliance on hard copies, standards, computer museums, and migration (1999). Paul Wheatley's view on migration and emulation differs from Rothenberg in his belief that both strategies will be incorporated into preserving digital materials for the long term. Emulation will serve a greater purpose to preserve complex objects incorporating software, while migration will be reserved for more simple data objects (Wheatley 2001). Rothenberg views migration as too unpredictable and complicated upon discovering errors and loss or corruption of data (1999).

Institutions that place a great emphasis on preservation are engaging in digitization projects. Given their skill and experience in evaluating and implementing reformatting projects, they bring extensive knowledge from which to foster the development of new standards for the digital age. In harmony with preservation efforts, digitization projects have sharpened the focus on some of the preservation issues facing libraries and archives today. Several case studies and projects contribute to the knowledge base of preservation and digitization (Lossau and Liebetruth 2000; Wheatley 2001; M. Berger 1999).

Conclusion

The literature written on preservation shows that the field has constantly been advancing and evolving best practices to include unique formats while maintaining traditional preservation. On the threshold of a revolution, Abby Smith (1999c, 1) comments that "wide dissemination of digital surrogates has created fresh demand for use of primary sources in their original media." Much of the preservation literature testifies to the importance of the original artifact and demands that

collaborative efforts will yield fruitful strategies. This development promises exciting possibilities in obtaining long-term preservation and enhanced access to collections.

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Maximizing Metadata
Exploring the EAD-MARC Relationship

Katherine M. Wisser and Jennifer O'Brien Roper

Encoded Archival Description (EAD) has provided a new way to approach manuscript and archival collection representation. A review of previous representational practices and problems highlights the benefits of using EAD. This new approach should be considered a partner rather than an adversary in the access-providing process. Technological capabilities now allow for multiple metadata schemas to be employed in the creation of the finding aid. Crosswalks allow for MARC records to be generated from the detailed encoding of an EAD finding aid. In the process of creating these crosswalks and detailed encoding, EAD has generated more changes in traditional processes and procedures than originally imagined. The North Carolina State University (NCSU) Libraries sought to test the process of crosswalking EAD to MARC, investigating how this process used technology as well as changed physical procedures. By creating a complex and in-depth EAD template for finding aids, with accompanying related encoding analogs embedded within the element structure, MARC records were generated that required minor editing and revision for inclusion in the NCSU Libraries OPAC. The creation of this bridge between EAD and MARC has stimulated theoretical discussions about the role of collaboration, technology, and expertise in the ongoing struggle to maximize access to our collections. While this study is a only a first attempt at harnessing this potential, a presentation of the tensions, struggles, and successes provides illumination to some of the larger issues facing special collections today.

The Association of Research Libraries' spotlight on special collections in "Building on Strength: Developing an ARL Agenda for Special Collections" has brought to the forefront many of the challenges and strengths that special collections have to offer to the research library setting (Association of Research Libraries 2001). The concern over access issues expressed in the Action Agenda highlights the need for a renewed focus with a realistic understanding of the process and the expenditure of resources. The agenda has confirmed a long-standing consensus among curators and archivists that access is a primary goal in the archival endeavor.

In the past, archivists have largely been left to their own creative devices in communicating the contents of their collections to the public. To facilitate access, they created card catalogs, inventories, registers, indexes of various types, calendars, file plans, and the ubiquitous, nebulous "finding aid." Print catalogs made it possible to advertise beyond the confines of the repository, but this was spotty exposure at best. Repositories needed to work steadily to expose potential researchers to the location, content, and contextual information of collections.

Online catalogs provided one ray of hope for repositories. Repositories could create collection-level representations of their holdings to entice patrons to their doors. This served two purposes. First, patrons using an online catalog to

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research a topic would be directed to the special collections material because of its relevance, when they previously may not have considered archival or manuscript materials as germane to their research. Second, with the advent of the Web and the suspension of geographical and temporal limitations, distant patrons could find the manuscript or archival material that they sought. Electronic union databases aided in this effort, but patrons needed to know that those databases existed and how to search them.

Catalog records, though, make poor substitutes for the traditionally rich descriptive documents that archivists create to represent their collections. The limitations of MARC, including field- and record-character limitations in some integrated library systems and a lack of hierarchical structure, mask the true intellectual work of arrangement and description done by archivists. MARC was created to make representations of items, while repositories wanted to describe collections of items. Soon archivists got the 'Web-bug' and started re-creating their finding aids in hypertext mark-up language (HTML) to present them to a wider audience. These representations were flat, though, and yielded only nonprecise searching capabilities.

