Library Buildings and the Building of a Collaborative Research Collection at the Tri-College Library Consortium

Report to The Andrew W. Mellon Foundation

by Judy Luther, Linda Bills, Amy McColl, Norm Medeiros, Amy Morrison, Eric Pumroy, and Peggy Seiden

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About the Authors

Judy Luther is president of Informed Strategies, a consulting company in Ardmore, Pennsylvania. Before founding Informed Strategies, she was Director of North American Sales for the Institute for Scientific Information and worked for the Faxon Company in sales and product development. Her library experience includes serving as the Library Director at Embry-Riddle Aeronautical University and Documents Librarian at Stetson University. Author of the *White Paper on Electronic Journal Usage Statistics,* published by CLIR in 2000, she serves on the Board of The Charleston Advisor, where she is a frequent contributor, and on the Board of UKSG Serials. Her articles on electronic publishing issues appear in *Against the Grain*, *Information Today*, and *Smart Librarie*s (formerly *Library Systems Newsletter*).

Linda Bills is the Special Projects Librarian for the Tri-College Consortium. As a joint employee of the Colleges, she collaborates with librarians and computing staff on projects ranging from digital asset management to the replacement of the ILL system. Before September 2001, Ms. Bills was the Consortium Automation Coordinator, responsible for managing the ILS and other shared systems, and for promoting cooperative projects. Linda attended the 2000 Frye Institute. She has recently coauthored articles on "Managing Administrative Metadata" (*Library Resources and Technical Services*) and "Subject Web Page Management without HTML Coding" (*Information Technology and Libraries*)

Amy M. McColl is the Assistant Head of Technical Services for Monographs, Special Collections, and Preservation at Swarthmore College. She is also responsible for coordinating collection development activities in the library and represents Swarthmore in the Tri-College Consortium Collection Managers group. Ms. McColl was previously employed at the Free Library of Philadelphia, the Philadelphia Consortium of Special Collections Libraries, and the University of Pennsylvania Biddle Law Library. Her publications include the *NACO Participants' Manual* (Washington, D.C.: Library of Congress, Cataloging Distribution Service, 1994).

Norm Medeiros is Coordinator for Bibliographic and Digital Services at Haverford College. He oversees acquisitions, cataloging, and serials processes, coordinates the library's digital initiatives, and serves as economics bibliographer. His research interests include electronic resource management, metadata harvesting, and the changing role of technical services administrators. He authors a column in the quarterly journal *OCLC Systems & Services*, chairs the Association for Library Collections and Technical Services (ALCTS)

Cataloging and Classification Section (CCS) Policy and Research Committee, and was a presenter at the recent Association of College and Research Libraries' National Conference in Charlotte, North Carolina. His most recent publication, "Managing Administrative Metadata," coauthored with four Tri-College colleagues, appears in the January 2003 issue of *Library Resources & Technical Services*.

Amy Morrison, Associate College Librarian at Swarthmore College, focuses on issues relating to physical space in libraries, collection management and assessment, and Special Collections. She is involved in Tri-College cooperative activities in staff development and collection management. She has attended the Higher Education Resources Summer Institute for Women in Higher Education.

Eric Pumroy, Director of Library Collections and Seymour Adelman Head of Special Collections in the Bryn Mawr College Library, is responsible for coordinating the library's collection development activities. He also serves on the Directors' Advisory Board for the Tri-College Consortium and is involved in Tri-College cooperative activities in collection development and digital collections. Before coming to Bryn Mawr in 1999 he was Director of Programs and the Library at the Balch Institute for Ethnic Studies in Philadelphia.

Peggy Seiden has been College Librarian at Swarthmore College in Pennsylvania since 1998. Previously, she held the same position at Skidmore College in Saratoga Springs, New York. She serves on the American Library Association Council and on the Board of the Research Libraries Group. Her most recent publication, which she coauthored with other members of this grant project group, is "Should Three College Collections Add Up to One Research Collection? A Study of Collaborative Collection Development at Three Undergraduate Colleges," forthcoming in *Resource Sharing and Information Networks*.

Preface

This report has value to institutions of higher education far beyond the three colleges that compiled it. The conditions their libraries face—rising costs and dwindling space—confront many colleges and universities. The findings of their investigations into several subjects—electronic publishing trends, the needs and behaviors of library users, options for saving money on space and acquisitions—have relevance to multiple institutions. And solutions the Tri-College Consortium is considering—collaborative collecting, weeding, and storing—have wide potential applicability. So do the likely obstacles that this report identifies.

But beyond the practical value of the report, it stimulates thinking about the future of academic libraries overall—or more precisely, about the future of scholarly resource acquisition, preservation, and accessibility. Academe as a whole is facing a shortage of resources for storing and providing access to the materials on which scholarship and teaching depend. Librarians in general are struggling to understand and meet needs for both traditional and electronic resources. And given the demonstrated convenience, potential ubiquity, creative transmutability, and increasing demand for the latter, it seems clear that we must massively digitize library collections, not just in the hope of ultimately saving money, but to realize technology's potential for transporting the world's libraries to anyone, anywhere, with a computer. As this report suggests, collaborations among our institutions as well as among librarians, publishers, faculty members, and information technologists within them are absolutely essential.

To me, this modest report takes a substantial step toward determining what really is possible in that vision and how it could be approached. If Bryn Mawr, Haverford, and Swarthmore expand their collaboration by attempting to implement this report's suggestions, they may be pioneering for us all. I hope readers will use this report to consider possibilities for their own institutions, and to consider the future of cultural resource development as a whole.

Deanna B. Marcum
President, CLIR

EXECUTIVE SUMMARY

"Library Buildings and the Building of a Collaborative Research Collection at the Tri-Colleges," the planning grant awarded to the Tri-College Library Consortium by The Andrew W. Mellon Foundation that is the subject of this report, was designed to address the intersection of two central issues—collection space constraints and collaborative collection development—facing the libraries at Bryn Mawr, Haverford, and Swarthmore Colleges. Working with a consultant, a six-member Planning Group representing the three colleges and the consortium gathered data on the collections, convened focus groups of faculty and students, and engaged three publishing industry experts to assess the state of electronic publishing. After analyzing the data, the Planning Group studied alternatives for maximizing collection space and made recommendations for new models and strategies to be pursued by the Tri-College consortium.

Key Findings

- Approximately 75 percent of the items in three libraries' collections have circulated one or fewer times in the past 10 years.
- About 40 percent of the items in the collections overlap (that is, they are held on more than one campus). About half of these overlapping items have not circulated in the past 11 years.
- Students and faculty take significant advantage of the shared collections. Nearly one-third of the requests for loans made by Haverford patrons are for materials in the Swarthmore or Bryn Mawr collections. The percentages are similar for Bryn Mawr patrons and slightly lower for Swarthmore patrons.
- The potential for space savings from use of electronic materials is greatest in the sciences. Users of these materials have eagerly embraced digital formats and are willing to allow the libraries to deaccession issues of print journals that have become available online.
- The potential of digitization has yet to be realized in the humanities, which tends to be monograph-dependent, because the e-book industry is immature and lacks economic and technological models necessary for large-scale adoption.

- Students and faculty place a high value on shelf browsing as a means of discovering information and of evaluating and selecting materials.
- Faculty members value local ownership of materials and are concerned about weeding, which they believe would affect the quality of the collections and the ability of students and faculty to do research.
- Of the three colleges, Swarthmore has the most severe space crisis. It has less than two years of growth space. Bryn Mawr may lose most of its growth potential in order to accommodate new services and needs. Haverford has about five years of growth space.

Conclusions

The results of this study indicate that the Tri-Colleges may, by eliminating overlapping materials with low use, be able to gain sufficient shelf space over the near term or until the promise of digital formats can be more fully realized. Since use rates of older materials diminish significantly over time, the libraries could add shelving capacity though a judicious regular weeding program without affecting student and faculty research. Furthermore, cooperative collection weeding would provide an opportunity for the bibliographers and subject specialists to work together to realign their buying practices to limit overlap and redirect dollars, thereby enhancing the scope and depth of the collections. Ultimately, the libraries and colleges will benefit greatly from a more unified approach to collection development that integrates three independent collections into a single research collection.

However, data from the focus groups and a pilot study on weeding indicate that faculty members have serious concerns about moving toward a more integrated collection. The colleges must engage their faculties in discussions about trade-offs that will be necessary if the libraries maintain their current collection practices and duplication or overlap rates. (In this report, "overlap" refers to one or more copies of the same title in different libraries, as opposed to "duplication" which refers to copies of a title beyond the first one located on the same campus.) The libraries should also note that any weeding project must be done in tandem with faculty; otherwise, the libraries risk the loss of credibility and support from their constituents.

Even if the faculty did support moving toward an integrated collection, weeding would not solve all the libraries' space needs. Compact shelving, which has been proposed for Swarthmore's McCabe Library and could be added to other libraries in modest amounts, could create significant space gains. However, the colleges would still need to continue to pursue off-site storage options if no additional space is planned within the next 10 years.

I. OVERVIEW

The Grant

This report is the product of a planning grant awarded by The Andrew W. Mellon Foundation in 2001 to the Tri-College Library Consortium, which comprises the libraries of Bryn Mawr, Haverford, and Swarthmore Colleges. The grant proposal, entitled "Library Buildings and the Building of a Collaborative Research Collection at the Tri-Colleges," set out a research agenda designed to address two central questions. The first question was a challenge: How could the three libraries come to terms with space problems caused by ever-growing collections and increasing demands to accommodate media, teaching, and student study areas in an environment in which library building expansion was a remote possibility? The second question was an opportunity: Could the libraries take advantage of their history of cooperation and the powerful tool of a unified online catalog to create a single research-quality collection out of the combined holdings of three strong liberal arts colleges?

The two questions seemed inextricably linked because many of the potential solutions to the space crises involved the same types of cooperative activities that would be needed to build an integrated collection. By addressing the two issues in a single study, the members of our Planning Group hoped to think about Tri-Colleges' holdings in a broad, creative way, and to identify steps that would enable the colleges to solve their space problems while building a richer, unified collection.

The proposal put forth a series of 14 questions as a way of framing the challenges and opportunities our Planning Group wished to address and the information we needed to gather during the project. The proposal and questions appear in Appendix 1. Several specific issues highlighted by these questions are outlined in the following paragraphs.

