Safeguarding Collections at the Dawn of the 21st Century:

Describing Roles & Measuring Contemporary Preservation Activities in ARL Libraries

Prepared by:
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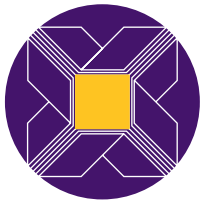
May 2009



Association of Research Libraries

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Preface

Preservation is a core function of the research library and a key element of both the stewardship and access missions of research organizations. The Association of Research Libraries affirmed this publicly as recently as August 2007 in the statement "Research Libraries' Enduring Responsibility for Preservation."

This report by ARL Visiting Program Officer, Lars Meyer, Emory University, reflects recent shifts in libraries' content management role but is also a response to a specific recommendation of the 2006 ARL Task Force on the Future of Preservation in ARL Libraries to gather data to provide a contemporary picture of preservation programs in ARL member libraries. As that group met with preservation librarians and developed a set of strategies for ARL to pursue, it became clear that ARL's preservation statistics gathering efforts were only able to capture a portion of the evolving preservation functions of member libraries and that a more comprehensive understanding of member's activities in support of preservation of collections was overdue.

Acting on the Task Force's recommendation, Meyer was invited to conduct a high level investigation of the range and balance of preservation activities represented among the ARL membership. He has undertaken a thoughtful and thorough qualitative examination of how preservation activities are evolving and expanding in the 21st century. He not only considered activities traditionally captured by ARL's preservation statistics, but also a host of emerging activities largely, but not exclusively, centered on developing digital collections.

At the dawn of the digital age, ARL member libraries confront a host of new opportunities and challenges as they transform both collections and services, and the preservation arena is not exempted. A research library's range of preservation activities now extends far beyond the traditional locus of activity, the preservation department. Within many research institutions, libraries are assuming new roles and working with other campus units to engage in a variety of activities aimed at enhancing the persistence of valuable digital content, often from the outset of its creation. In addition, collaborative strategies are emerging as libraries develop new means for ensuring preservation of content needed to support current and future research and scholarship. Third party preservation of the type provided by Portico for journal preservation is one example, but collaborative activities enhancing preservation are also developing within consortia or through other multi-library programs like LOCKSS and CLOCKSS.

As it turns out, this report also is being released at a time when new factors are emerging that are bound to affect the preservation environment. Among its many consequences, the pending settlement of the Google Book Search lawsuit is likely to spotlight several key issues with regard to long-term maintenance of print collections, the suitability of scanned surrogates of books for various library functions, and the preservation of digital files. A digital collection resulting from Google's scanning program won't be an adequate replacement for corresponding print collections; for research libraries, at least, there will continue to be many reasons for maintaining materials in print

form. However, when libraries can license access to a collection of millions of titles, new consideration will need to be given to a variety of specific decisions about titles and collections – both print and digital.

Resources for preservation activities have historically been scarce, but in the current economic climate of shrinking resource bases, investments in preservation activities, although no less necessary, need to be even more strategic. Continuing what has been done in the past will not be an option for all library activities that have an impact on the preservation function. This report should be useful for understanding the broad range of options research libraries have in making investments in activities to further preservation of high value resources in their collections.

Finally, this work will provide a basis for a follow-on project recommended by the Task Force on the Future of Preservation in ARL Libraries, the development of a new self-assessment tool to assist research libraries in developing efficient, balanced, and effective preservation programs that address the full extent of content they support. This report both characterizes the broadening aspects of specific preservation activities and makes many suggestions about where libraries should focus attention. These are immediately useful and also provide a basis for formalizing a framework and process for self-evaluation.

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Executive Summary

Preservation has long been considered a fundamental responsibility of research libraries. Data on preservation activities by its members has been collected by the Association of Research Libraries since 1987, but changing digital technologies and the research, teaching, and learning environments in which research libraries are engaged created a need to review and examine assumptions about the types of qualitative and quantitative data needed to characterize current and emerging preservation programs.

The report is organized around three themes: Preservation functions; Networked digital environment; Collaboration. Within each section, background and analysis are provided and recommendations for consideration by ARL are posed.

Changing Preservation Functions

Preservation cannot be considered the purview of a single department. The nature of materials collected and used changes the relationship between preservation units and the rest of the libraries. Libraries are frequently restructuring their organizations to meet the needs of their user communities. This report makes a number of recommendations regarding preservation roles and measuring the associated activities including:

- Organizational models for preservation are dependent on a library's roles and priorities and a strategic commitment to preservation is more important than a specific structure.
- Institutions need well-developed policies, strategies, and practices.
- Preservation decisions should be made strategically throughout the life-cycle stages of the resources acquired or created by the library.
- Well-articulated plans are critical for addressing fugitive digital or media-dependent content.
- Cost-benefit and risk analysis should be conducted as part of "green" environment campus initiatives.
- Conservation costs should be factored into increased use of special collections.
- Binding still serves a vital preservation function.
- Deacidification has potential for preserving printed works that cannot be digitized or preserved by other means.
- Staff education programs and disaster preparedness response plans are necessary for all sizes of libraries.
- Microfilm and preservation photocopies lend themselves to future digitization.
- Community agreed-upon practices are needed for preserving digital surrogates.

Networked Digital Environment

Libraries often operate in a distributed digital environment. Concerns about the availability and instability of digital content have raised awareness of the need for libraries to directly address the means by which it can be preserved. Recommendations include:

- Digital curation implies an active set of activities and will require partnerships on campuses or with external organizations.
- Preservation of born digital content requires an understanding of rights, technical infrastructure, and long-term staffing requirements.
- Digital repositories can extend the library's preservation activities to work with faculty regarding continuing access issues.
- Third-party strategies for preservation of e-journal content require new and different levels of investment and reallocation of funds.

Collaboration

Changing individual institutional functions and relationships and shared institutional interests suggest that increased cooperation is needed to tackle current and future preservation challenges. Many current preservation activities cannot be managed at the local level because of economic and technical concerns.

- Strong national leadership is required to coordinate collaborative strategies for cross-institutional activities.
- More information needs to be shared among libraries to reduce duplication of effort in digitization activities.
- Inter-institutional agreements are necessary to address web archiving needs.
- Action must be taken on the knowledge already gathered about shared print storage.
- Policies for digital storage are needed for retention, migration, "best" copies, etc.
- A deacidification clearinghouse should be developed to minimize duplication of effort.

Conclusion

A final set of recommendations suggest ways that ARL and others in the preservation community could move forward:

- Improved cooperation and collaboration both within and among institutions is necessary to bring attention to and resolve common issues for the community.
- ARL can encourage their members to share information about their current activities through the use of existing tools.
- Libraries should look to new ways to obtain expertise for preservation activities and use partnerships to extend their capacity.
- All ARL libraries should maintain a core set of preservation activities appropriate for their stewardship responsibility and institutional mission.
- The volatility of the content and technical environment requires staff to commit to continual learning.

Finally, specific recommendations to ARL's Statistics and Measurement Program are provided in Appendix B. They are offered as a means for furthering conversation within the ARL and preservation community. Categories of new data to collect, the level of data needed, and specific changes for current data and definitions are suggested. Of particular note is that it may be necessary only to indicate that an activity is undertaken, the level of specificity in many cases is not necessary to characterize preservation programs and activities in the aggregate.

Introduction

The analysis reported here is an outcome of the ARL Task Force on the Future of Preservation in ARL Libraries meeting held in 2006. Based on the discussion at that meeting the Task Force recommended that ARL conduct an investigation of the kinds of preservation activities being pursued or considered by ARL member libraries. ARL has gathered data on member libraries' preservation activities for several decades, but the goal of this study is to expand beyond those traditional bounds and address a fuller range of activities that advance the preservation of increasingly digital research collections. Thus, the findings in this report rely on additional sources of evidence including qualitative interviews conducted with preservation librarians and collection development librarians; an experts meeting to review initial findings from the qualitative interviews; and a review of recent literature.[1]

Based on these sources, this report summarizes the range of preservation activities pursued by ARL member libraries and provides recommendations about how libraries should characterize and measure those activities. Although a full palette of preservation activities is addressed, areas of emerging interest or concern for libraries are particularly highlighted. The recommendations in this report serve two purposes: (1) to inform the development of an ARL preservation self-study tool for libraries and (2) to offer suggestions to the ARL Statistics & Measurement Program for enhancing the ARL preservation statistics.

Several assumptions inform this report:

- Research libraries have been profoundly affected by digital technologies that influence user expectations and behavior;
- Libraries continue to balance the preservation needs of physical collections (chiefly paper and audio-visual) and digital content;
- Funds are insufficient to address all preservation needs in a research collection; and
- Collaboration and the creation of shared community resources and preservation strategies are essential, particularly for digital content.

Three perspectives drive the analyses presented:

1. Reshaping the preservation functions in research libraries

Libraries must reallocate priorities and resources in response to changing trends in publishing, research, and teaching activities. The relationships of staff in preservation departments to other library operations need to be re-examined

1 See Appendix A for a list of interviewees and meeting participants.

and new preservation functions must be supported. Cornerstone practices typically associated with book and paper collections continue to have a role, but a larger landscape must be tended.

2. The networked digital environment

ARL members need to expand their activities and deepen their practices related to preserving digital content though Web archiving, deployment of digital repositories, and efforts to preserve e-journals and other born digital content (whether purchased, licensed, or digitized by the library).

3. Library collaborative strategies

Community-level activities are crucial, both to address the challenges presented by digital formats, but also to make traditional preservation activities more effective. This is new territory, however, and more leadership or guidance from the library community is needed to address issues such as deacidification, digitization, Web archiving, and collaborative or cooperative storage.

One way of envisioning the current evolution of preservation activities is diagrammed in Figure 1. Activities to the left are well understood and tend to be managed locally, but need to be contextualized in terms of community-level preservation strategies to align the preservation efforts in any particular library to contribute to community efforts. Activities towards the right are less mature, more challenging to manage locally, and present the greatest opportunity for development and collaboration. These activities require the most learning and are often currently lacking effective community leadership.