It was not until 1995 that the seeds for Encoded Archival Description (EAD) really took root with an online finding aid project at Berkeley. At this point the creation of a metadata mark-up language became a marriage between archival theory and information technology. EAD was intended to supplement—not replace—existing representational structures. Throughout the evolution of information technology applications, including Gopher sites and HTML, the relationship between the online catalog record and the electronic finding aid was consistent (Encoded Archival Description Working Group 1999, 6). Technological advances allowed practitioners to refine that relationship while developing better representations at the same time.

North Carolina State University (NCSU) watched these developments with interest and decided to commit fully to EAD in 2001. In its implementation, the NCSU Libraries sought to define commonalities existing between metadata representations, to shape a workflow that would take full advantage of expertise, and to enhance productivity. With collection level MARC records affirmed as the local policy, staff felt it would be desirable to create a consistent crosswalk from EAD to MARC (Woodley 2000; St. Pierre and LaPlant 1998). In other words, an EAD template needed to be constructed in such a way that the information entered would be consistent with the requirements of a MARC record format. That process should include both the mapping of descriptive elements and the appropriate use of standards for content.

This paper focuses on two aspects of this project. It includes both the process we undertook and a discussion of lessons learned from that process. A detailed description of the methods used includes the collaboration of standards, the formation of a template, both the output to and input from the cataloger, and the examination of that data for effectiveness. The discussion section offers insight into the commonalities between descriptive metadata schemata and the methods of creating them, and the ways in which people from varying perspectives on a project can offer basic knowledge that will enhance each other's understanding of their own objectives. Coordinating two gateways of access to collections provides an arena for catalogers and archivists to learn from each other while streamlining eventual processes to the benefit of each metadata schema.

Process

To achieve both aims, members of the NCSU Libraries' Cataloging and Special Collections departments reviewed the collection-level information included in an EAD document in conjunction with standards for archival cataloging. These included *Archives, Personal Papers, and Manuscripts* (Hensen 1989) to understand the descriptive structure of manuscript cataloging standards and the MARC21 structure for manuscript and archives to find the commonalities between an EAD document and a cataloging record.

Based on these reviews, the departments constructed the template using the *relatedencoding* attribute for the <archdesc> element and strategically placing *encodinganalog* attributes throughout the <archdesc> section of the EAD instance. Figure 1 provides a snapshot of the <archdesc> section of an EAD finding aid using these attributes.

The values for the *encodinganalog* represent the corresponding MARC field for the data within that element. Table 1 presents a summary of the mapping between MARC fields (*encodinganalog* values) and elements from EAD. A complete table representation of USMARC to EAD crosswalking is available in the *Encoded Archival Description Application Guidelines,* Version 1.0 (Encoded Archival Description Working Group 1999, 240–42).

The formulation of the template was by far the most labor-intensive step of the crosswalk process. Once a standard template had been established, staff used NoteTab Pro's clip library capabilities to cloak the encoding of attributes. For instance, the technical support team member created scripts to apply the appropriate *source* and *encodinganalog* attributes and values automatically for the <controlaccess> section of the finding aid. The encoder selects which kind of index term is being entered (i.e., personal name, corporate name, subject, geographical place, or genre form), and the script places the appropriate attribute values in the element. For stable MARC fields, such as the 5xx fields, the clip pro-

gramming scripts are straightforward. For dynamic ones, such as the 1xx and 6xx fields, the programming is more complex, and the clips pose questions that provide the parameter for the element. The detailed programming throughout this process was achieved through the work of the information technology specialist within the department, and he remains available for necessary adjustments to the clips and template as the EAD implementation coordinator and special collections cataloger work on fine-tuning the process.

Generally, during the processing of collections and encoding of finding aids, the crosswalk is invisible to the archivist. Processors follow the template and are not required to have a full knowledge of the correlation between EAD and MARC. This allows the special collections processing staff to concentrate on the task of arranging and describing rather than trying to negotiate two metadata languages.

Once an EAD instance has been completed and parsed against the EAD document type definition, the instance is run through an Extensible Stylesheet Language for Tranformations (XSLT) that produces a .txt file that serves as the basis for the creation of the catalog record. That .txt file includes the MARC fields and the corresponding textual information, but does not include any EAD tags. The .txt file is an excerpt from the EAD instance for the information that both EAD and cataloging metadata structures share.