First, central to the project was the need to develop an understanding of the interrelationship of the three collections. More precisely, we needed to determine the following:

- The extent of overlap of materials among the collections
- Where the collections overlapped by age and subject area
- Trends in growth rates of particular areas of the collections and formats in which new materials had been acquired
- Strengths of each collection
- Areas where all three collections were relatively weak
- The role of interlibrary loans (ILL) and use of the Pennsylvania Library Consortium Initiative (PALCI) on local collection-development decisions and the appropriate balance between such resources and local collecting
- How much of the needed data were readily available and what types of tools would be needed to mine the data

A second area of investigation was collection-use patterns and what they indicated about an appropriate level of overlap. This investigation entailed an examination of the following:

- Circulation patterns across subject areas and age of the collections and libraries
- Information-seeking behaviors of faculty and students; in particular, the importance of shelf browsing and the rate of adoption of digital resources
- Courses offered by each of the colleges and the degree to which the curricula overlapped
- What enhancements to the Tri-Colleges' shared catalog, Tripod, and Web sites could assist patrons in using the collections on- and off-site.

The Planning Group assumed that the three libraries desired to move toward a more integrated collection. Thus, we asked the following questions:

- What are the political realities associated with integration, and how could those advantages be communicated to local constituents?
- What processes and mechanisms need to be in place to foster joint collection development and management?
- What should be the role of the faculty in an integrated collection-development scenario?
- What are the implications for public service of an integrated collection?

Finally, the Planning Group explored the three libraries' needs for space for physical collections and services for the next 25 years.

- How would e-publishing affect growth rates of the collections?
- How should the colleges address issues of long-term access to electronic resources?
- Do digital storage and streaming of multimedia hold potential for saving space and reducing acquisitions budgets?

The Environment

Bryn Mawr, Haverford, and Swarthmore Colleges have much in common. They all originated as Quaker colleges, have between 1,100 and 1,500 students, are known for their strong liberal arts curricula, and are ranked among the best private liberal arts colleges in the country. All three institutions are located within a few miles of each other in the Philadelphia suburbs.

Despite these similarities, there are genuine differences among the three colleges. Swarthmore was coeducational from the time of its founding in 1864, and it came out of a different branch of Quakerism than did the other two. Haverford, founded in 1833, was an all-male college until 1980. Bryn Mawr was founded as a woman's college in 1885, and has offered doctoral-level programs since its opening. It remains a woman's undergraduate institution, but has

male students enrolled in graduate programs.

Bryn Mawr and Haverford, often referred to as the "Bi-Colleges," are located within a mile of each other, and have partnered in a wide range of activities. Each school's students have been allowed to take courses on the other two schools' campuses since the late 1940s, and as a result, there has been a fair amount of academic cooperation. Haverford, for example, hosts the only music and astronomy programs, while Bryn Mawr supports the only programs in archaeology, art history, and geology. In addition, there are formal bi-college programs in Africana Studies, East Asian Studies, Comparative Literature, Education, and French.

Swarthmore, situated 10 miles south of the other two colleges, has been involved in fewer collaborative efforts, although even here the history of cooperation is a long one. During World War II, the three schools shared faculty and briefly considered unifying their libraries under a single administration. Collaborative efforts slackened after the war, but academic, social, and library ties have recently begun to increase. All three colleges now operate on the same academic calendar, and students are allowed to take classes at all schools. Free shuttle buses and vans provide transportation.

The libraries have been the most active units on each campus in pursuing cooperation with their counterparts.[1] The catalyst for much of this activity was the agreement in the late 1980s to set up Tripod, the three libraries' shared online catalog. Tripod, which became operational in 1991, offers a unified catalog to all of the libraries' 2.3 million volumes and an easy means of ordering books from another campus. All requested materials are delivered within 24 hours via a Tri-College library delivery service. Members of the library staffs have met regularly over the last decade to oversee the operation of Tripod, and those contacts have expanded in recent years as the libraries found it worthwhile to cooperate on purchasing electronic resources and setting up electronic reserve programs. Consortium activities have increased dramatically in the last few years, spurred by the appointment of new library directors at each school. In the last two years the libraries have collaborated on cataloging Web sites, creating Tri-College electronic subject guides, setting up an online reference service, and initiating a pilot digital collections program. The work of the Tri-College libraries is done by a combination of central consortium staff (currently three people) and the staffs of the three college libraries, most frequently operating within the structure of Tri-College committees and task forces.

While this section has focused on cooperation, it must be remembered that the colleges and their libraries remain happily and even fiercely independent entities. Differences in institutional cultures and organizational structures, in the relationships between faculty and staff, in decision-making and budgeting practices, and in resources

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[1] Freeman, Michael Stuart. 1997. Almost a unified library: Bryn Mawr, Haverford, and Swarthmore College library cooperation during the 1940s. *Libraries & Culture* 32 (Winter): 1-37.

and institutional priorities, not to mention differences in the temperaments of administrators, shape the possibilities for cooperative effort.

Organization of the Project

The Planning Group for the study consisted of staff from all three libraries, a member of the Tri-Colleges Consortium staff, and a consultant who coordinated the work and compiled the results. The members of the group were

> Linda Bills, Tri-Colleges Consortium Special Projects Librarian
> Amy McColl, Assistant Head of Technical Services, Swarthmore College
> Norm Medeiros, Coordinator, Bibliographic and Digital Services, Haverford College
> Amy Morrison, Associate College Librarian, Swarthmore College
> Eric Pumroy, Associate Director for Collection Development, Bryn Mawr College
> Peggy Seiden, College Librarian, Swarthmore College

Judy Luther, President, Informed Strategies, was the project consultant.

The work of the planning grant was divided into five major components: (1) assessing the collections; (2) analyzing trends in electronic publishing; (3) understanding student and faculty library use; (4) examining options for gaining collection space; and (5) exploring models for organizing the work of collection development and management in a collaborative environment. This report is organized according to those components. The key findings for each section are summarized below.

Results and Findings

1. Collection Assessment

The Planning Group spent a considerable amount of time analyzing data from Tripod in an effort to understand the strengths and weaknesses of the Tri-Colleges' collections, the rate and pattern of collection growth, and how students and faculty use the collections. While further analysis of the data is called for, the following trends seemed clear.

Use of the collection. Three-quarters of the collection rarely circulates: 57 percent of the volumes in the combined collections have not been charged out in the last 10 years, and an additional 17 percent have been charged out only once. Nearly a third of the collection was published before 1950, and these older books circulate at a significantly lower rate than recent ones do. Furthermore, there is a substantial rate of overlap among the collections at the three libraries. Approximately 40 percent of the titles are held by more than one library, and of these, half have not circulated in the last 11 years. These high levels of uncirculated copies suggest that the collections could be weeded without jeopardizing libraries' ability to meet the needs of students and faculty. Since the libraries are all facing space crises,

reducing the size of the collections can extend the useful lives of their current buildings.

Overlap in new acquisitions. The libraries frequently acquire the same title on multiple campuses. Currently, approximately 80 percent of the books Swarthmore acquires through its approval plan are also purchased through the joint Bryn Mawr/Haverford approval plan. If the libraries can reduce the level of overlap in their current buying, they can free funds to use on expanding the breadth of the Tri-College collection.

Cross-campus borrowing. Cross-campus borrowing represents a significant portion of the total borrowing of both faculty and students. In 2001, it accounted for 31 percent of all borrowing at Bryn Mawr, 37 percent at Haverford, and 20 percent at Swarthmore. These borrowing patterns underscore the importance of a strong core collection at each library; at the same time, they suggest that students and faculty on each campus have become accustomed to drawing on the collections of the other two libraries.

2. Trends in Electronic Publishing

Electronic publications have been absorbing ever larger percentages of library acquisition funds in recent years. One of the important issues for the planning project was to determine whether electronic publishing is likely to reduce the growth in the size of the libraries' physical collections and thereby decrease the need for additional collection space in the future. To help with this analysis, the Planning Group retained industry consultants to assess the current availability of electronic books and journals and the prospects for future expansion of electronic publishing. Major findings are summarized in the following paragraphs.

E-books. Electronic books are not yet a viable substitute for regular books because of copyright issues, the lack of a proven economic model, and the absence of a comfortable reading system. Nonetheless, e-books have considerable value as reference books, reserve readings, and browsing copies. In a consortial environment, e-books are especially valuable, because they ensure equal access to everyone in the system—including people working from offices, dorms, and off-campus sites.

Print-on-demand. Publishers are beginning to move toward a print-on-demand system for book distribution, which holds the promise that books will rarely go out of print. If this system comes into place, libraries will have fewer worries about books becoming unavailable and may not feel such a strong need to purchase duplicates.

E-journals. Electronic journals are becoming increasingly common, particularly in the sciences. Most major publishers have initiated programs to convert back runs of their titles to electronic form. Whether libraries will discard print copies once the electronic versions are available depends upon the reliability of the provider and the completeness of the content. In cases where confidence in the provider is very high (the nonprofit JSTOR is one example of an

organization held in such regard), the libraries have the potential to realize significant space savings by eliminating duplicate sets. The Tri-College libraries do not have the same archival role that research libraries have. They can more readily shift from print journals to electronic form, knowing that print copies will still be available from other libraries should they be needed.

3. Understanding Student and Faculty Use

The Planning Group conducted focus groups on each campus to gain a clearer understanding of how faculty and students use the collections and to elicit their reactions to some of the options being considered. The most strongly voiced concerns were as follows:

Browsing. Faculty and students place a high value on being able to browse the shelves and do not see current online browsing as a satisfactory substitute. Faculty members use browsing not just to identify books to read but also to locate references and background information. If the libraries reduce the amount of overlap among their collections, Tripod's browsing capabilities will have to be significantly enhanced and the number of texts available in electronic form substantially increased. The libraries will also need to develop ways of measuring the on-site use of their collections.

Locally needed materials. Students and faculty agreed that print materials used in coursework are time-sensitive and need to be housed on the campus where the course is being taught. As the libraries consider the issue of overlap, they will need to find ways of distinguishing between books needed locally for course support and materials needed for research, which can be housed anywhere in the system.

Electronic resources. Electronic information sources are heavily used and appreciated, and in some disciplines they are changing the way research is done. Because of the nature of the research process and the widespread availability of electronic resources, the greatest changes are occurring in the sciences. Fewer changes have occurred in the humanities, where scholars continue to depend heavily on print materials. These variations in use patterns among the disciplines argue for a discipline-by-discipline approach to changing acquisitions patterns.