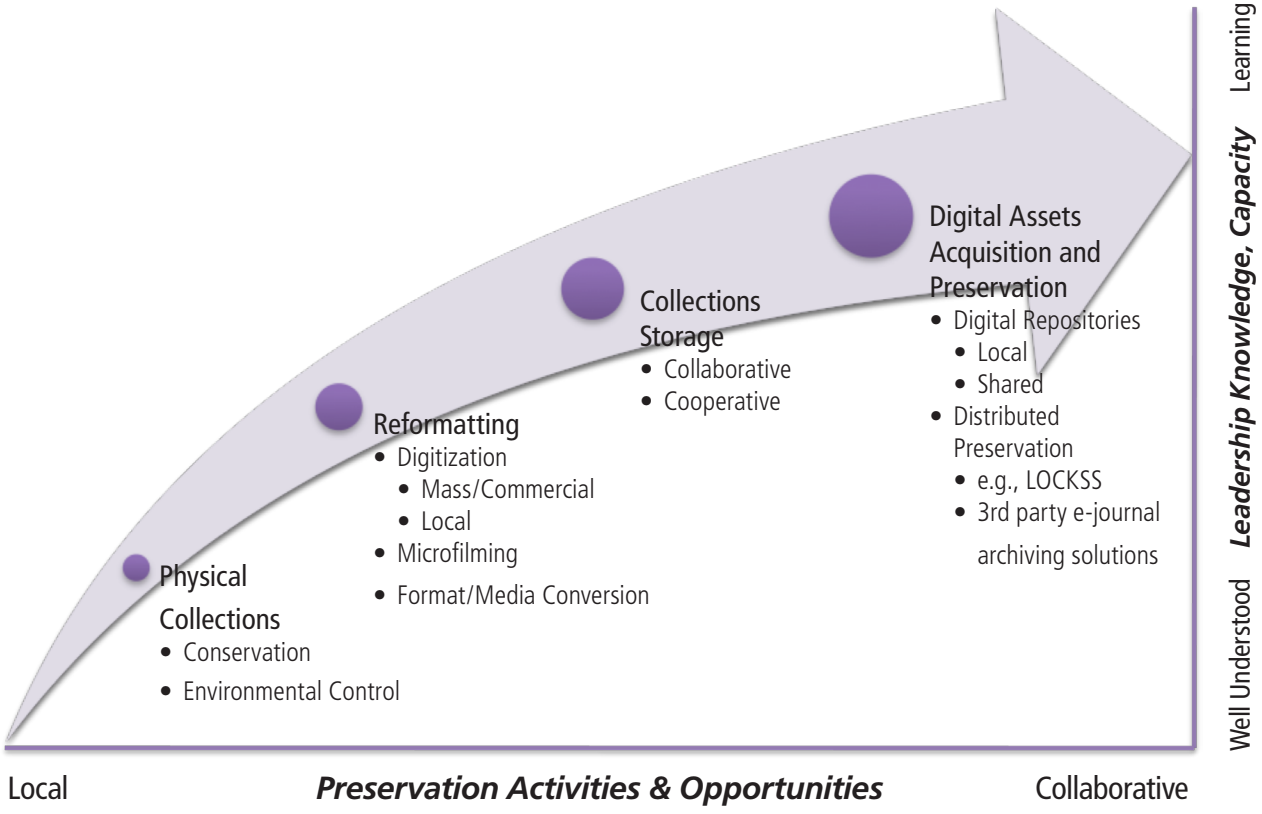

Figure 1. Preservation Activities & Opportunities

A Working Definition for Preservation

Preservation, broadly defined, encompasses the managerial and practical activities that libraries employ to stabilize, repair, or reformat collections materials. Some activities (e.g., conservation and reformatting) are directed at individual items while other activities (e.g., maintaining stable environmental conditions) benefit entire collections.

Most definitions of preservation are similar to the one included in the IFLA *Principles for the Preservation and Conservation of Library Materials*. It states that:

> Preservation includes all the managerial and financial considerations including storage and accommodation provisions, staffing levels, policies, techniques, and methods involved in preserving library and archive materials and the information contained in them.[2]

Nowadays, librarians, archivists, legislators, and the popular press frequently invoke the phrase "digital preservation" to describe activities such as harvesting Web content and preserving other born digital content as if they were philosophically different from other kinds of preservation activities. But the definition above applies to both books and bytes. Digital preservation is a subset of preservation.

Other terms used in this report include:

Reformatting, which includes activities such as digitization, microfilming, or photocopying.

Data Curation, as defined by the University of Illinois at Urbana-Champaign Graduate School of Information, "is the active and on-going management of data through its lifecycle of interest and usefulness to scholarship, science, and education. Data curation activities enable data discovery and retrieval, maintain its quality, add value, and provide for re-use over time. [It] includes authentication, archiving, management, preservation, retrieval, and representation."[3]

Digital Curation, is defined by the UK Digital Curation Centre as "… the actions needed to maintain digital research data and other digital materials over their entire life-cycle and over time for current and future generations of users. Implicit in this definition are the processes of digital archiving and preservation but it also includes all the processes

2 J. M. Dureau and D. W. G. Clements, *Principles for the Preservation and Conservation of Library Materials.* (The Hague: IFLA, 1986), p. 2.
3 See: http://www.lis.uiuc.edu/programs/ms/data_curation.html

needed for good data creation and management, and the capacity to add value to data to generate new sources of information and knowledge."[4]

A **Digital Asset Management System** is defined by the Society of American Archivists as the "[s]oftware to support the acquisition, description, tracking, discovery, retrieval, searching, and distribution of collections of digital objects."[5]

These definitions share the idea that preservation includes managing the relationship between content (information resources), context (the relationship of the content to other content), and access (how the content is used now and positioned for future re-use). Therefore, preservation, for the purposes of this report, includes all the activities related to stewardship of content, maintaining context, and ensuring continued access.

Preservation focuses on maintaining the relationship between…

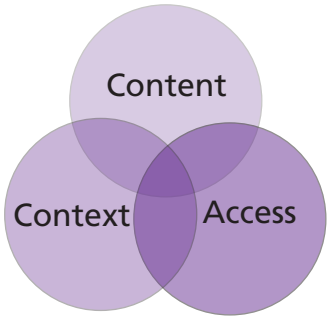

Figure 2. Preservation Foci

Each library will need to continually define its own preservation program, choosing which activities to pursue based on the nature of its collections, user needs, and the expectations of stakeholders, including not only university administrators and donors, but also other libraries or organizations with which the library shares common goals or formal agreements.

4 See: http://www.dcc.ac.uk/about/what/
5 "A Glossary of Archival and Records Terminology." Society of American Archivists. http://www.archivists.org/glossary/index.asp

Reshaping the Preservation Functions in Research Libraries

The changing nature of collections in research libraries raises questions about how to characterize an institutional role for preservation vis-à-vis digital library developments. Collection development and content acquisition have been affected by trends in commercial and scholarly publishing, such as publications appearing in multiple formats and editions simultaneously or only in digital form, as well as user expectations for access to digital content. In recent years, this has meant an increase in acquiring digital content, namely e-journal and database purchases and subscriptions. Libraries are also acquiring AV media, typically in the form of DVDs and audio CDs, due to their growing popularity in teaching and research. Digital content, whether bound to a particular media carrier or not, raises preservation questions and provides an opportunity to rethink the relationship between preservation and collection development.[6]

After all the heightened awareness, education, and more recent buzz about digital curation, there is a growing consensus among preservation and collection development librarians that within the preservation community too much time is still spent on discussions of analog vs. digital preservation. There is now little to gain from continuing discussions about the relative merits of emphasizing access over preservation, or vice versa, in a digital context. It is a *fait accompli* that preservation work sometimes involves creating digital surrogates and may also be concerned with maintaining access to digital resources. Sometimes this work is explicitly linked to a preservation unit within a library and sometimes it isn't.

A more pressing concern for the preservation community is whether appropriate or relevant preservation work is happening strategically throughout the life cycle stages of resources acquired or created by the library. Therefore, many preservation librarians are asking at what point preservation work should be undertaken (see figure 3).

6 As noted in *Transformational Times: An Environmental Scan Prepared for the ARL Strategic Plan Review Task Force*, the current economic situation will have a significant effect on library collecting (p. 7). In addition, collections are taking on new meaning (p. 16). What a collection is, what kinds of materials to collect, and how they will be collected will be an increasing focus of attention.

Figure 3. Simplified Resource Life Cycle Model

Typical questions include:

- Should paperbacks be bound upon Ingest (1)? Or, should they be bound at a Review stage (5), presuming they came to the attention of a reviewer because of damage?
- Should sound recordings and moving image materials be digitized at time of Ingest (1), given that they are particularly vulnerable to deterioration and technological obsolescence? Or, should libraries wait until a user is unable to Access (4) them in their current format?
- Which metadata guidelines or standards should be used in describing digital content to better facilitate preservation decisions? When should such metadata be created? At the time of first description (2) or at the time an item is reviewed and kept (5) or somewhere in between?
- Should metadata include information about the risk of loss for a particular resource? If so, should that metadata be created during Description (2) or later?
- To what benchmarks should items be conserved for present and future Access (4)?
- To what extent should we consider the number of copies in peer libraries when discarding print resources (5)?
- When is it necessary or worthwhile to retain original storage media and earlier manifestations of a digital object (3)?
- What role do circulating, general collections play when digital surrogates are, or are becoming, more easily available (1,3,4,5)?

To answer such questions, context matters. Institutional mission, available resources, expertise, and the nature of a particular resource all factor into the decision-making. In the absence of community standards, evaluating policies, strategies, and practices is an increasingly important element of preservation work.

Creating Digital Surrogates

To complement their investment in commercial digital content, libraries are exploring ways to create their own content through the digitization of historical paper collections and audio/visual resources. The preservation

community generally agrees that the result has been a shift of both staff and financial resources from conservation of analog media to digitization.

Many libraries proceeded in their early digitization efforts without a good understanding about the relationship between preservation, digitization, and access. The 2005 ARL report, "Recognizing Digitization as a Preservation Reformatting Method" countered a prevailing trend, frequently summed up in the phrase "digitization for access," by calling attention to standards, guidelines, and best practices in digitizing, as well as the need to develop strategies for the preservation of digital surrogates, lest all the effort to create them be wasted.[7] The report generated much controversy within the preservation community, but ultimately it raised awareness among library leaders about key issues related to digitization and preserving digital content.[8]

Nowadays, libraries can choose from among many widely accepted guidelines for creating digital surrogates of text, images, sound, and moving images.[9] At the same time, the ARL community has not yet established agreed upon practices for preserving these digital surrogates.

Collecting Web-Based Content

Collection and preservation work are inherently intertwined, as what is not collected cannot be preserved. While preservation work is evolving, collection development work is shifting as well, requiring new relationships to be formed between these key functions to support new library roles. For example, research libraries feel pressure to capture and preserve resources published on the Web if those materials support teaching and research. These kinds of materials range from the informal (e.g., blogs) to the formal (e.g., sponsored research reports) and cover a wide range of formats (sound, moving image, text, etc.), none of which are "fixed" in the sense that printed materials are.[10] Today, subject librarians, preservation librarians, and technologists all contribute expertise to selection of such born-digital content.

Some libraries have begun efforts to preserve Web content focused on particular subjects. For examples, see recent CNI, DLF, DigCCur, Imaging Science & Technology conference, and iPres program agendas for reports on specific projects. On a broader scale, the Library of Congress has launched several partnerships with libraries through its National Digital Information and Infrastructure Preservation Program (NDIIPP) to develop systems for collecting and preserving Web resources. Best practices and technologies are beginning to emerge from these activities, but these are still in a formative state.