The mapping of the template at NCSU focused solely on the collection-level information in the finding aid. Because NCSU has few if any catalog records for its special collections materials, a policy decision to represent those materials at collection-level (at the outset) was made. The ease of mapping collection-level information also came into play. For more sophisticated crosswalking, series-level or item-level cataloging can be done. This would require a separate XSLT program that targeted specific areas of the EAD instance. As well, item-level descriptions are not common for collections, particularly at NCSU. In a crosswalk from item-level description from a finding aid, the cataloger would be provided with less information for the item (i.e., physical description information) and would be required to revisit the item itself. Archival description at NCSU is necessarily "top heavy," and therefore the collection-level description was considered most suitable for our access needs.

The cataloging process begins once the .txt file has been created. The .txt document contains the MARC field tags followed by the relevant information for that field. Thus, the majority of the work has been done and is provided for the cataloger to copy and paste into the appropriate fields in the MARC record. It is not necessary for the cataloger to spend time searching for the appropriate MARC fields in which to put information. Furthermore, the information provided is complete in terms of descriptive accuracy of the collection, including subject analysis.

```
<archdesc level="collection" langmaterial="eng" relatedencoding="MARC">
<did id="d_summary">
<head>Descriptive Summary</head>
<repository>
<corpname encodinganalog="710">North Carolina State University. Libraries. <subarea>Special
Collections Dept.</subarea></corpname>
</repository>
<origination label="Creator">
<persname encodinganalog="100">Brooke, A. Wayne</persname>
</origination>
<unittitle label="Title" encodinganalog="245">The A. Wayne Brooke Collection, <unitdate
type="inclusive">1948 - 1986</unitdate></unittitle>
<unitid label="Call Number" encodinganalog="090">MC 268</unitid>
<physdesc label="Extent">
<extent encodinganalog="300">3 archival boxes, </extent><extent>3.75 linear feet</extent>
</physdesc>
```

Figure 1. Excerpt from an EAD Document

Table 1. MARC Fields and EAD Elements

MARC Field	EAD element
1xx	<origination>[<persname>, <corpname>, <famname>]
245	<archdesc><did><unittitle>
710	<archdesc><did><repository><corpname>North Carolina State University. Library. Special Collections Dept.
090	<archdec><did><unitid>
300	<physdesc><extent>
520$a	<abstract>
506	<admininfo><accessrestrict>
530	<admininfo><altformavail>
541	<admininfo><aquinfo>
561	<admininfo><custodhist>
524	<admininfo><prefercite>
500	<admininfo><userestrict>
545$a	<bioghist>
351	<scopecontent><organization>
6xx	<controlaccess><list><item>[<subject>, <persname>, <corpname>, <famname> or <geogname>]
655	<physdesc><genreform>

This is not to say that the cataloger can simply copy and paste from the .txt file to the MARC record, create holdings, and be done. Although the bulk of the work may be completed, the devil is in the details, and it is the details to which the cataloger must pay close attention. First, while the .txt file does contain MARC field tags as well as most of the subfield tags, it does not provide fixed fields or indicator tags and lacks some subfields. Since the fixed fields and indicators are critical for user searching and accurate search limitation, the cataloger must consider the content of the record and accurately supply the missing data. This illustrates the need for an experienced cataloger to convert the .txt file to the MARC record, as these important details might be easily neglected or omitted by someone less familiar with MARC and its functionality. Figure 2 and figure 3 demonstrate the transition from the .txt file to the MARC record.

The second area of detail that the cataloger needs to verify is the accuracy of the access point forms. This applies equally to subject access and to personal and corporate

040 $a NRC $e appm $c NRC

090 $a MC 268

100 $a Brooke, A. Wayne

245 $a The A. Wayne Brooke Collection, $f 1948 - 1986 $h [manuscript]

300 $a 3 archival boxes, $a (3.75 linear feet)

351 $a The papers are divided into eight series with a bibliography appended. The Correspondence series consists of letters from two periods of A. Wayne Brooke's involvement with the Selective Sequence Electronic Calculator (SSEC). The first is during the period in which he worked on the SSEC, and the second was when he was preparing a manuscript detailing the importance of the SSEC to the history of computing. The Writings series contains a draft of the unpublished manuscript detailing the importance of the SSEC to the history of computing. The Research Notes series contains notes and charts that refer to documents in the Writings series. As

Figure 2. Excerpt from the .txt Document

Type: p Bib l: c Enc l: I Desc: a Ctry: ncu Lang: eng Mod: Srce: d
Form: Dat tp: i Dates: 1948 1986 Control:

040; ;a NRC $e appm $c NRC $
090; ;a MC 268 $
049; ;a NRCC $x JOR $
100; 1;a Brooke, A. Wayne $
245; 14;a The A. Wayne Brooke Collection, $f 1948-1986 $h [manuscript] $
300; ;a 3 $f archival boxes $a (3.75 $f linear ft.) $
351; ;a Organized into seven series: Correspondence, 1950-1986. Writings, 1952-1984. Research notes. Selective Sequence Electronic Calculator. History of computing. Organizations, 1950-1987. Miscellaneous. Walk East on Beacon ; $b Chiefly chronological arrangement. $

Figure 3. Excerpt from the MARC Record

name access. Depending upon the authority acumen of the EAD creator, names may appear in invalid or outdated forms, and the cataloger must catch these anomalies to ensure proper collocation in the catalog. The cataloger is also responsible for notifying the EAD coordinator when authority errors are encountered. Most of the authority errors identified at the NCSU Libraries during this process were the result of a one-time inaccuracy in the inputting of information into the style sheet, which was then used by various creators. Thus, timely recognition of authority errors by the cataloger can dramatically improve the quality of future .txt files.

Aside from occasionally editing biographical or historical notes when the system is unable to accept the information due to its length, the cataloger does not create and/or alter the information provided in the .txt file. Rather, it is more important that the cataloger be attuned to what information is *not* provided and appropriately fill in those gaps. This process allows the person most familiar with the source materials, the processor/EAD encoder, to provide the best descriptions and analysis possible, and the person most familiar with the MARC standard, the cataloger, to create the optimal access tool for the library's catalog.

The connection between the MARC record and the EAD instance is complete when the holdings record is created, including an 856 field pointing to the EAD-encoded finding aid. Just as EAD is not considered a sufficient replacement for MARC, the MARC record should serve as a gateway for the patron to retrieve further information about a collection. Direct access to the information-rich finding aid is one way to help patrons assess the suitability of a resource for an information need.

Discussion

Encoded Archival Description was created with the structure of the materials in mind. The goal of EAD is to describe the archival collection accurately and completely in accordance with archival theory and practice while taking full advantage of technological innovations. Archives and manuscript collections provide different challenges from secondary sources in terms of complexity and volume. Archivists add intellectual value to their collections by representing them in coherent levels of description to communicate the relationship between the materials. Records do not exist in isolation from one another. They are created by individuals or institutions; they are sources of communication—conversations between agents; they are the human record and are necessarily as complex as humans. In order to make the records of an individual or an institution accessible for researchers, archival theory addresses the inherent nature of the material and provides parameters for arrangement and description that illustrate that nature.

The MARC record, on the other hand, was created to automate cataloging done according to existing and accepted standards of bibliographic description. The information provided is intentionally straightforward and uniform in appearance. The value of the MARC record is not intrinsically in any one record, but rather in the compilation of many MARC records into one database. It is through the power of the catalog that users are able to discover and identify materials on their topic from among thousands of other library holdings.

A primary difference between the EAD and MARC standards is the conceptual level at which each metadata language exists. Archival description encompasses several different conceptual levels, whereas a bibliographic description (represented by a MARC record) exists on one level. The parallel between the two, which allows for the crosswalk application described above, is the collection-level description. The archival work done at the subcomponent level informs that collection-level description, which in turn informs the bibliographic description.

Because EAD and MARC standards are addressing different goals, they are not interchangeable. While both are

metadata schemata designed to create a surrogate for a variety of material, they do that task quite differently. The EAD finding aid creates a surrogate that is the equivalent of a model replica of the materials. The user can see the material as a whole, as well as get an in-depth glimpse into the structure and complexity of the material. Alternately, the MARC record provides the equivalent of a photograph of the material. The user can see the material as a whole, as well as a glimpse of the description, but the MARC record is flatter and less complex than the EAD surrogate. With archival material, the power and value of the MARC record lies in its ability to provide a serendipitous connection between users and materials via the catalog. The advantages of MARC cataloging include a more mature, robust standard and practitioners who understand the importance of the details necessary to fully exploit the MARC standard. Both metadata standards have strengths and weaknesses, but acting in concert, the combination of structures provides fuller access to special collections materials and a more comprehensive and intelligent depiction of the collections.