New types of spaces. Both faculty and students supported the creation of new spaces in the libraries, particularly comfortable informal spaces, group study areas, and places for using media.

Faculty involvement. Faculty members expressed concerns about the effects of moving to an integrated Tri-College collection. They believe that local ownership of books and journals in a faculty member's discipline is an important indication of a good academic library; accessibility through a consortium is not the same. Faculty members were concerned that weeding will harm their students' work as well as their own. Any changes in the way the collections are managed will require that the libraries work closely with the faculty members so that the libraries make the right collection decisions and the faculty members understand the trade-offs.

4. Space Planning Options

All three libraries are facing space crises and have few prospects for expansion. To resolve this dilemma, the Planning Group examined ways of making the existing space more satisfactory for the near term, or until the impact of electronic publishing on library space needs can be predicted more clearly. All constituents must be apprised of the costs, trade-offs, and opportunities associated with these options. The most promising options are discussed below.

Deaccessioning. Space for several years' worth of growth may be gained by weeding duplicates and overlaps that have not circulated in the last 11 years. To realize significant space gains, the libraries will need to (1) expand the scope of materials considered for weeding and (2) implement routine weeding programs. Given the age of the collections and the low level of use of the older materials, both activities seem possible. Although weeding holds promise for recovering space, it may compromise the collections if it is not done carefully and in consultation with faculty.

Compact shelving. All three colleges use compact shelving in at least one of their libraries, and Swarthmore plans to install units in McCabe Library that will gain 10 years of expansion space. The gains to be made from compact shelving are limited, however; the floors in most of the libraries are not strong enough to support the additional weight. Moreover, this option is desirable only for low-use collections, since only a small part of the collection is accessible at any one time.

Off-site storage. A number of research institutions have created off-campus storage to house low-use books. Off-site storage has the advantage of keeping books in the system and making them available within 24 hours, the same response time promised by the rest of the Tri-College system. The disadvantage is the significant cost of building and maintaining the facility. Swarthmore and Bryn Mawr are looking into a proposed cooperative storage facility for Philadelphia-area cultural institutions.

Electronic resources. The growth in the space required to house the libraries' journals collections is slowing at an estimated rate of 360 linear feet (LF) per year as a result of offering journals in electronic rather than print form. The space savings should continue to grow in the sciences and, at a slower rate, in the social sciences and humanities. Other significant space savings are being realized in reference and government documents. Space savings through purchase of electronic books is probably at least five years away.

5. Exploring New Models

As the Tri-College libraries work together to address their common space problems, they have the opportunity to move toward the creation of an integrated research collection—one capable of supporting a much broader range of student and faculty work than is possible at present. Building an integrated collection will require that the libraries expand the decision-making structures and communication tools that they have developed during the last few years. The libraries will

have to continue to find new approaches to doing their work. The Planning Group identified the following approaches as most important:

Organization of collection development. Each of the libraries organizes its collection-development activities in a different way, resulting in different approaches to collections and different methods of decision making. To operate effectively in a collaborative environment, the libraries will need to adopt other models for organizing their work, including the model of the research university subject specialist.

Tri-College approval plan. Reducing duplication in new acquisitions among the three libraries can free funds to spend on materials not currently being acquired. Since a major portion of the libraries' book budgets is spent through approval plans, finding a way of coordinating these plans is critical.

Deaccessioning projects. Large-scale, coordinated weeding projects are an essential part of any long-term strategy for recovering library space. Undertaking such projects without weakening the overall quality of the collections will require careful communication among librarians and faculty and, at least for a time, a central project staff to manage the process.

Catalog enhancement. The greatest faculty and student concern about an integrated collection is the loss of the ability to browse the shelves. The libraries will need to find methods of making the shelf-browsing function in Tripod more usable and of enriching the cataloging records so that virtual browsing is an acceptable substitute.

II. COLLECTION ASSESSMENT

A significant portion of the planning grant focused on understanding the development and use of the Tri-Colleges' collections and their impact on the growth and space planning needs of the three libraries, both individually and as a consortium.

Data-Gathering Process

A Statistics Task Force was designated to gather data on the collections: their size, strength, duplication, growth rate, and use.[2] Members of this task force were Scott Silverman, Norm Medeiros, Barbara Weir, and Linda Bills.

As a preliminary step, the colleges worked with Electronic Scriptorium to identify and merge remaining duplicate bibliographic

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[2] The work done under the planning grant followed well-established practices and methods such as those outlined in the *Guide to the Evaluation of Library Collections* (Subcommittee on Guidelines for Collection Development, Collection Management and Development Committee, Resources Section, Resources and Technical Services Division, American Library Association (ALA). 1989. Chicago: American Library Association); and in the *Guide to Review of Library Collections: Preservation, Storage, and Withdrawal* (Lambert, Dennis K., et al., compilers. 2nd ed. 2002. Chicago, Ill., and Lanham, Md.: Association for Library Collections

records in the database. This process eliminated about 60,000 duplicates that had survived the original record merger, done in 1990. Additional database massaging was done to facilitate the creation of reports based on call numbers.

The task force consulted bibliographers and determined that statistics should be gathered for 215 subject areas.[3] Their goal was to obtain as much information as possible to cover four areas of inquiry:

1. Collection size, growth, and duplication (quantity)
2. Collection strength (quality)
3. Collection use
4. Patron needs

The following statistics were accordingly gathered. Unless otherwise stated, statistics came from report functions in Tripod. Tripod was fully implemented in 1991, and all such statistics date from that time or later.

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and Technical Services, ALA, in cooperation with Scarecrow Press). Studies of collection overlap, use, and age and composition go back at least 100 years. Thomas E. Nisonger's 1992 bibliographic study *Collection Evaluation in Academic Libraries: A Literature Guide and Annotated Bibliography* (Englewood, Colo.: Libraries Unlimited) and the sources it cites document this literature. Nisonger is updated by the more selective *Collection Evaluation Techniques: A Short, Selective, Practical, Current, Annotated Bibliography 1990-1998* (Strohl, Bonnie, compiler. 1999. Collection Evaluation Techniques Committee, Collection Development and Evaluation Section, Reference and User Services Association. Chicago: ALA).

We chose to collect circulation figures in spite of the controversy surrounding them, and we will be looking for ways to use these numbers, along with other measures of the value of titles, in order to make judgments about weeding. Early results of conversations with faculty members showed that their views on the value of circulation figures for collection management align with the famously negative reaction of faculty at the University of Pittsburgh to their library's 1978 research, as reported in the so-called Pittsburgh Study (Kent, Allen, et al. 1979. *Use of Library Materials: The University of Pittsburgh Study*. New York: Marcel Dekker). See Nisonger, op. cit., pp. 55-60, for citations to articles relevant to the controversy. Perhaps because our circulation counts included the entire collection, as opposed to only recently acquired materials, our overall noncirculation rate was much higher than Pittsburgh's or those in other follow-up studies (for example, Hardesty, Larry L. 1981. Use of Library Materials at a Small Liberal Arts College. *Library Research* 3[Fall]: 261-82, and Hardesty, Larry L. 1988. Use of Library Materials at a Small Liberal Arts College: A Replication at Eckerd College of the 1978 University of Pittsburgh Study. *Collection Management* 10[3-4]: 61-80). Our rate of noncirculation for materials acquired in the last 10 years more closely aligns with Kent's and Hardesty's findings

Our motives and methods for counting titles by subject follow the tradition of the Association of Research Libraries' North American Collections Inventory project (Farrell, David, and Jutta Reed-Scott. 1990. The North American Collections Inventory Project: Implications for the Future of Coordinated Management of Research Collections. *Library Resources and Technical Services* 33[January]: 15-28 and the National Shelflist Count studies of the 1970s and 1980s. See, for example, the last iteration of the count, *Titles Classified by the Library of Congress Classification: National Shelflist Count, 1985*. 1986. Chicago: Resources and Technical Services Division, ALA). Our integrated library system allowed us to count titles more precisely and by more parameters than the National Shelflist Count could.

Our figures also align with those of Hardesty's overlap study (Hardesty, Larry L., and Collette Mak. 1994. Searching for the Holy Grail: A Core Collection for Undergraduate Libraries. *Journal of Academic Librarianship* 19 [January]: 362-71), which provides both a concise review of the overlap literature and reports results that reflect our own in terms of percentage of titles uniquely held.

[3] Only Library of Congress and Dewey print monographs were examined. Special collections and government documents were excluded.

Collection Size, Growth, and Duplication.
Number of monographic titles and volumes, and annual growth
    from 1991 to the present
Monographic title and volume overlap among the libraries

Collection Strength4
Number of foreign language titles
Collection age by publication year
Interlibrary loan lending activity

Collection Use
Number of circulation transactions
Circulation rates (e.g., number of volumes with 0, 1, 2-5 or 6+
    circulations) in 11 years
Circulation rates to faculty
Circulation rates to non-Tri-College libraries (ILL loans)
Circulation distribution to faculty and students based on depart-
    ment or major
Cross-library borrowing within the Tri-Colleges

Patron Needs (non-Tripod)
Analysis of courses offered in the last four semesters
Borrowing from outside of the three colleges (that is, ILL borrows)

Data were prepared for the bibliographers in a FileMaker pro-
gram created by Linda Bills. Organized by subject area, the program
displays both summary and detailed data for each of the criteria
listed above. It also produces comparative reports specific to each
type of data, for instance, a report listing each of the 214 subject areas
showing the number and percent of uncirculated titles in each col-
lege and for the consortium as a whole. The comparative reports are
intended to help bibliographers see patterns of growth and use and
quickly spot exceptional cases. Breakdowns are available for the con-
sortium as a whole and for each library. Examples of the reports are
provided in Appendix 3 (http://www.brynmawr.edu/consortium/
MellonPlanningGrant).
    As the recommendations of this study are implemented, feed-
back from the subject specialists will aid in determining which
data are useful, what additional data are needed, and how the data
should be presented. The aim is to develop an ongoing data collec-
tion and analysis tool.

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4 Collection strength was the most difficult measure to obtain. Subjective expert
evaluation was not possible. At the time of the study, the OCLC Automated
Collection Analysis Service (ACAS) reports were not affordable. With the recent
reduction in ACAS prices, the colleges hope to revisit this option and to explore
other methods for comparison with peer collections.