7 In 2005, ARL published "Recognizing Digitization as a Preservation Reformatting Method" calling on ARL member institutions to adhere to standard best practices for digitization and to develop policies for the maintenance and preservation of digital products. See: http://www.arl.org/bm~doc/digi_preserv.pdf

8 ARL efforts were not unique. Cornell University contributed significantly to educating librarians through their digitization and digital preservation workshops and publications.

9 See, for example guidelines and best practices available from the Library of Congress (http://lcweb2.loc.gov/ammem/about/techIn.html); the National Archives (http://www.archives.gov/preservation/technical/guidelines.html), CLIR (http://www.clir.org/pubs/abstract/pub137abst.html), The Canadian Information Heritage Network (CHIN) (http://www.chin.gc.ca/English/Digital_Content/index.html). A thorough list with links to guidelines from around the world, see here: http://www.digitizationguidelines.gov/stillimages/resources.html. Also see http://hul.harvard.edu/ois/digproj/projguide_tab4.html for links to guidelines for all formats.

10 An example of roles that research libraries might take in preserving born digital primary sources was explored in the 2007 Center for Human Rights Documentation & Research conference, "Human Rights Archives and Documentation: Meeting the Needs of Research, Teaching, Advocacy, and Social Justice." http://www.columbia.edu/cu/lweb/indiv/humanrights//news_events/2007/conference/

Collecting Machine Dependent Media

Increasingly, materials are being collected whose informational content is known to be threatened by media deterioration, as well as the eventual obsolescence of playback equipment and software. For these reasons, many preservation librarians argue for evaluating and possibly even addressing preservation concerns at the time of acquisition for these materials, particularly magnetic media (e.g., videotape, audiotape, and datatape) and optical storage media (CDs, DVDs). But no consensus exists about when preservation interventions should begin if such materials are acquired by an institution. Possibilities include: at the time of ingest to the collection, at time of processing, or upon first attempted or failed use. Nor is there universal agreement about what needs to be preserved: the media, the content, or both?[11]

Institutions vary in the preservation options that are available and affordable to them and this naturally affects their strategy. Nonetheless, libraries that build historical collections should programmatically address the challenges and costs of preserving fugitive storage media, hardware, and software. Preservation assessment, action, or intentional deferment, should be documented by each library. Developing a plan to address fugitive digital or media-dependent content is as important as having a disaster response plan for print collections. To be sure, these activities are costly and therefore better addressed through collaborative efforts as well as development of better and more economical tools. Within a library, an acquisitions department might regularly alert preservation colleagues about the planned or completed purchase of fugitive materials. At the community level, libraries could signal to each other the intent to engage in expensive preservation work by using OCLC as they do in preservation microfilming efforts.

Traditional Core Preservation Activities

The activities typically associated with preservation staff and units are examined below. Preservation librarians in ARL libraries continue to believe that the following activities are still relevant for preserving research collections although some work in these areas may not be well documented by the current statistics survey. The brief examination of evolving work in the core preservation activities presented below is complemented with specific suggestions for better documenting these efforts in Appendix B.

Environmental Conditions and Housing

One of the most cost effective preservation strategies for print and media is maintaining environments where temperature and relative humidity fluctuate minimally from maintainable and practical set points. Although the effect of environments on collections is well documented, recent increases in energy costs and "green" initiatives are renewing debate about maintaining established parameters for temperature and relative humidity set points in general stacks.

Because the effects of suboptimal environmental conditions on library materials are well documented, research libraries should be cautious about enacting energy conservation measures without completely evaluating the costs, benefits, and risks of doing so, taking into consideration the particular nature of special and general collections holdings as well as remote storage collections that may house "last" or "best" copies.

11 The preservation of media carriers is, of course, a curatorial concern. In some contexts, it may make sense to preserve a VHS cassette or floppy disk because it has intrinsic value.

Physical Treatment (Conservation, Binding, Deacidification)

Conservation

General concerns with the preservation of cultural resources means that the conservation of books, manuscripts, and other artifacts continues to be an important activity for libraries.[12] Research libraries often cite rare and unique holdings as the resources that differentiate themselves from one another. In fact, there has been much activity towards making special collections materials more accessible to scholars, i.e., exposing "hidden" collections.[13] Many preservation librarians and special collection curators anticipate that such exposure will lead to increased need for stabilizing artifacts (particularly preceding digitization), repairs, exhibit preparation, and complex conservation treatments in preparation for, or in response to, increased use. Both preservation and special collections communities, however, share a concern about whether libraries have adequate capacity, in terms of staff and skills, to address increasing conservation demands.

Based on data from the ARL Preservation Statistics, physical treatments, have, in fact, been trending downwards since 1999/2000 (Figure 4)[14] while the number of protective enclosures has been increasing in the same period (Figure 5). After increasing for several years, the treatment of unbound materials declined significantly after 2003. An increase in manufacture and use of protective enclosures may indicate a trend to stabilize fragile materials, perhaps offsetting declining resources in conservation treatments or deacidification.

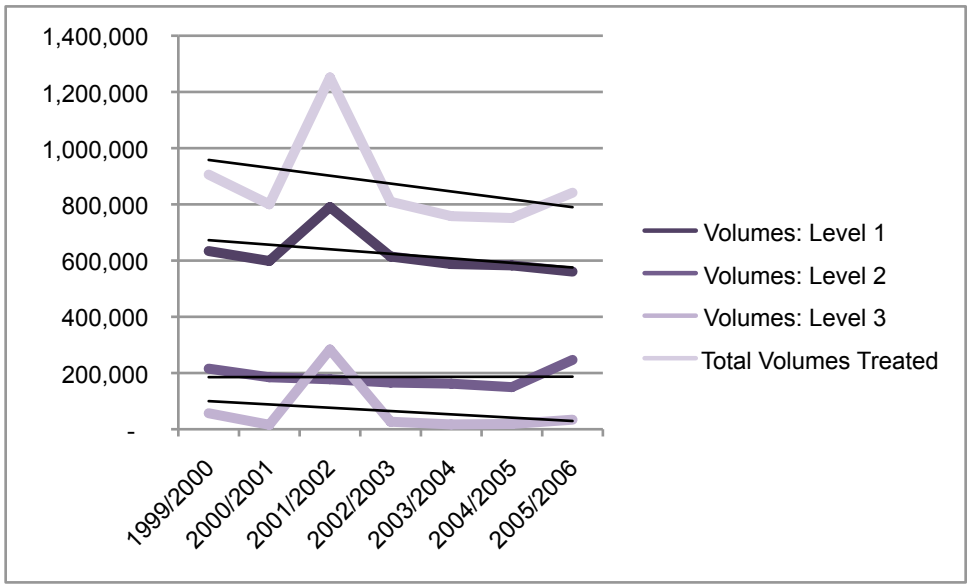

Figure 4. Physical Treatment of Bound Volumes by ARL University Libraries

12 See *A Public Trust at Risk: The Heritage Health Index Report on the State of America's Collections* published by Heritage Preservation (December 2005) http://www.heritagepreservation.org/HHI/ and Anne R. Kenney and Deirdre C. Stam, *The State of Preservation Programs in American College and Research Libraries: Building a Common Understanding and Action Agenda* (CLIR, 2002) http://www.clir.org/pubs/reports/pub111/contents.html.

13 ARL, CLIR, OCLC, and individual libraries have formally addressed the issues and challenges associated with uncataloged or otherwise inaccessible "hidden collections."

14 The Level 3 spike in 2001/2002 was an anomaly due to a disaster recovery project. The Level 1 spike is due to a change in how several libraries counted activity.

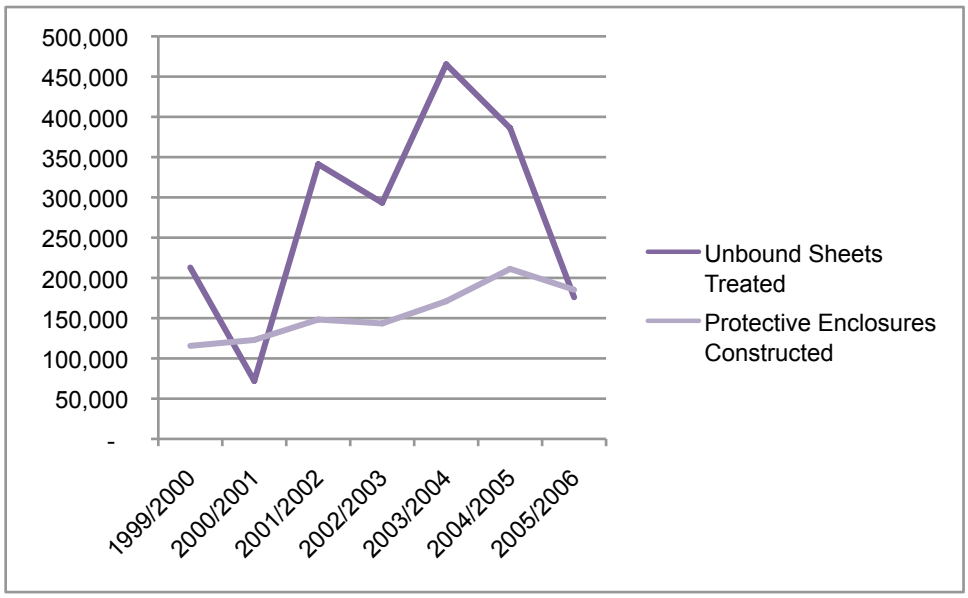

Figure 5. Protective Enclosures Constructed and Unbound Sheets Treated by ARL University Libraries

Binding and Library Binders

According to the ARL statistics, total library expenditures and materials expenditures have increased since 1999 while the number of volumes bound commercially has decreased, as have expenditures for commercial binding. The decline in library binding is most likely due to libraries cancelling serial print subscriptions. Libraries may also be shifting resources from binding to other functions.[15] Still, library binding continues to serve a vital preservation function, despite reductions in library binding activities and expenditures, and will continue to require staff resources for processing.

At the same time, library binders seem generally to be in the process of diversifying their services. Because of the well-established relationships between most library binders and their clients, as well as the strong presence of library binders and the Library Binding Institute (the trade group for library binders) within the American Library Association, many preservation librarians see opportunities in working with their binders and the binding industry to develop services that meet library expectations or standards for work beyond library binding. In addition to library binding, some are offering a wider range of repair services, providing more sophisticated conservation treatments, print-on-demand, and digitization services.

Deacidification

Deacidification has enormous potential for preserving printed works that cannot be reformatted due to copyright concerns or have enduring value in their original format, and for preserving unique archival materials. Deacidification also eliminates much of the future need for repair or reformatting. Following a steady increase between 1999/2000 and 2002/2003, use of deacidification for bound volumes declined in ARL member libraries (See Figure 6).