In order to benefit from the intimate knowledge a processor gains when arranging and describing a collection, a work pattern was established that allows information to flow from one level to another. To achieve this flow, archival processors work with the EAD implementation coordinator to assure that collection-level information input into the EAD document conforms with the MARC requirements output to the .txt file. The EAD coordinator and the cataloger balance the collection description, collaborating to serve the goals of each metadata structure.

In conjunction with this process of documents informing each other, the crosswalk process has given the practitioners a chance to learn from each other. In areas such as authority and controlled vocabularies, the cataloging processes have informed the EAD encoding and the implementation of consistency across departmental finding aids. In creating MARC records for collections, the encoding has helped catalogers better understand the structure of archival description and the nature of manuscript and archival materials.

The issue of authority is an excellent example of how this process requires interaction between the standards and the practitioners, not just simple translation of encoding standards. In NCSU's implementation, the departments encountered problems with the mapping of the <repository> tag to the 710 field for the NCSU Libraries' Special Collections Department name. While the form used in EAD was part of the template, the catalogers consistently had to change it to the authoritative form of name to ensure consistent collocation in the catalog. After several instances of discovering that the .txt file had yielded a nonauthority form, the cataloger approached the EAD coordinator to discuss the issue. Through this consultation process, the cataloger learned that the EAD process is not driven by uniformity. The EAD coordinator was able to discern how important the authoritative form was to the cataloging record and worked to integrate some of the MARC-driven uniformity into the EAD template.

On a conceptual scale, the issue of authority control provided even more opportunity to exchange expertise. Archival description does not require authoritative forms, but it can benefit from their use. Users should not have to use multiple variations in terminology to search for the same concept (person, place, subject, etc.), and authoritative forms can strengthen links between disparate collections. In particular, the use of the Library of Congress Name Authority File has taught both the EAD coordinator and the cataloger something about each other's task. Manuscript materials are collected from a variety of institutions and persons, not all of whom have recognized authoritative forms. Recognizing the need for an authoritative form of name and providing information to create the authority record allow each person to "trade places" with the other and appreciate the expertise that each brings.

In addition, the source of authority forms became an important issue. From an administrative standpoint, the EAD coordinator needs to supply the source of the controlled vocabulary and to communicate that source to the cataloger in order to assure that vocabularies were being used consistently. The addition of a *source* attribute for <controlaccess>, where multiple vocabularies were used, provided this framework.

The cataloging procedure just described is in an early phase of development. With full knowledge that it is possible for the process to be more fully automated, this initial procedure served as a pilot to determine if the implementation would succeed. In an upgraded iteration of this process, the MARC record will be directly imported into the integrated library system. This should further expedite the mechanical process and allow the cataloger to focus more intensively on the cataloging details.

Conclusion

When the MARC standard was introduced, it was in itself an innovative idea. Two decades before the Internet explosion, the concept of digitizing information previously only available in print was revolutionary. By the time Encoded Archival Description was created, digitization of information was the norm, not the exception. The implementation of EAD is not as simple as encode-and-go, though. Metadata standards do not exist in isolation, and practitioners benefit from an investigation of these standards' commonalities.

In a world of cut-and-paste and application toggling, both physical and mental processes have changed. The

collaborative process has become increasingly important in terms of maximizing expertise and workflow and creating a congruence of standards and objectives. When the NCSU Libraries sought to implement EAD, it was seen as an opportunity for cooperation and partnership between two types of metadata (EAD and MARC) and two types of library professionals (archivists and catalogers).

Some may view this workflow as eliminating the cataloger from the process of defining the content of the record. This is true to a certain extent, but this process aims to prevent the duplication of effort. Since the collection has already been described for one type of discovery tool, the cataloger is able to use this information and concentrate on refining the resultant MARC record. At the same time, the information generated during the processing and encoding of a collection provides detailed collection representation and ample information from which a catalog record can be created. Other information is standardized and does not need the attention of either the EAD coordinator or the cataloger beyond its established format. A collaborative approach allows both EAD and MARC implementations to learn from each other, to develop along the same descriptive lines, and to create coherent representations of the department's holdings. Each effort allows the representation process to flow seamlessly between two standards and to enhance service to the user by building a more sophisticated gateway to the collections.

Future research on this project should include examining the effectiveness in real terms of multiple access points to collections. Does patron interest in our collections increase? Is that interest a direct result of the creation of multiple metadata representations of special collections materials within NCSU Libraries? Throughout the creation of this process, both the cataloger and metadata coordinator worked under that assumption that increased access would increase usage. Does that assumption bear true? Reflection on the effectiveness of increased metadata representation is one of the next great frontiers in information science research.

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