Data-Gathering Results

The results reported here reflect the broadest perspective on the data. The three discipline divisions cover roughly the following Library of Congress classes: Humanities A–BD, BH–DU, E–F, M–PZ, TR, and Y–Z; Social Science BF, DX, G–GC, and GN–LG; and Science GE, Q–TP, TS–TX, and U–V.

Collection Size and Growth

Discipline size and growth patterns reflect the stable distribution of monographs in the disciplines, with the preponderance of books in the humanities. Thirty percent of titles and 32 percent of volumes currently in the collections were added in the last 10 years (Table 1).

Table 1. Subject Distribution of the Tri-College Collections								
Discipline	1991 # Titles	%	1991 # Volumes	%	2001 # Titles	%	2001 # Volumes	%
Humanities	494,071	67	714,620	69	628,492	66	928,329	67
Social Science	153,973	21	210,984	20	213,606	22	295,601	21
Science	90,367	12	114,819	11	116,390	12	153,822	12
Total	738,411	100	1,040,423	100	958,488	100	1,377,752	100
Percentage Purchased 1991–2001					30%		32%	

Collection Overlap

"Collection overlap" refers to the total of all titles and volumes that are held at more than one campus. "Overlap" is not the same as "duplication," which the Planning Group defined as copies of a title beyond the first one located on the same campus.

Monographic overlap rates were tracked both by the number of titles held in more than one library and by the number of volumes represented by that overlap (Table 2). The number of volumes was more than twice the number of titles, reflecting not only multivolume sets but also instances of "triplication." Rates were measured against the total collection. The data suggest that the introduction of the shared catalog in 1991 led to reduced duplication in all disciplines.

Table 2. Monograph Overlap Rates of the Tri-College Collections								
Discipline	Pre-1991 Titles	Rate	Post-1990 Titles	Rate	Total Titles	Rate	Overlapped Titles	Rate
Humanities	129,258	26%	28,639	21%	157,897	25%	361,122	39%
Social Science	56,637	37%	15,591	26%	72,228	34%	142,253	48%
Science	19,053	21%	3,153	12%	22,206	19%	44,715	29%
Total	204,948	28%	47,383	22%	252,331	26%	548,090	40%

Serial subscription overlap rates vary by library (Table 3). There are 7,259 current print serial subscriptions[5] on the three campuses. These represent 5,216 separate titles, and 2,026 second or third subscriptions, with 530 titles subscribed to on all three campuses.

Table 3. Overlap Rates of Print Serial Subscriptions

	Total Subscriptions	Unique Subscriptions	Overlap Subscriptions	Rate	Duplicate Subscriptions
Bryn Mawr	2,891	1,710	1,181	41%	
Haverford	1,699	654	1,045	62%	
Swarthmore	2,669	1,333	1,336	50%	
Tri-College	7,259		3,562	49%	2,026

Electronic serials overlap extensively with print journals. Purchasing decisions for electronic journals and journal collections have been made primarily to provide access to titles known to be used in print. Collectively, the Tri-College libraries have 5,216 print journal titles and 2,200 e-journal subscriptions, not including full-text coverage in aggregator databases such as Lexis-Nexis. The total number of journal titles available in print or electronic form has increased by 10 percent, or 500 titles, since the Tri-Colleges began jointly licensing content for the consortia member libraries. Seventy-three percent of the e-journals, compared with 50 percent of print journals, are available in all three schools.

The growth of electronic resources in the colleges is illustrated in Table 4.

Table 4. Growth of Electronic Resources at the Tri-Colleges

Year	E-Journals			EJ Coll.			Databases			DB w FT		
	BMC	HC	SC	BMC	HC	SC	BMC	HC	SC	BMC	HC	SC
1991	0	1	3	0	0	0	0	5	0	0	0	0
1996	11	6	11	1	0	2	21	8	11	0	0	1
2001	40	26	30	10	10	10	63	33	50	11	8	11

BMC= Bryn Mawr College; HC=Haverford College; SC=Swarthmore College. E-Journals = single title purchases; EJ Coll. = Collections of e-journals such as JSTOR, Ideal; Databases = A&I or similar resources; DB w FT = A&I databases with some full text such as Lexis-Nexis or Expanded Academic.

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5 "Serials" include print periodicals, annuals, monographic serials, and continuations. Excluded are government documents and online and microfilm subscriptions.

Collection Age

Thirty-two percent of the circulating monographs in the collection were published before 1950, and 45 percent were published between 1950 and 1990. The remaining 20 percent were published since 1990 (Table 5).

Table 5. Age of the Collection		
Publication Date	# Titles	Percent
Pre-1950	326,433	31.56
1950-1969	178,783	17.2
1970-1989	291,797	28.21
1990-	200,810	19.42
No Date	36,391	3.52

Interlibrary Lending and Borrowing Activity

ILL activity may be an indirect measure of collection strength. Data indicate that the Tri-Colleges loan nearly twice as many items as they borrow. Further data gathering on ILL could indicate the value that the research community places on specific parts of the collections. A snapshot of ILL patterns showed that approximately 50 percent of Tri-College loans were in the humanities, 40 percent in the social sciences, and 10 percent in the sciences.

Circulation

Examinations of usage levels in the consortium revealed that 57 percent of the 1.39 million volumes in the circulating collection had not been borrowed since Tripod was implemented in 1991 (Table 6). Approximately 175,000 of these volumes with no circulations are overlaps (held by more than one library).

Table 6. Circulation Levels since 1991		
# Circulations	# Volumes	Percent
0	723,063	57.41
1	220,491	17.51
2-5	241,054	19.14
6+	74,899	5.95

A further examination of circulation levels for duplicated items shows that the percentage of these items with zero circulations is slightly lower than that for volumes as a whole, indicating that some of the overlap is warranted by higher usage (Table 7). However, it is still clear that over half the overlap volumes have little or no current use.

Table 7. Circulation of Overlap Items since 1991		
# Circulations	**# Volumes**	**Percent**
0	272,877	50.58
1	101,317	18.78
2-5	122,350	22.68
6+	42,944	7.96

An analysis by publication date for volumes in all disciplines shows a direct correlation between circulation activity and the age of an item (Table 8).

Table 8. Circulation by Publication Date since 1991			
Publication Date	**# Volumes**	**# Volumes w/0 Circ.**	**% w/0 Circ.**
Pre-1950	380,724	306,962	80.63
1950-1969	256,927	168,310	65.51
1970-1989	379,594	174,264	45.91
1990-	242,262	73,527	30.35

Cross-Library Borrowing

The rate of cross-library borrowing within the Tri-Colleges has been tracked since the introduction of the shared online system. Table 9 indicates that, after an initial jump, cross-campus borrowing leveled off for many years and has recently begun to rise again. The higher levels for Bryn Mawr and Haverford are largely due to the existence of Bi-College programs and the Bi-College approval plan.

Table 9. Rates of Borrowing from Non–Home Campuses								
Patron's Campus	**Pre-Tripod**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Bryn Mawr	23%	32%	30%	30%	32%	32%	29%	31%
Haverford	26%	28%	25%	25%	30%	30%	29%	37%
Swarthmore	7%	12%	11%	17%	15%	19%	19%	20%

We undertook a more detailed analysis of cross-library borrowing by faculty departments and student major. In the process, we uncovered data-tracking inconsistencies that, although now corrected, meant that faculty data could not be gathered retrospectively. Student data were available; Tables 10 and 11 show the type of information obtained.

Table 10. Cross-Campus Borrowing Rates by History Majors January 1999–December 2001

Source	BMC Students	HC Students	SC Students
Bryn Mawr	60%	24%	13%
Haverford	26%	63%	12%
Swarthmore	14%	13%	75%

Table 11. Cross-Campus Borrowing Rates by Math Majors January 1999–December 2001

Source	BMC Students	HC Students	SC Students
Bryn Mawr	78%	23%	3%
Haverford	14%	67%	3%
Swarthmore	9%	10%	94%

Patron Needs Based on Curriculum

The Planning Group created a system to categorize the colleges' courses and enrollments into the same subject divisions that were applied to the collections and to rate courses in terms of degree of dependence on library resources. Although the measures of need obtained seem useful, assigning the subjects proved difficult and has not yet been completed. Further work is needed to determine whether this measure can be efficiently applied to patron needs analysis.

Borrowing from Beyond the Tri-Colleges

Another potential measure of unmet patron needs would be interlibrary borrowing activity from outside the three colleges. Although we have rough numbers of requests, subject classification information is not available for PALCI and difficult to compile from Online Computer Library Center (OCLC) requests.

The interlibrary borrowing patterns of the three schools reveal an emphasis on books (60 percent books to 40 percent journals). Half of the books borrowed came from PALCI, a statewide system with patron-initiated borrowing and fast response time. Currently PALCI handles only monographs; its introduction has increased the interlibrary activity for books. Nearly half (47 percent) of interlibrary borrowing from outside the Tri-Colleges was done by undergraduates.

Key Findings

- Approximately 40 percent of the circulating titles in the three college libraries have copies in another library.
- Fifty-seven percent of the circulating volumes have not circulated in the last 11 years; an additional 17 percent have circulated only once. Older materials circulate less frequently than more recent

materials do. Fifty percent of overlapped titles have had no circulation in 11 years.

- Overlap in the current approval plans between Swarthmore and the Bryn Mawr/Haverford shared plan is 80 percent. Overlap within the Bi-College plan itself is 15 percent.
- Patrons are comfortable borrowing materials from the other libraries. Cross-library borrowing rates are steady or rising.
- Humanities materials account for 67 percent of the monographic collection. Social science materials account for 21 percent and have the highest overlap rate. Science materials account for 12 percent and have the lowest overlap rate.

Data Collection Issues

Data collection accuracy and usefulness could be improved in several ways, a few of which are not under the Tri-Colleges' direct control. For example:

- An ongoing data collection system should be instituted, particularly for "snapshot" statistics that are not available in the historical system reports.
- The bibliographers should update the current subject categories, which now number 215, to bring them in line with collection concerns.
- Swarthmore and Haverford currently do rolling inventories; the Bryn Mawr collection was last inventoried in 1990. Coordinating inventory schedules with collection evaluation schedules would be valuable.
- Each library has a different program to capture in-library and noncirculating use. In-library use in particular is of concern to the faculty, and tools for measuring this would be helpful. Likewise, the statistics programs used for this study could not count reserve use.
- A few collections restrict circulation to their own campus; use statistics for these materials will not be a true reflection of demand.
- Interlibrary loans from outside the Tri-Colleges could be more closely analyzed if more data were available, especially from PALCI.
- A better way needs to be devised to analyze patron needs as reflected in courses and enrollment.