15 For a discussion about reducing binding budgets, see Duhon, Lucy, Jeanne Langedorfer, and Sandhya D. Srivastava. "Binding Journals in Tight Times: Mind the Budget" *Serials Librarian* 50, no. 3/4 (June 2006): 227–33.

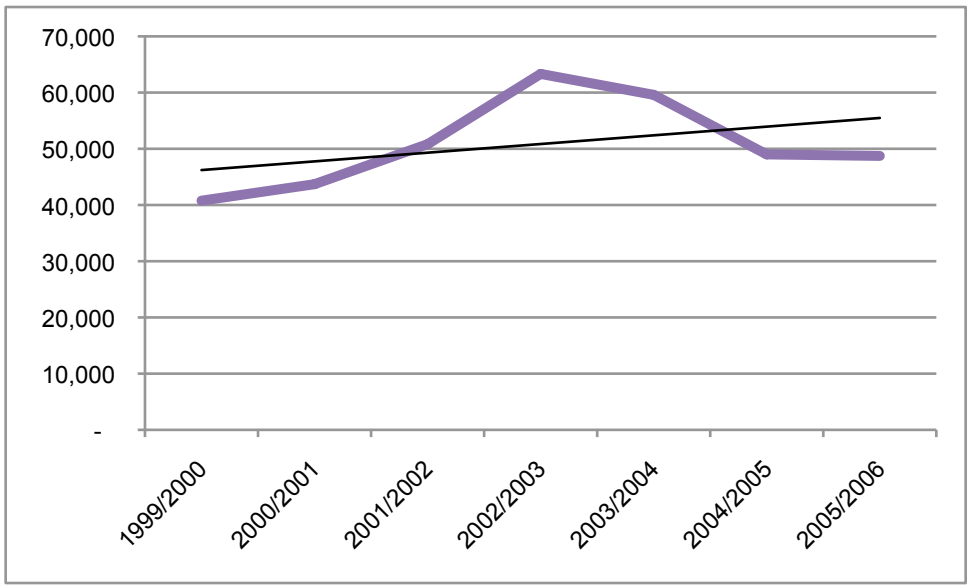

Figure 6. Bound Volumes and Pamphlets Deacidified by ARL University Libraries

A report from a study group on mass deacidification in North American research libraries that was convened in 2007 by The Andrew W. Mellon Foundation identified a number of reasons that deacidification is not used more frequently.[16] Chief among these are:

- The process is expensive and often requires books to be sent off-site.
- Some treatments have had undesirable side effects.
- The long-term effectiveness of various processes is still being studied.
- In short, many libraries are uncertain whether the benefits of mass deacidification outweigh the costs.

The study group convened a small group of preservation experts to discuss deacidification as a preservation strategy. The following were among the observations recorded:

- A declining number of libraries view the preservation of the original format for items in the general collection as a mandate.
- Libraries increasingly focus preservation activities on special collections or unique holdings, on audio and video formats, and on digital archiving.
- Libraries are increasingly investing in digitization activities, not always with preservation outcomes, but often at the expense of investments in traditional preservation procedures.
- Libraries still receive a large amount of material that requires deacidification treatment.
- There is need for more reliable and sustained research on paper chemistry, the stabilization and strengthening impact of deacidification, and its long-term effects on materials.

16 James Neal, et al., "Mass Deacidification Revisited," *CLIR Issues* 61 (January/February 2008) http://www.clir.org/pubs/issues/issue61.html

Physical Treatment Concerns

Physical treatment costs vary widely. By and large, though, they are cost-effective. Furthermore, they are necessary for special collections materials, especially those that are more frequently consulted and exhibited. Nonetheless, preservation and collection librarians note the tension that libraries have to navigate when asked to build special collections and to make those collections more accessible. There is concern that purchasing digital content and digitizing collections are using a disproportionate amount of funds at the expense of purchasing or conserving rare and unique materials.

Staff and User Education, Disaster Preparedness and Response

Educating staff and users about the proper care and handling of library and archives materials is a common preservation activity. Level of effort in this area varies greatly among libraries. Even well staffed preservation programs may have difficulty teaching all relevant staff in large libraries about care and handling issues. Libraries without formal preservation programs may be doing less in this area. Similarly, disaster preparedness and response efforts may vary widely. There is some concern that many smaller research libraries lack up-to-date plans, particularly if there is no one to shepherd their development.

Reformatting

Microfilming

Microfilming is still employed by some libraries, particularly for single sheet items or low use, brittle materials. Microfilming of single sheet items has been trending upwards since 1999/2000 while microfilming of bound volumes has declined in the same period. It is not clear what is driving this trend, although presumably special collections items are the source of single sheet microfilms.

It's unclear why some libraries continue to film unbound, single sheets instead of digitizing them. Libraries may be concerned with the easy and unlawful duplication and distribution of digital surrogates or they might lack the technical infrastructure or skills for digitization. Mass digitization efforts may result in too much damage. It might also be possible that digitization of special collections is not reported in the preservation statistics. See Figure 7 for a comparison of reformatting efforts of unbound sheets by microfilming, digitizing, and photocopying.

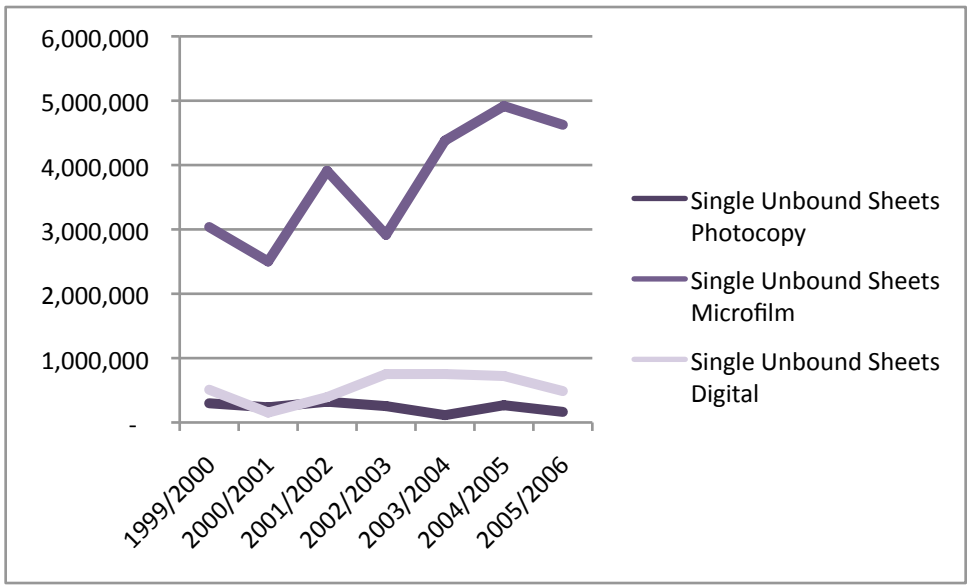

Figure 7. Totals for Unbound Sheets Reformatted by ARL University Libraries

There is some concern in the preservation community that brittle books and periodicals protected by copyright are set aside and not preserved because they do not lend themselves to mass digitization workflows and because microfilming is widely perceived as a dead technology (even though properly processed and stored microfilm has an estimated life expectancy of at least 500 years and microfilm can be digitized at a later date).

Legacy Microfilm Collections

Libraries hold vast amounts of microfilm that was created with internal funds, grant support (especially from NEH), or purchased from vendors. Despite its awkwardness in a digital world, many scholars continue to use microfilm because it is the only format in which some resources are available. Microfilm created to RLG guidelines and industry standards lends itself to digitization quite readily. Efforts are underway at some libraries to digitize microfilm titles in the public domain. The University of Kentucky has, with support from NEH, been researching issues and challenges related to the digitization of microfilm.

Preservation Photocopying[17]

"Preservation photocopying" of bound volumes and single unbound sheets has declined overall since 1999/2000. Preservation librarians continue to argue that this is a sensible replacement option for deteriorated materials that are protected by copyright (fair use allows libraries to make a copy), that require random access (e.g., dictionaries, encyclopedias, atlases, etc.), or that are used chiefly in print format (e.g., music scores). Because replacement hardcopies are usually produced in accordance with exacting standards, the copy will lend itself to digitization, provided that it is cared for properly. Some vendors also make the digital files used to print the replacement copy available to libraries.

17 Preservation photocopy is a misnomer; the vast majority of replacement hardcopies now are produced from digital files.

Partnering to Preserve Racing's Rich History

Becky Ryder

In Lexington, Kentucky, the Keeneland Race Course Library, one of the few such facilities at a horse racing track, holds the largest and most complete collection of the *Daily Racing Form (DRF)*, the Thoroughbred racing industry's signature publication. The collection of approximately 4,000 volumes was placed at the Keeneland Library by the publisher in 2000.

The *Daily Racing Form* was first published in 1894 and then consisted of four newsprint pages containing articles and race results known as "form" charts. Over the years, the newspaper has expanded to three editions and today publishes over 2,000 unique pages of articles and statistical data daily.

To preserve the *DRF* archive, Keeneland sought advice from Preservation Services at the University of Kentucky Libraries. The UK Libraries maintain a reputation as an authority on newspaper preservation in Kentucky. Possessing a conservation facility, an in-house microfilming lab and thanks, to their participation in the National Digital Newspaper Program, a growing expertise in microfilm-to-digital content creation, Kentucky was uniquely positioned to propose a testbed project to determine the best methods of preserving and providing access to approximately 11 million unique pages of fragile, historic newspapers covering the dates, 1896 through 1996.

Preservation Librarian Becky Ryder surveyed a representative sample of the *DRF* to determine the physical condition and intellectual and physical features of the newspaper. When she completed the assessment, Ryder proposed the creation of a testbed digital archive of approximately 100,000 digital page images focused on the coverage of the Kentucky Derby. And, thus, **Partnering to Preserve Racing's Rich History: The Daily Racing Form Preservation Project**, was established.

Today, Ryder and her UK colleagues, along with project staff funded by the Keeneland Association, are creating the *DRF* archive using a microfilm-to-digital methodology. The volumes are disbound and separated into individual pages. Some undergo conservation treatment to remove grime and to mend torn pages. After disbinding, issues are stored in archival folders which, in turn, are stored in custom made archival boxes. For the first time in years, a researcher can now read the information formerly bound into the inner margins. The filming process proceeds quickly after the disbinding, and the film scanning is virtually automatic since the film is produced to be digitized. Once the digital images are created, they are ingested into the content creation software and eventually exported to the Kentuckiana Digital Library where they are keyword searchable by article type. The University commits to the long-term preservation of the digital content and the microfilm masters, and Keeneland is supporting the development of a freely available resource that will benefit an international equine industry. Together, the Keeneland Library and UK Libraries are blending established and emerging technologies to preserve, once and for all, the publication known as the "America's Turf Authority."

At the conclusion of the testbed project, UK Libraries will provide a blueprint for scaling the project, using a combination of in-house and outsourced solutions, to complete the conversion of the complete archive within five years.

Creating Digital Surrogates of Print and AV Materials

In the past, when microfilming was the primary reformatting technology, any attempt to establish in-house microfilming labs or facilities to inspect film was met with high costs and a requirement for specialized knowledge. This frequently resulted in outsourcing the work, except in libraries with significant microfilming operations. Today, most ARL libraries have moved away from microfilming and are active in some area of digital reformatting or conversion of print and AV materials.

Digital capture devices, especially flatbed scanners and tools for digitizing sound, are increasingly affordable and many consumer or professional models can meet digitization guidelines, standards, or best practices established by libraries, archives, and museums. Because of the relative ease of access to digitization technologies, reformatting operations have become increasingly common and are often distributed throughout a library. As a result, local digitization of bound materials and single sheets has increased.

Although digitization technologies have become increasingly affordable in the past ten years, the library community's uncertainties about metadata production and maintenance, providing dependable access, data preservation concerns, and copyright issues may have negatively affected decisions to digitize even more bound volumes.

Mass Digitization of Books

The first decade of the 21st century has seen the rise of large-scale digitization strategies both within research institutions and the commercial sector. While most libraries continue to grapple with in-house digitization challenges, several larger libraries are collaborating with non-library entities to outsource the mass digitization of books. Collaborations with mass digitization partners or third party archiving solutions such as Google Books, Microsoft Live Books (now defunct), and the Open Content Alliance have resulted in broader access to books. The recent Google Book Search Settlement, if approved by the courts, will broaden access to many out of print titles, albeit not necessarily rare ones.

Although not organized specifically for the preservation of printed materials, libraries recognize that these programs have substantial implications for preservation programs, primarily in three regards. First, how do commercially driven digitization efforts complement other library digitization efforts? Secondly, how do libraries cope with the preservation of an enormous number of digital files? And thirdly, how does the library address the need for metadata that is more complex and expensive than cataloging records typically used in microfilming?

In response to the mass digitization efforts, library-based digitization now tends to focus on unique special collections materials and rarer general collections material. Typically, libraries focus in-house digitization efforts on materials in the public domain. In contrast, library partnerships with Google, for example, have resulted in the digitization of copyrighted materials.

In many cases, the owning libraries have been able to receive image files of their digitized books. Those libraries are now grappling with the technical and financial implications of preserving those files. One strategy, developed by CIC libraries and others, resulted in the HathiTrust. Initially devised for the purpose of storing digital files acquired by libraries through agreements with Google, the HathiTrust in coming years will develop search mechanisms and plans for ingesting non-Google content.

Other libraries, such as Cornell, employ a mix of storage strategies to better improve the odds of long-term preservation, including depositing copies of files created under the Microsoft Live Books project with the Internet

Archive in addition to keeping local copies. Oya Rieger examines the key issues and challenges for preservation vis-à-vis mass digitization efforts in "Preservation in the Age of Large-Scale Digitization: A White Paper" (CLIR, 2008).

Describing all of these new digital objects is challenging for most libraries. Libraries can create metadata for digital surrogates by reusing and modifying extant metadata. Typically, nowadays, this can be accomplished through machine processes. On the other hand, records to describe objects not previously described on the item level, such as the manuscripts and photographs, for example, that typically comprise archival collections, oftentimes requires original cataloging.

Reformatting Photographic Materials, Sound Recordings, and Moving Images

Analog and digital reformatting of non-paper items has increased in recent years, most likely due to increased awareness about the fragility of photographic materials and magnetic tape-based sound and video recordings within the library and archives communities.[18] Impediments to preserving AV materials persist, however. Measuring the scope of the audio/visual preservation challenge is complicated because oftentimes little is known about the extent or complexity of an institution's physical AV holdings (many of which may even reside beyond the purview of the library). Catalog information about holdings may be limited, intellectual property issues are daunting, and many libraries lack preservation expertise in this area.

Nonetheless, tools and efforts to address these challenges are coming online. The University of Illinois at Urbana-Champaign and Columbia University have developed survey tools to assess the scope of collections that contain AV items and to record data about preservation needs on a collection or item level.[19] The California Preservation Program completed "a statewide survey to document the scope and scale of the audiovisual preservation problem" that resulted in several recommendations.[20] The project uses the preservation assessment tool, CALIPR, developed by the University of California, Berkeley, and demonstrates that it is possible to complete surveys for distributed collections.

The National Audio-Visual Conservation Center (NAVCC) of the Library of Congress is a centralized facility especially planned and designed for the acquisition, cataloging, storage, and preservation of the nation's collection of moving images and recorded sounds. It is furthering the refinement of tools that systematically address the digitization of expectedly large AV holdings, specifically SAMMA (System for the Automated Migration of Media Archives) to preserve magnetic video recordings and IRENE (Image, Reconstruct, Erase, Noise, Etc.) to preserve audio recordings.[21] In addition to safeguarding the Library's own collections, the NAVCC will provide innovative preservation services to other libraries, archives, and industry constituents in both the public and private sectors.[22]

Reformatting Concerns

Arguments about digitization for access vs. digitization for preservation can unnecessarily obscure the broader issue of whether such activities, when conducted outside of a preservation department, constitute preservation work. If digital reformatting plays a preservation role, what is the best way to manage and measure that work within the scope of a larger library-wide preservation effort?

18 See the proceedings of the 2003 Sound Savings conference (http://www.arl.org/preserv/sound_savings_proceedings/), Abby Smith, David Randal Allen, and Karen Allen. Survey of the State of Audio Collections in Academic Libraries (CLIR, 2003), and

19 The Columbia University tool is available at: http://www.columbia.edu/cu/web/services/preservation/audiosurvey.html

20 See: http://calpreservation.org/management/cppav/av_needs.html

21 See: http://www.loc.gov/avconservation/preservation/projects.html

22 See: http://www.loc.gov/avconservation/packard/mission.html

Regardless of whether a library is an NDIIPP partner, participating in a consortium to collect and preserve digital content, or acting alone, preservation activities such as identification, assessment, ingest into an archival system, data curation, dissemination, etc. are not captured by the current preservation measurement survey. Therefore, to reflect such preservation efforts, the work should be recorded as suggested in Appendix B, Table 5.

Data for in-house and some contract digitization is reported by ARL libraries in the annual preservation statistics. However, mass digitization efforts by libraries involving commercial partners is oftentimes shrouded in confidentiality, make it difficult to accurately determine how much is digitized, which titles are being or will be digitized, and which quality benchmarks are being applied.

Preservation Administration and Organization

Given the broad range of emerging responsibilities for developing and implementing preservation strategies, each library must decide for itself how best to organize its preservation activities; it is far more important to commit strategically to preservation efforts than it is to adhere to an "acceptable" organization model. Collection makeup and size, staff capabilities, partnerships, and institutional mission contribute towards shaping a particular preservation program. While the competing merits of centralizing or decentralizing preservation efforts are worth exploring, even in organizations with centralized preservation operations, some preservation work will typically be distributed (e.g., minor repairs completed in branch libraries or digitization in special collections). Even in organizations without a central preservation operation, preservation responsibility should be vested with at least one individual who has at a minimum part-time responsibility for advancing and bringing coherence to preservation efforts. This preservation administrators must be adept at managing simultaneous horizontal relationships within a given organization, oftentimes leading staff who are not direct reports in efforts to bring a preservation or long-range perspective to library work focused on acquiring, managing, and delivering both analog and digital content.

The Networked Digital Environment

With the rapid growth of valuable digital content that is both informally and formally published, the most quickly evolving arena of preservation concern is the challenge and possibility of preserving such content in a networked environment. The Blue Ribbon Task Force on Sustainable Digital Preservation and Access is examining this issue with particular focus on digital information in the public interests. Nonetheless, its assertion that "there is no general agreement … about who is responsible and who should pay for the access to, and preservation of, valuable present and future digital information" applies equally well to digital content of interest to research libraries and their users.[23] To that end, libraries are developing a mix of strategies to seize upon opportunities and to address these challenges. Typically, locally created digital content is preserved in local repositories. At the same time, some libraries are developing scalable collaborative, cooperative, and complementary solutions for e-journal archiving, Web harvesting, and archival storage. Without such strategies in place, libraries risk losing (or not acquiring in the first place) digital content that their stakeholders depend upon. The sheer scale of the digital preservation problem has catalyzed a number of innovative initiatives that are described below.

Digital Curation: An Emerging Concept

The library, archives, and museum communities are currently wrestling with identifying the relationship between *preservation, digital preservation*, and *digital curation*. *Digital preservation* (preserving digital content) is a subset of the broader term preservation. *Digital curation* is all the activities that relate to the creation, capture, description, use, preservation, and re-use of a digital resource, be it a simple digital object (e.g., a sound file) or a set of interrelated digital resources (e.g., a Web site). Digital curation implies a more active role in the life cycle of digital content than the reactive or post-creation activities implied by digital preservation. All three concepts – digital curation, digital preservation, and preservation – will continue to evolve.

Regardless of terminology, libraries understand that they must identify strategies and methods by which to preserve digital content that they have acquired or created. In some libraries, this has meant developing or solidifying relationships with campus IT units or looking to external partners or opportunities for shared digital storage possibilities.

Preserving Digital Content (Surrogate and Born Digital)

Preservation strategies for digital content are still evolving. Most practitioners recognize and appreciate the difference between bit level preservation and full preservation, the latter ensuring the continued accessibility to,

23 Blue Ribbon Task Force on Sustainable Digital Preservation and Access. *Sustaining the Digital Investment: Issues and Challenges of Economically Sustainable Digital Preservation* (December 2008), p. 1.

functionality of, and context for digital objects in light of hardware and software obsolescence. Most efforts to preserve born digital content occur within Digital Asset Management, Digital Life Cycle Management, or Digital Curation initiatives.[24]

Preservation of born digital content begins with: decisions about the form in which a library should acquire digital content; a clear understanding of the library's rights to preserve such content; policies, technical infrastructure, and staff to realize the ongoing work; and in some cases, a commitment to join or develop cooperative digital preservation networks. In addition, the preservation of born digital content must be managed along with the administrative, technical, structural, and descriptive metadata relevant to the digital content. In many institutions, responsibilities for creating or acquiring digital content have become blurred with describing that content. For instance, preservation staff must now be well versed in metadata concepts in order to carry out digital preservation work.

Libraries have pursued varying strategies to address the preservation of digital assets. The most effective efforts tend to be those that focus on maintaining access in cooperative environments, such as the Scholars Portal, a cooperative program in Ontario, Canada, built for local hosting of e-journals.[25] Scholar's Portal staff are currently examining the possibility of expanding the program's administrative and technical infrastructure to include the hosting of government documents, datasets, GIS information, etc.