III. TRENDS IN ELECTRONIC PUBLISHING

The economics of publishing on the Web is prompting a shift from ownership of a local print copy to access to a remote electronic copy. It is more efficient for publishers or vendors to host content on the Web, in a location that users can access from any place at any time, than to sustain the print model, where materials are printed, distributed, bound, and retained locally. Libraries are questioning the need to retain print copies locally when material is reliably available online.

In order to assess the impact of electronic publishing on acquisitions and weeding, the Planning Group retained industry consultants to conduct research on the availability of current and previously published books and journals in electronic form. Rick Lugg of R2 Consulting Services addressed e-book issues, and October Ivins and Marilyn Geller addressed e-journal issues. The results of their research, performed in fall 2001, are presented in this section and the full reports are available in Appendixes 4 and 5 at http://www.brynmawr.edu/consortium/MellonPlanningGrant/). The Planning Group then considered the e-publishing landscape to evaluate its potential impact on Tri-College collections and space.

Trends in E-Books

The total number of paperback and hardbound books published in the United States in 2000, according to the 2001 *Bowker Annual*, was slightly less than 100,000, down from 120,000 in 1998. The average number of academic print titles handled on approval plans for 2000–2001, according to *Blackwell's* and *Yankee Book Peddler*, ranged between 40,000 and 50,000. *Books in Print* estimates that the total number of e-books, regardless of year issued, is about 40,000.

Although e-books have not yet enjoyed commercial success, between 80 percent and 100 percent of academic publishers are converting their titles into PDF, XML, and OEB standards that provide them with greater options for electronic distribution and print on demand. Rick Lugg estimates that by 2004 most academic publishers will have their new titles in format-neutral repositories, making possible print-on-demand or electronic publishing.

E-books are currently available from three sources: intermediaries that serve as a distribution channel, publishers hosting the content themselves, and libraries initiating projects sometimes in conjunction with publishers.

Intermediaries present the works of many publishers and are the most visible source of book content in electronic form. Although netLibrary and Questia have 25,000 and 40,000 volumes, respectively, of predominantly older titles, neither had a sustainable economic model. Ebrary accepts books only in PDF format. This strategy allows them to secure newer content. They have approximately 20,000 titles. The most successful intermediaries at this point have a discipline focus; they include Knovel (engineering reference works), Ovid (nursing titles), Xrefer (linked reference works), and Books 24x7 (technology titles).

Publishers such as Gale, MacMillan, Wiley, and Oxford University Press are offering small well-respected collections in electronic form. The Mellon Foundation has been funding the exploration of various approaches. Two of these include Bibliovault at the University of Chicago, which offers more than 5,000 titles from 20 university presses available on demand (http://www.bibliovault.org/), and the History E-Book Project at the American Council of Learned Societies, which is working to convert more than 500 back list titles of

significance in history and to publish 85 new electronic titles. (http: //www.historyebook.org/intro.html)

Library-sponsored initiatives include the University of Virginia's Electronic Text Center (http://etext.lib.virginia.edu), which offers 1,800 public domain titles available in MS Reader and Palm formats. The Committee on Institutional Cooperation, comprising the Big Ten Athletic Conference and the University of Chicago, is developing a cooperative pilot to make their current university press titles available in PDF format to their member libraries. (http://www.cic.uiuc.edu/programs/UniversityPressCollaboration/index.shtml)

At Carnegie Mellon, University Librarian Gloriana St. Clair and Raj Reddy, the Simon Professor of Computer and Robotics, are developing the Universal Library. Their goal is to digitize one million books at sites in India and China. They have completed a pilot of 100 books with funding from the National Science Foundation and they are expecting additional funding to support shipping of books overseas for conversion, selecting books, clearing copyrights, developing a scalable database, and doing related research on text language processing and automatic metadata creation programs. (http://delta.ulib.org/html/index.html)

University of Pennsylvania (UP) has partnered with Oxford and Cambridge University Presses to create History Books Online for research purposes. With funding from the Mellon Foundation, UP is hosting all Oxford and Cambridge University Press history titles since 1999 to study classroom and research applications and the relationship between print and electronic book use and sales. The Tri-College consortium is participating in this experiment. (http://digital.library.upenn.edu/ebooks)

Print-on-Demand

Publishers use short-run digital printing and standard distribution methods with their major printing partners to deliver small orders of books (e.g., between 25 and 300 copies). This allows them to control their inventory costs and extend the life cycle of low-demand titles. Most publishers have PDF versions of front list and backlist titles that they can store cost-effectively and print as needed.

Cost-effective hardware should be available in the next two years to deliver on the promise of print-on-demand, enabling a single copy to be produced at point of sale. This approach will allow for electronic distribution and local printing. Vendors that store electronic files for publishers and print them as needed include Lightning Source, owned by Ingram, which hosts 100,000 books from 1,300 publishers, and Informata, owned by Baker and Taylor, which launched its "Ed" delivery system in 2002.

As print-on-demand becomes more widely available, libraries will no longer have to acquire potentially lower-use books at the time they are published. If it is combined with e-books that can be viewed all or in part, libraries are likely to acquire core materials in print, but access other materials online, with the option for quick de-

livery of a complete print copy.

Using electronic versions and print-on-demand to stand in for low-use older materials that are weeded or stored off-site is an appealing idea; however, the cost of securing electronic rights for back list and out-of-print titles, combined with the cost of scanning and converting the content, precludes the rapid conversion of older materials by publishers. The Carnegie Mellon University Million Book project will be an important test of whether this approach is feasible.

Trends in E-Journals

The June 2002 issue of *Library Systems Newsletter* documents the number of scholarly journals available in electronic form that are indexed in the Institute for Scientific Information's Citation Indexes. Of the 8,500 journals included in these indexes, 75 percent of those in the Science category, 64 percent in the Social Science category, and 34 percent in the Arts and Humanities category are available in electronic form. EBSCO's Electronic Journal Service lists 8,000 e-journals. Some industry experts estimate that as many as 10,000 journals are now available in electronic form.

Library decisions about the location and disposition of journal back files in print are dependent on the availability of these journals in electronic form. October Ivins conducted a survey of 15 publishers (six society, seven commercial, and two university presses) and four publisher service providers to determine their plans.

Intermediaries for journals included in the survey are publisher service providers who offer a conversion or hosting service such as Ingenta, BioOne, Highwire, or JSTOR. Aggregators who must rely on a contract with the publisher for their content (ProQuest, EBSCO-host, Gale) are not included in this report because of the variability of their content.

The publisher service providers verified the trend toward converting back files and noted that cost is the limiting factor. JSTOR is focusing on converting the back files of journals. It is intentionally keeping two to five years behind current publication to protect publishers' subscription incomes.

Publishers surveyed as societies included the American Chemical Society, American Institute of Physics, American Mathematical Society, Association for Computer Machinery (ACM), Institute of Electrical and Electronics Engineers, and Institute of Physics. Commercial publishers included Blackwell Publishing, Elsevier, John Wiley & Sons, Kluwer, Academic, Lawrence Erlbaum, Springer Verlag, and Taylor & Francis. University presses included Oxford University Press and Cambridge University Press.

The society publishers surveyed have more than 90 percent of their 663 journals in both print and electronic forms; commercial publishers have only 33 percent of their 6,688 journals in both forms. Only 12 society and 39 commercial publishers publish journals exclusively in electronic form. Many publishers are converting their pricing to electronic with a surcharge for print (rather than print with

an electronic surcharge) and offering electronic-only subscription options.

ACM has converted almost its entire back file, and Elsevier has an aggressive commitment to convert more than 1,440 titles by 2005. Seven other publishers are selecting titles to convert or converting all their titles retrospectively in stages by decades. Their progress is dependent on economic conditions, technological developments, and evolving market preferences. Forty percent of the publishers do not have major conversion plans for their back files because of the expense and the concern that libraries may not be willing to pay for back file access.

Use of Electronic Journals

Preliminary results from the University of California's Mellon-funded Collection Management Initiative indicate that although use of print journals is higher when the print copy is located on site, digital versions are used one to two times more frequently than print versions overall.

Retention of Print

Marilyn Geller, who was project director of a Mellon grant for digital preservation at Harvard University, advised retaining access to print versions after a journal back file has been made available online until the content of the electronic version is equal to or better than that of its print counterpart. The publishers surveyed echoed this advice and expressed concern about the lack of standards, inconsistencies in converting content, and future problems with data migration.

Bibliographic Control

Obtaining clear holding and licensing data on e-journal subscriptions is difficult because e-journals are frequently licensed in conjunction with the print or as part of a collection of journals that includes many titles not previously held by the library. Integrated library systems' modules for dealing with print subscriptions do not yet address control issues for electronic journals and collections. To overcome this problem, the Tri-College Consortium created an Electronic Resources Tracking System (ERTS) in FileMaker to track administrative metadata for electronic subscriptions held by each college. This database could be expanded to include call numbers, the number of bound volumes, title changes, ISSNs, and other pertinent data.

Key Findings

- Print-on-demand is likely to be available from many publishers or distributors within two to three years. If this service is combined with an online preview option and comes from a reliable source, it could reduce the need for "just in case" purchases of titles peripheral to the curriculum.
- Collections of current e-books are limited because of a variety of factors, including the lack of a sustainable economic model.

- Collections of electronic versions of older books are limited because of the cost of acquiring the electronic rights and digitizing each title.
- E-books currently show the greatest potential for use as reference works and for quick access to limited sections of a work for research or reserve reading. The lack of comfortable reading systems discourages their use for substantial reading.
- Most major journal publishers, both commercial and society, have programs in place to convert back runs of their titles to electronic form. However, it is not clear whether content will completely duplicate that of print journals in all cases.
- The reliability of the archives of journals is a major concern when decisions are made about retention of print copies.
- Journal publishers currently advise against discarding back runs of converted titles and urge retention of or access to print for the near term.