Pennsylvania State University, in collaboration with the Pennsylvania State Library, initiated a program to copy all floppy disc media acquired by the libraries in a server-based digital preservation system, thereby guarding against loss of access by creating backups that are not dependent upon a media carrier. A typical preservation function in this program was to copy floppy discs contained within books. Even though this pioneering program has scaled back in response to floppy discs declining in popularity, the growing volume of copy-protected media, and concerns about rights issues, it demonstrated nonetheless that preservation actions could be completed at the time of acquisition as part of routine workflow.[26]

Other efforts to preserve digital content require technical skills that might best be described as digital or data archaeology. Emory University Libraries, The University of Texas Ransom Center, and the Maryland Institute for Technology in the Humanities (MITH) are pursuing a project, funded by NEH, "Approaches to Managing and Collecting Born-Digital Literary Materials for Scholarly Use," to examine how to best preserve and make accessible literary works and related data created on personal computers that special collections libraries acquire as components of personal archives. Typically, those computers are several years old and contain files created with now obsolete word processing and e-mail software.[27]

Special Collections in ARL Libraries summarizes a number of challenges and opportunities presented by born digital content. A recurring theme in discussions concerning born digital content is the need for collaboration. To provide continuing access to born digital materials, librarians, curators, and archivists must collaborate with content creators, repository services staff, scholars, and other stakeholders.

24 For an example of how to distribute responsibilities for digital life cycle management, see the Library of Congress http://www.loc.gov/preserv/prd/presdig/preslifecycle.html .

25 See: http://www.scholarsportal.info/

26 From e-mail correspondence with Sue Kellerman, December 12, 2008.

27 For more information, see: http://mith.umd.edu/maryland-institute-for-technology-in-the-humanities-emorys-manuscript-archives-and-rare-book-library-and-the-harry-ransom-center-partner-on-strategies-for-born-digital-literary-collections/

Web Archiving

Collection development librarians and preservation librarians interviewed for this project note that libraries are increasingly acquiring materials published outside of traditional publishing channels; they cannot rely on approval plans and firm orders to acquire all materials that would serve a particular research need. To address the many formal and informal publications that are only published on the Web, the Library of Congress, through NDIIPP, has partnered with libraries to explore possible tools and economics of preserving digital content, including harvesting and preserving content from the Web.[28] While the Library of Congress Web Archives[29] are curated by subject librarians, the non-profit Internet Archive typifies the automated approach to Web archiving. Many federal governments, acting through national libraries, particularly in Europe, also have begun significant efforts to archive the Web content created in their country.[30]

Digital Repository Development

> **"…[I]t is vitally important for all research libraries to be engaging with digital repository development projects in some fashion."**[31]

The concept of institutional repositories as sites for depositing working papers, theses, reports, and other informal publications, is giving way to a concept of digital repositories that embrace all kinds of content: datasets, moving images, still images, sound recordings, text, hybrid documents, and, increasingly, learning objects. Preservation librarians interviewed for this project agreed that digital repositories should not be confused with preservation repositories. In and of themselves, digital repositories do not guarantee preservation or (open) access without the backing of formal programs explicitly focused on the preservation of the repository data.

Many preservation librarians see the development and management of digital repositories as sensible opportunities for them to partner with other library and IT staff. Some repository programs, such as the one at the University of Illinois at Urbana-Champaign, are parts of larger digital asset management systems with preservation components. In these cases, librarians, but not necessarily preservation librarians, have broader engagement with the issues of organizing, describing, and preserving information stored and disseminated via digital repositories. They act as informed advisers for faculty who may deposit content with a campus or external repository. In some cases, libraries have launched programs to educate faculty about how they can assert their rights to deposit content into repositories where their institution can assume responsibility for its preservation and continued access.

28 For a complete list of projects, see: http://www.digitalpreservation.gov/partners/resources/tools/index.html
29 See: http://lcweb2.loc.gov/diglib/lcwa/html/lcwa-home.html
30 For an overview, see the panel discussion, International Approaches to Web Archiving - Panel Discussion, at the 2008 iPres Conference, http://www.bl.uk/ipres2008/presentations_day2/39a_Panel_Discussion.pdf
31 The Research Library's Role in Digital Repository Services: Final Report of the ARL Digital Repository Issues Task Force. Washington, DC: Association of Research Libraries, 2009, p. 14. http://www.arl.org/bm~doc/digital-repository-report.pdf

IDEALS

Sarah L. Shreeves

The Illinois Digital Environment for Access to Learning and Scholarship (IDEALS) is the institutional repository for the University of Illinois at Urbana-Champaign (UIUC) at http://www.ideals.uiuc.edu/. IDEALS collects, manages, and provides access to and long term preservation of the research and scholarship, as well as materials that reflect the intellectual environment, of UIUC. IDEALS is a joint initiative of the University Library and the Campus Information Technologies and Educational Services (CITES), the academic computing organization on campus.

IDEALS was established with funding from the Office of the Provost both to provide open access to the research produced at UIUC and long term preservation of that research. Research and scholarship here is defined in broad terms; published literature where copyright and publisher policy allows, the grey literature of campus (such as occasional papers and technical reports), datasets, audio and video material, presentations and posters, and electronic theses and dissertations are all accepted into the repository. Likewise IDEALS accepts all file formats. Like most institutional repositories, IDEALS accepts materials directly from faculty, students, and staff of the university.

IDEALS staff have paid close attention to preservation issues from the start of the repository in 2006 in terms of technological infrastructure (storage, back-up, file corruption checks, virus checking, etc), policies and procedures (including public documentation of these), organizational commitment, and resource allocation. A team within the Library and CITES (led by the Preservation Librarian and including IDEALS staff, the Strategic Architect for the campus, and the Archivist for Electronic Records) works to establish and assess coherent , consistent , and explicit preservation policies and procedures.

Because IDEALS accepts all file formats, we have had to be explicit about the level of preservation support we can provide to the material we take in. We cannot commit to full preservation of all items that are deposited into IDEALS. IDEALS offers three categories of support—full, moderate, and basic. Full support means that IDEALS endeavors to preserve the functionality and renderability of the file. Moderate support means that IDEALS will preserve the renderability of a file but may not preserve the full functionality. Basic preservation is 'bit-level preservation' support (which is offered to all items in IDEALS). 'Bit-level preservation' includes: regular file corruption checks, virus checks, and multiple back-ups (including off-site), a persistent identifier, basic metadata, and migration to new storage media when needed.

Formats fall into one of these three categories based on a matrix of factors:

- Open standard (more preservable) or proprietary (less preservable)
- In wide use (more preservable) or limited use (less preservable)
- Renderable by more than one software application (more preservable) or only one (less preservable)
- Lossless format (more preservable) or lossy format (less preservable)
- No embedded content or dependencies (more preservable) or contains embedded content or dependencies (less preservable)

IDEALS maintains a running list of formats and where they fall in our categories of support; this list is regularly updated.

While IDEALS has a fairly well-established preservation plan and procedures in place given our resources and software in use (DSpace), we are also continuously looking to improve and fill in gaps – such as in preservation metadata. The IDEALS Preservation team is also using the Trustworthy Digital Repository Audit and Certification Checklist as a guide for a self-audit, and IDEALS will be looking at conducting a full audit in the future.

Third Party Strategies for Preserving e-Journals and Other Content

The research library community has clearly recognized the need to identify preservation solutions for e-journal content. In 2005, ARL endorsed a call that "libraries must invest in a qualified archiving solution."[32] Several archiving options have emerged[33] and many ARL libraries have signed on with Portico and/or the LOCKSS network. A number of libraries and publishers are working with LOCKSS to further develop the distributed preservation protocol and software to accommodate the needs of dark archives and large files of varying formats (CLOCKSS).

Many libraries have also aggressively pursued agreements with publishers for the right to access backfiles should a given publisher become unable to provide access to e-journal content or cease to exist altogether. These so called "trigger events" are the current focus of e-journal archiving efforts.

NDIIPP has funded libraries to develop and test the efficacy of distributed networks to preserve digital content. For example, The MetaArchive Cooperative is a network of libraries working together to build a trusted digital repository based on the LOCKSS software. Chronopolis is a similar project for preserving digital content but involves collaboration among libraries, super computer centers, and research centers.[34]

The National Science Foundation, through its Office of Cyberinfrastructure, has solicited input for the collaborative program DataNet to develop strategies for the preservation of scientific datasets and data streams. As mentioned previously, several libraries, chiefly those partnering in the Google Books Project, have formed the HathiTrust to preserve and create access to Google Books files.

For many libraries, such partnerships require different kinds of investments and reallocation of funds. For example, as expenditures for binding decrease, the need to fund e-journal preservation through third party providers has increased, resulting in a rebalancing of preservation expenditures. Other issues are explored further below.

32 Donald J. Waters, ed. "Urgent Action Needed to Preserve Scholarly Electronic Journals" (Washington, DC: Association of Research Libraries, 2005) http://www.arl.org/bm~doc/ejournalpreservation_final.pdf

33 For a review of options see: Terry Morrow et al., *A Comparative Study of e-Journal Archiving Solutions: A JISC Funded Investigation* (JISC Collections, 2008) and Anne R. Kenney et al, *E-Journal Archiving Metes and Bounds: A Survey of the Landscape* (Washington, DC: Council on Library and Information Resources, 2008) http://www.clir.org/pubs/reports/pub138/pub138.pdf

34 For a complete list of NDIIPP partners and tools, see http://www.digitalpreservation.gov.

Library Collaborative Strategies

Collaborative preservation efforts and national agendas were discussed repeatedly at the experts meeting. Most see the issues as closely tied to more fundamental concerns about ensuring that resources for collaboration truly target work that address concerns that cannot be met solely on the local, individual library level. At the same time, because resources are limited, collaborative efforts are all the more important. Community action is needed to develop strategies for collecting, storing, and delivering not only redundant print and audio/visual library collections, but also digital resources that may have limited functionality or usefulness (from a library or research perspective) because of rights restrictions and eventual format obsolescence.

Collaboration, however, requires leadership. Even though OCLC, CLIR, and ARL, among others, address preservation issues and challenges, clear calls to action and concerted responses around particular issues such as shared print storage, Web archiving, digital preservation, and mass deacidficaton are largely lacking. The kind of leadership that emerged around brittle books, for example, lacks a locus in the current environment.

Below is a brief review of key preservation activities that would have their impact strengthened through collaborative action. In some cases, the collaborative action might best be addressed regionally. At other times, it makes more sense for a national organization, such as ARL or ALA, to lead an effort.

Digitization

Similar to deacidification efforts, libraries are concerned with the consequences of duplicating effort in digitization projects. Libraries are keen to minimize redundancy in preservation reformatting efforts. For example, libraries collaborated to minimize redundancy in RLG sponsored Great Collections microfilming projects largely funded by NEH. Doing so resulted in a greater variety of materials preserved. The same would be true for digitization projects.