Trends in Electronic Publishing

To assess the impact of electronic publishing on space planning, the Planning Group attempted to estimate the amount of space that could be saved through the various e-publishing initiatives, including current journal subscriptions, converted back files of journals, e-books available from the publisher, less current e-books that have been converted and made available through intermediaries, and the Government Printing Office's electronic collection within the Federal Depository Library Program.

The long-term availability of online equivalents from a "trusted source" (that is, a publisher or a publisher service provider) is the most important criterion used by libraries that are deciding whether to withdraw print journals and cancel print subscriptions. The Planning Group felt slightly more confident in nonprofit organizations because they are under less pressure to produce a return on investment and more committed to sustaining the service than for-profit groups are. The pricing model is also a factor, because future electronic access might be jeopardized by price increases. Additional factors included whether the title was indexed, the completeness of its content, and local requirements for print versions.

Books

At present, the industry does not offer a book reader that competes in ease of use or affordability with the printed book when a patron wants to read substantial portions of the text. Library patrons and staff are finding that e-books are most useful as reference works and when access to only a part of the book is needed (for example, when books are evaluated for print purchase or when extracts are needed for reserve use).

Twenty leading publishers accounted for 20 percent of the books acquired in 2001 by the Tri-Colleges, and approximately half of these titles are likely to be available in electronic form by the end of

2003. However, given the lack of suitable reading devices and the unknowable long-term future for e-books, the libraries expect to continue buying print copies of needed books. As e-book availability increases, and depending on pricing models, access to a database of current e-books online could serve as a preview and a backup tool. Such availability, particularly in conjunction with print-on-demand services, might make it possible to reduce the duplication of print copies. Any reduction in duplication through this means is likely to be gradual and might be used to purchase a broader range of titles; for this reason, the Planning Group did not predict any near-term or strong effect of e-books on the collection growth rate.

Electronic collections of older books have been slow to develop because of the cost and the difficulties in securing copyright clearances. As the Million Book Digital Library Project becomes fully operational, it may offer the Tri-Colleges an opportunity to convert books they might otherwise consider storing off-site. Since this project is still in its pilot phase, the Planning Group did not project any specific space savings.

Journals

In its discussions of e-journals and space, the Planning Group focused on the reliability of publisher or supplier back files and on the concerns of faculty members. The Tri-Colleges have already been reducing or eliminating print runs and making binding decisions on the basis of these criteria, applied on a title-by-title basis. Because back file security is a concern for all academic libraries, many national initiatives are addressing it. Improvements will most likely continue, but their pace cannot be predicted.

Reference Databases

No market research was done on trends in electronic publication of abstracts and indexes and similar services. The Planning Group believes that such publication is now the norm; it is no longer an emerging trend. In the last five years, all three libraries have freed significant amounts of reference shelf space by discarding print reference works and canceling print subscriptions in favor of the electronic services. Libraries will continue this practice in cases where print collections overlap with existing database coverage and as additional works go online or as back runs are filled in. The Planning Group cannot predict the timing of these changes; we also believe that the major space gains have already been made.

IV. UNDERSTANDING STUDENT AND FACULTY USE

The purpose of the focus groups was to improve Planning Group members' understanding of how faculty and students use the libraries in the Tri-Colleges, to communicate to participants the challenges facing the librarians, and to obtain participants' feedback on the options being considered. Through this dialogue, we intended to ad-

vance the conversation on each campus and elicit insights useful for the planning process.

Focus Group Process

Seven focus groups were conducted in October 2001. One faculty and one student group was held on each campus, and a second faculty group was convened at Swarthmore.

The faculty members participating in the groups represented a broad range of disciplines. Between 4 and 12 individuals participated in each of the faculty focus groups; 5 to 7 upper-class undergraduates took part in each student group (at Bryn Mawr, graduate students were included). Questions were modified as needed to accommodate the number of participants and the nature and direction of the discussion.

Results

Although participants used different phrases, they consistently identified three essential steps in the use of materials:
1. Discovery: identifying the item
2. Selection: deciding to use the item
3. Delivery: accessing the full text

This summary of results begins with abstracted comments about these three steps. These comments are followed by other major themes that emerged from the discussions.

1. Discovery
- Online searching is good for finding known items.
- Online searching is less successful for unknown items, new topics, and unfamiliar terms.
- Shelf browsing is highly valued, especially by the humanities faculty, as a way to discover relevant materials.
- Browsing is an important tool for print or electronic materials, but browsing in electronic sources is not as intuitive as shelf browsing.
- Focus group participants were largely unaware of online virtual shelf browsing in the OPAC; those who were aware of it did not find it especially useful.
- Some students reported finding more books by looking at the shelves than by searching online; others found both Tripod and PALCI to be good sources of materials.
- Full-text searching for journals, especially in JSTOR, allows people to find materials they otherwise would not have known about.
- Expanded information about each title in the OPAC would improve the discovery and retrieval process.
- Online search capability gives students access to a broader range of resources than they formerly had. This ease of access and breadth of material are reflected in higher-quality work, according to faculty members.

- Faculty members often expressed the opinion that students would not use books unless they were in their local library; students, on the other hand, reported frequently requesting books from other libraries in the Tri-Colleges and through PALCI.
- Alerting services work best on narrow topics. They are of limited value for faculty teaching general interest courses.
- Upper-level students felt they were familiar with the libraries and with significant tools in their disciplines.
- The most effective instruction in library use occurs in relation to particular class-related assignments when students are motivated to learn about the resources.

Selection

- The quality of information on the Web is not always good.
- Students need to learn critical evaluation skills.
- Shelf browsing is an effective way to find good materials and to reject inappropriate ones.
- Students noted that faculty often encouraged them to use materials that were less than five to ten years old.
- Tripod does not provide a lot of information about books; as a result, the user may not be sure whether a certain book will be useful. Students feel it is wasteful to order a book from another library if they are not sure it will be useful.
- First- or second-year undergraduates were more likely than upper-class students to use e-reserves and links from the faculty syllabi without realizing that they were using journal articles.

Delivery

- Guaranteed long-term access to electronic materials should be assured before print copies are removed.
- Print materials needed for curriculum support are time-sensitive and should be housed on the campus where the course is being taught.
- Students using materials required for their classes prefer items that are easy to use and link directly to the full text.
- If materials need to be retrieved, faculty members prefer that they be delivered to their offices.
- Local ownership of the materials in the faculty's disciplines is an important part of a good academic library; accessibility through other colleges is not the same.
- Faculty members do not feel that remote storage is an attractive option.
- Students seem comfortable using materials on other campuses, either by visiting the campus or by requesting them.
- Some students reported weekly visits to or weekly use of materials on another campus.
- Missing content (for example, letters to the editor or advertisements) in online journals is a problem; sometimes such information is important.
- Microform is not an acceptable means of accessing full content.

Users would rather wait to receive the print material or travel to another library to read it than use microform.

- Students like e-reserves; however, they can be difficult to read if not properly scanned.
- Both students and faculty found PALCI timely and easy to use.
- Participants agreed that reading online resources on the screen is not acceptable; however, they also expressed concern about the amount of materials printed. Some printouts, they said, are never retrieved.
- Once a journal is available in electronic form, science faculty felt that the print volumes could be stored off campus and that they could cancel their personal subscriptions.

Other Major Themes

Use of the Web
- The Internet has had an undeniable impact on teaching.
- The immediacy of the Web, especially for news and access to scholars' Web pages, is highly appreciated.
- Both students and faculty perceive that reliance on electronic resources varies by discipline. Individuals in the sciences and social sciences have considerable amounts of online resources; those in the humanities still rely heavily on print.
- There are both faculty and students who are not comfortable with computers and electronic access.

Uncirculated Books and Weeding
- Virtually all faculty members believe that the finding that a high percentage of books do not circulate is not an indication that collections could be weeded.
- Faculty were concerned that studies of circulation do not take into account in-library use.
- Having a unified collection in one physical location is important.
- Browsing physical shelves is important for the discovery and evaluation of materials.
- Lack of past use is no indication of lack of future need.
- Older books may be used differently than newer books are. Instead of checking the older books out, faculty members may use them for reference and background information.
- Faculty noted that students depend heavily on browsing.

Library as Place
- All agreed that space for viewing videos with small groups is highly desirable and should be added or expanded.
- There is a need for comfortable space on each campus that would appeal to both students and faculty.
- Faculty and students commented on the need for space for group use as well as for quieter, individual-use areas.
- Faculty and students support social spaces and coffee service.
- Faculty use of the library facility is declining because of desktop

access to content via the Web and Tripod.

- Faculty go to the library to read current issues of print journals that are not available online, to review approval books, to put materials on reserve, and to meet with students.
- Some faculty members believe the campuses should strongly reconsider creating more space for books and other activities before any serious weeding is undertaken.
- Students liked the wireless laptops that can be checked out at Swarthmore and Bryn Mawr for use anywhere in the library.
- Faculty members with library carrels appreciate the convenience and quiet study space.

Key Findings

- Use patterns of both print and electronic resources are driven primarily by convenience and time; for students, cost is an additional factor.
- There is a need to develop new spaces in the library, particularly comfortable informal areas, group study areas, and video-viewing rooms.
- Browsing the physical collection is highly valued; online browsing is not a satisfactory substitute.
- Materials needed for classes must be held in the local library.
- Faculty members want to have meaningful input into any decisions that affect the collections, particularly decisions concerning extensive weeding.
- The online catalog and other searching tools need to have more ways to suggest similar materials and encourage serendipity.
- Having additional online information about resources would improve the selection process and result in more efficient borrowing.
- Faculty members almost universally rejected evidence of lack of circulation as a valid indication that collections could be weeded.
- Many faculty members believe that students will not use books if they are not in the on-campus collection. Students, however, reported frequently requesting books from other libraries in the Tri-Colleges and through PALCI.
- For some faculty, local ownership of the materials in the faculty's disciplines is an important part of a good academic library; ownership and accessibility through other colleges is not the same.
- Different usage patterns in different disciplines need to be taken into account; general systems for collection management should not be applied.
- Electronic information sources are heavily used and appreciated, especially in the sciences. In some disciplines, they are changing the way research is done.

Understanding Student and Faculty Use

Both students and faculty see the library as an important place for study and social life. Some see it as a quiet refuge from noisy dorm

rooms or office interruptions; for others, the library is a place to hang out and meet friends. Where café services are available, they are appreciated. Faculty commented on the ambiance of some of the library buildings, contrasting those with poor lighting and seating to those with cheerful, comfortable facilities. Both students and faculty wanted the spaces to be attractive and wanted services to be offered as a way to encourage library use. Among specific uses, video-viewing facilities and group study areas were most frequently mentioned as desirable.

Both students and faculty place a high value on browsing physical collections. Physical browsing is important for print materials because of the limited information available in the online catalog for both discovery and selection. Users mentioned that an online search for a topic might turn up only one or two books; examination of the shelves at those call numbers would reveal many more. Users must rely on searching the right terms used in cataloging, since the full text of most titles cannot be searched online. When selecting a book, users prefer to examine the book itself rather than to rely on cataloging data. Students and faculty both mentioned the utility of the table of contents data in newer titles. Faculty members feel that browsing is essential for students who, they believe, chiefly use what is available in their own library. Students, on the other hand, seem familiar with options for Tri-College requests and ILL and are comfortable using them, especially if the materials are delivered quickly.

Participants were asked what kind of material needs to be available in one hour, one day, or one week. All agreed that materials needed for classes must be located at the local library and that overlap is necessary if the same subjects are taught in more than one school. Faculty defined the materials very broadly. In preparation for a lecture, if a faculty member finds a need for a previously unused resource, he or she wants it to be immediately available. For research purposes and for summer school courses, when enrollments are lower than during the regular academic year, the faculty said cross-campus borrowing and ILL are acceptable ways to get materials.

Almost all patrons appreciate electronic databases and journals for ease of discovery and of use. The science disciplines rely most heavily on journal literature, and increasing numbers of their journals are online in full text. Faculty in the sciences said that print copies are not needed when e-journals are available and reliable. Scholars in the social sciences and especially in the humanities rely more heavily on monographic literature. The full text of journals is less readily available in these fields than in the sciences.

The discovery and selection processes for print books are hampered by the lack of sufficient information on book content in the OPAC and by the absence of full-text retrieval. Any weeding of monographic holdings would increase this problem by decreasing browsing, which in turn would increase the need for expanded metadata. Although online virtual shelf browsing and related item searching are available in the OPAC, these options are not obvious to patrons. An OPAC redesign aimed at emphasizing these and other

functions would make it easier for users to discover appropriate materials. Emphasis should be placed on increasing usability with improved, yet simplified searching and software that will allow for serendipitous discovery online.

Faculty were not concerned about the large percentage of books that had not circulated in 10 years. They doubted the accuracy of the data, since it did not reflect in-library use, and questioned the advisability of weeding collections solely on the basis of lack of circulation. Although some faculty are willing to accept limited weeding to make space for new books, the more common reaction was to advocate for expanding library space on campus. Remote storage was not an attractive alternative. Students were more willing than faculty to accept quick delivery from another library as an option, provided they have good information about such books.

For students, electronic access has blurred the distinction between types of materials; for example, they do not always identify articles found online as "journal articles." Having become accustomed to using online journals, they experience print journals as a new type of literature and find them difficult to navigate. They feel that they need more training in this area.

Students initially consult textbooks, reserve readings, and resources pointed out by the faculty before they begin to search aggregated databases of content with journal articles immediately available to them. Students appreciate electronic reserves as an alternative to print reserves. Once students begin working in their majors, they learn about discipline-oriented indexes from librarians or faculty. Students in each focus group commented that instruction in library resources needs to be linked to specific assignments.

Although all constituencies were concerned about the large amount of photocopying for journals and e-reserves, they also observed that they could not read more than one to five pages online at a single sitting.

Not all users feel that they are computer-literate. In an information-based society, graduates need to know how to use information resources and multimedia and understand how to incorporate them into word processing, spreadsheet, and presentation programs.

V. SPACE PLANNING OPTIONS

The libraries of Tri-Colleges applied for the Mellon planning grant because of their concern about upcoming space shortages. Bryn Mawr has no plans to expand its library facilities. Librarians at Haverford are operating under the assumption that no new space will be available in the foreseeable future. At Swarthmore, any addition must await at least until the next capital campaign, which could be 10 to 15 years away. Therefore, a central objective of this project was to explore the feasibility of developing a new model of collection growth. Under consideration were the impacts of consortial collection development and of the acquisition of e-resources on the rate

of growth of each college's printed collections. This section explores library as space, defines space requirements in library buildings, and provides an overview of the state of holdings and the current rate of growth in each library. It summarizes the findings on deduplication and weeding of the print collections and looks at the space savings that libraries are already realizing as they move to electronic journals and reference sources as a predictor of what we might expect as the minimum level of future space savings.

Library as Space

In February 2002, attendees at an Association of Research Libraries/ OCLC Strategic Issues Forum explored the concept of the library as a space for academic life that allows room for social and intellectual activities. Two themes emerged from the forum: (1) the shift in focus from space and place to people and their activities in the buildings; and (2) an expanded view of the library's role in integrating learning-oriented functions. Many libraries are home to language labs, writing centers, and tutoring centers. Integrating these learning functions makes sense from a theoretical as well as a practical perspective. Furthermore, as faculty members revise courses to include electronic resources, students want enhanced space with group video-viewing rooms, discussion areas, and ready access to computers. Input from the focus groups and from a Swarthmore College survey point to the need for more space for computers, leisure seating, tables, and meetings.

Figuring out how long the existing buildings could accommodate linear growth of their collections is relatively simple. However, to accommodate the various formats in which knowledge is "published" and the way people learn from those materials, libraries have to provide new types of spaces. This is nothing new; libraries have always made room for new formats and the equipment to facilitate their use. Today, however, libraries are expected not only to accommodate passive use of these materials but also to enable faculty and students to integrate these resources in creating new knowledge. Faculty and students expect to be able to read, view, and listen to media and also scan, capture, and edit materials that they may wish to use in the classroom or in assignments. In response, libraries are incorporating spaces such as digital media labs as a natural progression from supporting viewing to supporting the production of multimedia.

Adding this type of functionality is not simply a matter of trading a traditional carrel for one equipped with multimedia hardware. The amount of space required for multimedia functions increases with the nature of use: a 3 percent increase for viewing, an 8 percent increase for creation, and a 10 percent increase for production facilities. For example, a standard carrel for reading is 36 inches wide while a multifunction workstation needs to be 51 inches wide. Additional space may be required for functions such as production studios or editing rooms and for staff support of these functions.

Space Requirements

Standards for library shelving have established "working capacity" at 86 percent of the LF occupied. Beyond this level, the space becomes too crowded to function efficiently, causing problems in reshelving books and locating material.

According to Habich,[6] the average width of materials across all disciplines in an academic research library is 0.99 inches for a book and 1.77 inches for a bound periodical, which equates to 12 books or 7 bound journals per LF. Compact shelving vendors use an average of 8 volumes per LF. The average for the Tri-Colleges is 9 volumes per linear foot of books and bound journals. As wider bound journals are removed, creating a higher balance of books, the Tri-Colleges may wish to use 10 volumes per LF in their calculations.

Linear footage measurements include space currently housing government documents. These collections are not growing as a result of the cancellation of U.S. Government Depository status for Haverford and increasing publication of government documents on the Web.

The Current State of the Collections: Holdings and Growth Rates at the Three Colleges

On the basis of the library standard definition of 86 percent working capacity for shelving and their current annual growth rates of print materials, all three colleges will reach working capacity in the next 15 years (Table 12).

Table 12. Estimated Working Capacity of the Tri-Colleges Libraries			
	Bryn Mawr	**Haverford**	**Swarthmore**
Shelving available	133,660 LF	64,632 LF	95,099 LF
Working capacity (86% of capacity)	114,948 LF	55,584 LF	81,785 LF
Shelving in use	88,067 LF	52,172 LF	81,451 LF
Current % of working capacity	76.6	93.8	99.6
Annual growth	1,738 LF	716 LF	1,052LF
Years to reach working capacity	15 years	5 years	0 *

*Swarthmore has completed a Master Plan for using compact shelving in its main library that should extend shelving capacity by nine years. Funding has not yet been approved for this plan.

In 2001 Swarthmore added compact shelving in its science library that extended its shelving capacity by 6 to 10 years. Reductions in print journal volumes as a result of conversion to online access have already occurred and are expected to continue to result in sav-

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6 Habich, Elizabeth Chamberlain. 1998. *Moving Library Collections: A Management Handbook.* Westport, Conn.: Greenwood Press. Appendix A: Average widths of library materials, Figure A1.1.

ings shelf space in the science library.

Architectural plans have been drawn for Bryn Mawr's main Canaday Library, which needs to be renovated to accommodate an expanded range of services. Implementation of these plans will reduce shelving and dramatically shorten the time before Bryn Mawr reaches capacity; in fact, it may virtually eliminate the 15 years of expansion space estimated to be available today. Building a new wing onto Canaday Library for additional collections and new programs is not an option because of local building regulations.

Haverford just completed the construction of a new science library with less space than the two branch libraries it replaced. Haverford has five years of growth space before reaching working capacity.

The Impact of Consortial Collection Development

At the start of this study, the Planning Group believed that a Tri-College collection-development plan could help the colleges realize space savings in two ways. First, it could slow the growth rate of print collections by minimizing the amount of additional overlap in materials bought and housed by the libraries. For example, of the nearly 5,500 books that Swarthmore purchased through the Academic Book Center (ABC) approval plan last year, 80 percent were also purchased by the Bi-College Haverford/Bryn Mawr plan. Reducing the overlap rate to 50 percent would save approximately 165 LF per year. However, any decrease in the overlap of new materials would likely be offset by the reallocation of dollars to the purchase of other new materials and would result in space savings only if those new materials were electronic.

The second and optimum way to realize space savings is to weed the existing collections. The data indicate that the older the material, the less it is used. In fact, usage figures (as measured by circulation) drop significantly for materials published before 1950. As noted previously, over 80 percent of materials published before 1950 have not circulated in 11 years.

The three colleges have traditionally made their weeding decisions independently. Haverford has an ongoing program of weeding that it considers good for the health of a collection. Over time, ideas about the collections and the curriculum have changed, and some items may no longer be needed to support course work or research. Swarthmore has focused on weeding its collection in the sciences. It also regularly reviews duplicate copies of older materials in other disciplines. Many of the multiple copies were purchased as course reserves but have not been used as such for more than 10 years.