While external partners in mass book digitization projects have not expressed concern about duplication, minimizing redundant effort is a significant issue for library-led digitization projects and is particularly acute for audio/visual collections given the high per-item reformatting costs. Unfortunately, at this point, libraries are not sharing sufficient information about the objects digitized and the quality benchmarks employed.

Web Archiving

Valuable resources appear on and disappear from the Web every day.[35] Though some efforts are underway, libraries are not particularly well organized in pursuing the preservation of Web-based publications. The preservation and

35 In addition to blogs and videos for example, which can vary greatly in their relative value to present and future scholarly pursuits, government documents and reports published by NGOs, for example, that might have been formerly published and distributed in paper form, may now appear only on the Web, and perhaps only briefly.

collection development librarians interviewed agree that Web archiving should be systematically pursued, possibly by subject. At the same time, they recognize that it will be necessary to overcome the poor track record cooperative collection development has.

The lack of inter-institutional agreements is a serious issue today because Web resource archiving isn't about minimizing collection redundancy and substituting cooperative borrowing or ILL for reduced access. Rather, it is about ensuring ongoing access by preserving fugitive materials. Research libraries, particularly, have a responsibility to determine how the community can best share the effort of identifying, describing, and preserving Web-based publications.

Shared Storage: Print

OCLC has been investigating issues and challenges concerning shared print storage.[36] While there also has been much discussion about shared storage issues, there is widespread concern that there has been insufficient leadership. Some libraries are moving forward with de-duping and collaborative storage with or without established definitions of "best" or "last" copies. Particularly lacking are agreements about the optimal number of best or last copies in a region, nationally, or even internationally. A report funded by Ithaka is forthcoming that will provide some insight to the question of "optimal overlap."[37]

Shared Storage: Digital

Although it is hosting the content created in its book digitization project, Google cannot be expected to maintain digital files indefinitely on behalf of libraries or for their interests to fully align with libraries. Likewise, the long-term viability of the Open Content Alliance and the Internet Archive is unknowable. There is strong sentiment among preservation leaders that owning libraries must assume responsibility for preserving the digital surrogates of their physical holdings. Because long term preservation of digital files will require large ongoing investments, libraries need to develop policies for digital storage that address concerns about retention, migration, "best" digital surrogates, etc. To that end, several strategies are being pursued.

Some libraries have begun contributing to the DLF/OCLC Registry of Digital Masters.[38] By registering a title, a contributing institution is signaling its intent to "preserve and maintain the accessibility of the described materials over an extended timeframe (decades or centuries, not years)."[39] Because it is operated by OCLC, libraries can assume that it will continue to be available following DLF's transfer to CLIR. The CIC libraries have formed the HathiTrust and made its services available to other libraries wishing to participate in the project. In addition, the research library community should continue to monitor CRL's investigation of the *Trustworthy Repositories Audit & Certification (TRAC): Criteria and Checklist*.[40] Recently, CRL began assessment of two key repositories, the Hathi Trust and Portico. Long-term preservation of digital content requires confidence in vendors and systems. Such confidence is aided by the use of guidelines for systems and independent auditing.

36 See: http://www.oclc.org/programs/ourwork/collectivecoll/sharedprint/
37 For an overview and early findings, see: http://hangingtogether.org/?p=448
38 See: http://www.oclc.org/digitalregistry/default.htm
39 See: http://www.diglib.org/collections/reg/reg.htm
40 See: http://www.crl.edu/content.asp?l1=13&l2=58&l3=162&l4=91

Deacidification

The absence of a national deacidification program sidetracked discussions about deacidification priorities. For those few libraries pursuing deacidification, the lack of information sharing about what is being deacidified is a problem. Libraries that are acquiring materials not likely to have multiple holdings throughout North America should coordinate efforts to systematically deacidify acquisitions, with an emphasis on minimizing duplication of effort. One approach would be to develop a body/clearinghouse/registry to share information broadly about titles being deacidified, similar to the "intent to film" practice used in microfilming.[41]

Next Steps

Commercial publishing practices, library digitization efforts, and library collecting priorities are evolving in response to technology innovations and consumer or user expectations. These developments present libraries with questions about prioritizing local preservation efforts vis-à-vis community concerns and opportunities. Improved cooperation and collaboration appear to be sensible principles with which to address shared preservation concerns. Successful collaboration though hinges on a common understanding of the issues and effective leadership to guide efforts. Libraries must begin their collaboration efforts locally, looking for opportunities within their own organization (e.g., who are the right staff to craft a successful digital repository) and their parent institution (what preservation values and tools can the library bring to capturing and organizing institutional records, student publications, faculty research data, etc.) and then begin to look outward to other libraries (for shared print storage) and to content creators (e.g., working with publishers to facilitate the preservation of e-resources, whether in systems such as LOCKSS, Portico, or something new).

ARL could facilitate such collaborative efforts by encouraging members to share information about their activities. Several tools exist for doing so in regard to individual items, such as the MARC 583 Action Note, using preservation and digitization vocabulary created by the Library of Congress, and the Registry of Digital Masters. ARL could similarly encourage information sharing about cooperative or collaborative print storage. This issue first requires additional exploration of what outcomes ARL members seek regarding the larger concerns about the nature and management of collections. Also, ARL could examine outcomes for cooperative Web archiving, with particular focus on both content (the what) and technologies (the how).

41 The use of MARC 583, the Preservation and Digitization Action Note, is not widely employed even though the Library of Congress has developed extensive guidelines for its use.

Conclusion

The overarching trend among research libraries is a broadening of their preservation agenda. They are increasingly acquiring, making, and preserving digital content while continuing to manage the preservation of books, manuscripts, archives, and audio-visual materials. Research libraries are engaging a wide range of challenges including, but not limited to, the management and preservation of the digital output of the now well-documented large-scale book digitization projects; the preservation and conversion of sound recording and moving image materials whose use is threatened by decaying media and technological obsolescence; the capture and preservation of digital content created by the library and other entities within and beyond the parent institutions.

The other striking aspect of contemporary preservation activities in research libraries is the drive to develop collaborative approaches to providing preservation functions. Libraries are already widely engaged in developing new partnerships with campus IT centers and third party developers of turnkey solutions, such as LOCKSS and Portico. These kinds of early activities are clarifying key issues that need to be addressed in the short term and have surfaced several troubling gaps in national leadership. Collaboration issues are not confined to the library community.

The drive to serve a broader range of preservation needs is also requiring libraries to seek new forms of expertise. Because fulfilling a research library's preservation responsibilities increasingly depends upon technology and needs to address digital preservation concerns, preservation is now informed by expertise in a growing number of domains. For example, computer science research speaks to many aspects of preserving digital content; materials science addresses concerns that surface in exhibit of library materials; domain scholars can provide valuable insight to how a growing diversity of research materials are produced in their respective subject areas; and metadata librarians can contribute metadata critical to the preservation of library holdings, digital or otherwise.

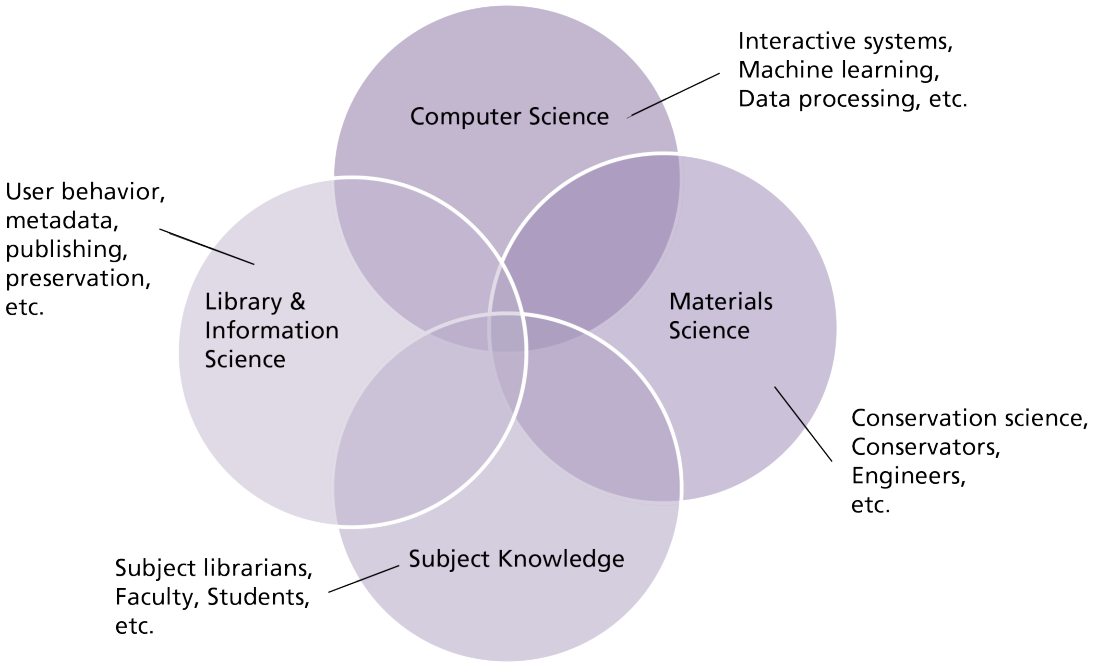

Figure 8. Domain expertise needed for successful preservation action

It is unlikely that all of the requisite expertise to fulfill a library's preservation functions will be resident in a given library, so here again ARL members will have to look to developing new partnerships within and outside their parent institutions. When access to experts is not possible on their campuses or within the library community, libraries must look externally for partners or collaborators. In addition to other libraries, many organizations that are supportive of library efforts related to preservation offer the possibility for collaboration or cooperative in many areas of preservation, such as conservation, digitization, and curating born digital content. Moreover, there is emerging interest in finding areas of common interest or concern among libraries, archives, and museums. For an overview of some recent discussions see the OCLC report *Beyond the Silos of the LAMs: Collaboration Among Libraries, Archives, and Museums.*[42]

In 2007, the ARL Board of Directors issued the statement "Research Libraries' Enduring Responsibility for Preservation," which acknowledged that the digital content that comprises such a significant portion of the materials now collected by libraries adds a layer of complexity to the preservation challenge. It concluded that, "Each research library has a core of preservation responsibilities, some that can be met only locally but others that increasingly should or can be met only through cooperative strategies."[43] To that end, ARL libraries are in the midst of an ongoing process to redefine the scope of their preservation programs, selecting among activities that range from preserving books and paper with known methods, to developing strategies for growing collections of machine-dependent audio and moving image collections, to digital reformatting of print and AV materials and the long-term management of digital content.

42 See: http://www.oclc.org/programs/reports/2008-05.pdf
43 See: http://www.arl.org/bm~doc/preservation_responsibility_24july07.pdf

Collectively, research libraries are engaging in an impressive array of activities as they seek to serve as wise stewards for collections in a growing array of formats. Any ARL library can engage in a range of activities, even with few or no dedicated preservation staff. Such base-line preservation activities include reviewing or developing plans for disaster preparedness; devising policies for preserving the range of media held by libraries, particularly for media prone to technological obsolescence and born digital resources; and reviewing or establishing contracts with vendors (library binders, digitization experts, conservators, etc.)

But even this level of activity requires looking beyond the kind of work historically identified with preservation units (binding, repair, environmental monitoring, etc.) to include activities in other library units and beyond the library. It requires collaborating and partnering with other institutions and establishing formal agreements with commercial entities. And since technology and the vendor marketplace are volatile, preservation and other staff will have to commit to continual learning.

Libraries with larger preservation programs are similarly required to balance a mix of local and collaborative strategies as they grapple with traditional and emerging needs. Beyond supporting a deeper investment in local activities and expertise to advance preservation, these programs also are positioned to play a larger leadership role in pioneering collaborative strategies.

This report has identified a range of new preservation activities and highlighted key challenges faced by preservation programs in the shorter term. In addition to informing library and preservation leaders, it will serve as a basis for ARL's development of a preservation self-assessment tool for member libraries. The tool will be designed to help a library paint a more complete picture of its preservation activities than what is reflected in the currently reported statistics. The tool will also aid libraries in identifying preservation strengths, weaknesses, and cooperative or leadership opportunities. Together this report and the tool will offer a broader base for planning and prioritizing preservation activities in a digital age.

Appendix A: List of Participants

Telephone Interviews

David Lowe	University of Connecticut
Janet Gertz	Columbia University
David Magier	Princeton University
Michael Stoller	New York University
Nancy McGovern	Interuniversity Consortium for Political and Social Research (ICPSR)
Evelyn Frangakis	New York Public Library
Sue Kellerman	Pennsylvania State University
Martha Hruska	University of California, San Diego
Tom Teper	University of Illinois
Barclay Ogden	University of California, Berkeley
James Simon	Center for Research Libraries
Becky Ryder	University of Kentucky
Andrew Hart	University of North Carolina
Alan Darnell	Scholar's Portal
Jeanne Drewes	Library of Congress
Diane van der Reyden	Library of Congress
Constance Malpas	OCLC
Roger Schonfeld	Ithaka

Experts Meeting

James Neal	Columbia University
Janet Gertz	Columbia University
David Magier	Princeton University
Evelyn Frangakis	New York Public Library
Sue Kellerman	Pennsylvania State University
Tom Teper	University of Illinois
Becky Ryder	University of Kentucky
Andrew Hart	University of North Carolina
Alan Darnell	Scholar's Portal

Appendix B: Recommendations to the ARL Statistics & Measurement Program

The following recommendations are intended to serve as catalysts for further discussions. Although this report did not include a specific charge to address the ARL Preservation Statistics, interviewees and comments made at the experts meeting were frequent and varied enough to include consideration here.

Environmental Conditions and Housing

Recommendation

ARL member libraries should monitor environments and maintain information on monitoring practices for spaces housing collections. Monitoring records should include the following information.

Table 1. Environmental Monitoring Statistics

Collections monitored by facilities and collection types	Air qualities monitored	In addition to preservation staff, who receives the environmental data
Special collections	Temperature Relative Humidity Other	University facilities management University administration
General collections		
Storage collections		
Others:		

Physical Treatment: Conservation

A problem with current measures of conservation treatments is that different formats are gathered into a single count. In particular, treatment of photographs and other non-paper items require different expertise or treatments may be vended separately. Stabilization and conservation of photographic materials oftentimes requires a skill set significantly different from cleaning magnetic tape or repairing motion picture film, for example; currently these are reported as an aggregate. Moreover, the stabilization and conservation of containers might be closely aligned with reformatting efforts and completed by staff operating outside typical or traditional library preservation operations, leading to those efforts being underreported.

Recommendation

To ensure a balance of investments, libraries should continue to count conservation treatments performed. To reflect the range of work, counts should be broken down by bound volumes, manuscripts, photographs, and other artifacts with greater granularity. In addition, given the emphasis on special collections, libraries should collect separate statistics for conservation work performed on special collections and general collections. [44]

44 Libraries should consider the nature of their collections in developing preservation policies since many general collections, particularly large ones, include unique or nearly unique materials.

Table 2. Conservation Treatment Statistics

The distinction between special and general collections varies from one library to another. Circulating materials in one library may be housed in special collections in another. By segmenting the statistics in this manner, general trends about priorities in ARL libraries might emerge.

	Special Collections	General Collections
Unbound sheets		
Bound volumes		
Photographic material (prints, negatives, transparencies, etc.)		
Moving image materials		
Motion picture film		
Video		
Other		
Sound recordings (repaired, stabilized, not reformatted)		
Disc, analog		
Magnetic		
Objects (paintings, works on paper, sculpture, botanical specimens, etc.)		

Physical Treatment: Binding

Recommendation

Libraries should continue to measure binding activities and expenditures. They should also measure, track, and monitor use of other services provided by their binder.

Table 3. Services Purchased from Vendors

	Quantity
Boxing, phase boxing	
Conservation work	
Level 1	
Level 2	
Level 3	
Digitizing	
Paper	
Other media	
Print on Demand when made from a digital surrogate to replace brittle or irreparable materials.	

Physical Treatment: Deacidification

Recommendation

To maintain consistency with other recommendations for reporting conservation activities, libraries should identify the relative quantities of special collections and general collection materials that are deacidified.

Staff and User Education, Disaster Preparedness and Response

Recommendation

ARL should collect information on whether member libraries have a disaster preparedness and response plan and whether their staff receives training on care and handling of library materials.

Table 4. Recording Staff and User Education Activities

Does your library have a disaster response plan
Yes
No
What types of disasters does it address?
When was the plan last updated?
What media does it address?
Books
Manuscripts
Archives
Sound recordings
Disc, analog
Magnetic media
Optical media
Other carrier/storage
Moving image materials
Motion picture film
Magnetic media
Optical media
Other carrier/storage
Art objects
Does the plan include contact information for
Relevant library staff
Library or campus security
Disaster recovery vendors
Relevant administrators (finance, risk assessment, legal, etc.)
Are library staff trained in disaster awareness and response?

Yes
No
Do staff receive training on the proper care and handling of library materials?
Yes
No
If yes, with what frequency?
Who performs the training?
Preservation staff
Consultants
Other staff

Reformatting

Recommendations

The ARL report "Recognizing Digitization as a Preservation Reformatting Method" notes that to be considered a preservation effort, digitization must be accompanied by an institutional plan to preserve the digital content. Therefore, if a library has a plan or mechanism for preserving digital surrogates created by the library or a vendor, it should count its digital reformatting efforts as preservation.

To better identify reformatting trends in ARL libraries, statistics gathering should more clearly identify specific reformatting efforts. In particular, the distinction between analog and digital reformatting in the ARL statistics is useful because it conveys important information about access. Equally, or perhaps more, important is data about the materials being preserved. Typically, preservation reformatting efforts are divided by format: still images (photographs, books pages, posters, etc.), sound recordings, and moving images. Most libraries probably already distinguish format in their internal statistics gathering. To be useful for comparative purposes, ARL libraries should collect and report data for these three categories of effort—microfilming, preservation photocopying, and digitization—and specify quantities for kinds of source materials. In addition, reasons for choosing a particular reformatting option should be indicated.

ARL also should collect parallel expenditure data for microfilming, preservation photocopying, and digitization. Currently, only data for photocopying and microfilming expenditures are collected. Interviews for this report revealed that some libraries include digitization efforts under "other preservation expenditures."

Table 5. Additional Reformatting Data

Microfilming
Does your library microfilm?
Yes
No
Where does the microfilming take place? Indicate activity in each category by percentage.
In house lab
Vendor

For all microfilming activities, what is the relative percentage for each category (totals to 100)
General collections:
Special collections:
Why do you microfilm? (Check all that apply)
Replace brittle volume
Create a surrogate
Cost effective
Copyright concerns
External funding source
Internal funding source
Preservation
Access
Photocopying (including print out from digital file)
Does your library photocopy library materials?
Yes
No
Where does the photocopying take place? Indicate activity in each category by percentage.
In house lab
Vendor
For all photocopying activities, what is the relative percentage for each category (totals to 100)
General collections:
Special collections:
Why do you photocopy? (Check all that apply)
Replace brittle volume
Create a surrogate
Cost effective
Copyright concerns
External funding source
Internal funding source
Preservation
Access
Digitization
Does your library digitize library materials?
Yes
No
Where does the digitization take place? Indicate activity in each category by percentage.
In house lab

Vendor
For all digitization activities, what is the relative percentage for each category (totals to 100)
General collections:
Special collections:
Why do you digitize? (Check all that apply)
Replace damaged item
Create a surrogate
Migrate from obsolete technology or format
Cost effective
Copyright concerns
External funding source
Internal funding source
Preservation
Access
Vendor driven mass digitization effort
In what quantities are the following digitized annually:
Bound volumes
Unbound sheets
Sound recordings
Analog disc
Magnetic tape
Digital
Optical media
Other
Moving Image Materials
Motion picture film
In addition to digitizing, do you have new negatives, internegatives, and prints struck?
Magnetic media
Optical Media
Total number of digital files created.
Total number of files submitted for long-term preservation

Third Party Strategies for Preserving e-Journals and Other Content

Recommendation

The ARL preservation statistics should provide opportunities for libraries to note examples of collaborative work and preservation R&D activities. A checklist for common national-level projects like Portico and LOCKSS should be developed. Ideally, such statements would be brief and include a link to a project Web site.

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List of Acronyms

ARL	Association of Research Libraries
CRL	Center for Research Libraries
CNI	Coalition for Networked Information
CIC	Committee on Institutional Cooperation
CLOCKSS	Controlled LOCKSS
CLIR	Council on Library and Information Resources
DigCCurr	Digital Curation Curriculum
DLF	Digital Library Federation
DLF	Digital Library Federation
GIS	Geographic Information System
IDEALS	Illinois Digital Environment for Access to Learning and Scholarship
IRENE	Image, Reconstruct, Erase Noise, etc.
iPres	International Conference on Preservation of Digital Objects
LOCKSS	Lots of Copies Keep Stuff Safe
MITH	Maryland Institute for Technology in the Humanities
NAVCC	National Audio Video Conservation Center
NDIIPP	National Digital Information Infrastructure and Preservation Program
NEH	National Endowment for the Humanities
OCLC	Online Computer Library Center
RLG	Research Libraries Group
SAMMA	System for the Automated Migration of Media Archives
CHIN	The Canadian Information Heritage Network
IFLA	The International Federation of Library Associations and Institutions
TRAC	Trustworthy Repositories Audit & Certification
UIUC	University of Illinois at Urbana-Champaign