The idea of weeding may require a shift in thinking that runs counter to the belief that a big library is a good library, and that materials must be locally held to be of value. The administration, faculty, and students will need to be comfortable with the vision of one collection and with the idea that materials do not need to be a permanent part of the home collection to be readily accessible.

In preparation for moving parts of their collection in the summer of 2003, Swarthmore identified books in religion and philosophy that met strict criteria. The titles were
- held on at least two of the campuses
- published before 1980
- not circulated in the last 12 years or circulated less than five times since 1970
- never placed on reserve
- not a gift
- generally secondary sources
- not written by Swarthmore alumni or faculty

Preliminary faculty response to suggested withdrawal lists in philosophy indicated that about 35 percent of the items meeting those criteria may actually be deselected. In religion, the percentage was less than 10.

The data showed that among the three libraries there are 175,000 volumes that overlap and that have not circulated since 1991. If the libraries could weed just half of these volumes (i.e., around 87,500 items), they would gain approximately 8,750 LF feet of space. However, if the faculty members determine that 80 percent of the overlapping items should be retained, the space gains will be small in comparison with the amount of work required to achieve them. The lists of potential volumes were reviewed by the humanities subject specialist and all the faculty members in the departments. At the current rate of growth of the Tri-College collections, if the libraries were to realize the maximum space gains for weeding one copy of all overlapped items, they would gain two to three years' worth of growth space. Swarthmore's weeding project suggests that the target areas for weeding may need to be expanded. For example, while 175,000 volumes have not circulated at all during the study period, a much larger number have circulated only once or twice. In these cases, a single copy could support that level of use. Overall, the libraries hold more than 500,000 overlapping volumes. The Swarthmore project also suggests that the libraries need to make clearer to the faculty the relative costs of retaining low-use materials on campus versus having them available within the Tri-Colleges.

While weeding alone may not solve the space problems, it can provide sufficient incremental gains in shelving capacity until additional space savings may be realized through increasing use of electronic books and journals.

Finally, the libraries need to look more closely at faculty attitudes toward off-site storage. At one point, the Planning Group considered that having a volume located at another Tri-College library was a type of off-site storage. However, discussions with faculty in philosophy made it clear that the issue is one of ownership. Unfortunately, neither the focus groups nor the weeding project addressed the level of tolerance or the relative costs and effects of remote storage compared with those of deaccessioning. A better understanding of faculty attitudes toward these options is essential.

Impact of E-resources

In considering whether the libraries could withdraw or relocate print volumes once titles are available in electronic form, the Planning Group considered the following factors:

- The content needs to be available from a trusted source, that is, a publisher or a publisher service provider.
- Future electronic access must not be jeopardized by rampant price increases.
- The provider must offer an archival guarantee.
- The product must be indexed.
- Content must be complete.
- Local faculty requirements for print versions must be borne in mind.

Libraries have already begun to realize some space savings by shifting from print to digital format. As the acceptability of online services grows, the libraries will gain substantial savings here. In a number of cases the libraries have canceled print journals when on-line versions became available. For example, Swarthmore's science library canceled 48 print titles for 2002, which reduced the requirement for shelving new volumes by 340 LF in the following year. After consultation with faculty, the three science librarians selected those journal titles whose pre-1960 volumes needed to be held on only one of the three campuses. This resulted in savings of approximately 150 LF in each building.

Access to reliable electronic journal back runs offers opportunities for the Tri-Colleges to reduce duplicates. A Tri-College report calculated that the number of print volumes of JSTOR titles that could be deduplicated was approximately 10,000. Increasing this number by 50 percent—to 15,000 volumes—would free an estimated 1,666 LF of space. A similar strategy of reducing print back files to a single copy could be employed as publishers expand their journal archives. In the Tri-College reference collections, libraries have stopped subscriptions to print indexes and abstracts that are received as databases and, in many cases, have weeded back runs of those materials. More savings can probably be realized in this area; this topic needs to be studied.

Currently the e-book shows its greatest potential in the areas of reference and reserve readings. It has not developed its full potential as a substitute for a print stack title that can be read in the traditional manner.

In the past four years there have been notable reductions in the space required to house Swarthmore's Federal Depository collection as the result of a transition to electronic format (Table 13). In 2002 there were additional reductions because of the realigned depository arrangements among the three colleges intended to reduce overlap in their holdings of government documents. It is expected that the Government Printing Office transition to electronic printing will continue, but at a decreased rate.

Table 13. Growth of Documents Collections				
Location	**1998/99**	**1999/00**	**2000/01**	**2001/02**
SuDocs collection	5869	5348	4316	2727
Docs in LC collection	1193	1007	1299	1061
Docs periodical titles	133	129	111	46
Total print receipts	7195	6484	5726	3834
LF added	138	125	110	74
Fiche added	2727	1405	356	294
Electronic records added	588	854	1991	1873

Options for Maximizing Linear Feet of Shelving

In the immediate future, the Tri-College libraries will most likely use a combination of on-site compact shelving and off-site storage.

On-site Compact Shelving

The libraries have been taking advantage of compact shelving to expand their capacity to house materials. Haverford has compact shelving in its new science library. Swarthmore gained 10 years of growth space in its science library by using compact shelving, and it plans to install additional compact shelving in summer of 2003 for periodicals and government documents. Only Bryn Mawr has space with the required floor strength to add more compact shelving.

Compact shelving comes in a range of options, including manual, mechanical-assist, and powered mobile shelving, which reduces aisles to one for every six ranges of bookshelves. While it allows on-site browsing, compact shelving limits the number of users at one time. If lesser-used materials are stored on the shelving, this is not an issue.

High-Density On-site Storage

Commonly known as an automated storage retrieval system (ASRS), this is an on-campus option that automates the retrieval of books stored by size. It was first installed at California State University (CSU) at Northridge in 1991. It enabled the library to create the space to store 950,000 volumes in 8,000 assignable square feet; this is one-tenth the amount required for open stacks.

Adapting inventory control systems and robotic technology used in commercial warehouses allowed CSU to store books by size in bins that would be automatically retrieved so that staff could pull the desired item. Benefits of restricted access include prolonging the life of material by minimizing handling, providing environmental control, improving inventory control, and improving the reliability of access.

Subsequently, Eastern Michigan State University and the University of Nevada Las Vegas (UNLV) installed an ASRS. In addition to

allowing room for growth, the system at UNLV houses old periodicals, little-used books, government documents, special collections, and older reference materials.

High-Density Off-site Storage

More than 20 of the largest research libraries in the United States have created off-site storage centers in the last decade. These libraries include Harvard, Yale, Johns Hopkins, Cornell, the University of California system, the University of Michigan, the University of Minnesota, Penn State, the University of Pennsylvania, the University of Pittsburgh, Virginia Tech, and the University of Texas at Austin.

Known as a high-density book shelving system (HDBSS) and pioneered by Harvard in 1984, the approach enables libraries to store materials by size in containers on shelves that are 30 to 40 feet high. Operating an HDBSS requires an inventory system, and the books must be bar coded and retrieved by an order picker. To extend the life of the materials, the space is controlled for temperature, humidity, light, pollution, vibration, pests, and insects, and is protected from fire and water damage.

Storage facilities that store low-use materials report annual retrieval rates of 2 to 4 percent.[7] Given the need for mediated retrieval and the sensitivity of researchers to the lack of direct access, performance standards are a core part of service arrangements for reliable retrieval.

In 2001 Bryn Mawr and Swarthmore considered joining a local consortium of cultural institutions with the intent of using off-site storage for 20 to 25 percent of their book collections; however, this project has not been funded. Existing sites within the region for possible collaboration include a facility run by the University of Pennsylvania and another operated by Princeton University, Columbia University, and New York Public Library.

It became apparent during this planning grant that placing little-used books in an off-site location would limit opportunities for discovery and thereby further decrease the likelihood of their being used. When the Planning Group considered suggesting that the tables of contents of stored books be digitized, they were faced with the irony that they would be providing better access to their least-used collections. Nitecki and Kendrick (2001) call this the "paradox of off-site," noting that users "begin to wonder why we can't provide a higher level of service for all of our collections, not just the materials stored remotely." These authors point out that an "off-site program puts pressure on research libraries to improve services across the board, not solely in support of collections transferred to the high-density shelving facility."

Materials moved off-site are typically those that may be used once in a generation. The books benefit from security and preservation while the users trade the opportunity to shelf-browse for the

7 Nitecki, Danuta A., and Curtis L. Kendrick, eds. 2001. *Library Off-Site Shelving: Guide for High-Density Facilities.* Englewood, Colo.: Libraries Unlimited.

opportunity to provide space for new materials and for requested programs and services. Nitecki and Kendrick noted that there is an "emerging theme in how readers think about sources of materials . . . and increased expectation that everything they need can be requested easily, reliably supplied and delivered to a convenient array of locations or via a useful array of technologies."

Key Findings

- Libraries need additional space not only to accommodate collection growth but also to provide new services such as multimedia production, writing centers, group study spaces, and common areas.
- Minimizing duplication of purchases will not necessarily produce large space gains, but it will allow the libraries to save money that they may use to increase the depth and scope of the collections.
- Important space gains might be made through weeding overlap copies of materials that have not circulated since online circulation began in 1991. To realize greater gains, the three libraries will need to expand the scope of materials considered for weeding and implement routine weeding programs. Building trust with faculty is critical to effective weeding programs.
- Faculty members need to be engaged in discussions of the relative costs and benefits of deaccessioning and remote storage.
- The availability of journals in electronic format is already creating significant space savings (an estimated 340 LF per year collectively among the three libraries). These savings will most likely continue to grow in the sciences and will eventually affect the social sciences and the humanities. Other significant space savings are being realized in reference and government documents. Space savings through purchase of electronic books will not be achieved for at least five years.

VI. EXPLORING NEW MODELS

Moving to a Unified Collection

Since the introduction of Tripod, the three college libraries have become increasingly interconnected in the ways they develop their collections and do their work. Today, faced with growing space limitations, the libraries have two choices. On the one hand, they can continue on much the same path as they have been on for the last decade, engaging in cooperative purchasing activities where appropriate but maintaining three independent collections. If the libraries choose this path, then each of them will have a collection that looks much like that of the others. They will continue to buy many of the same books every year, and they will continue to house many of the same older, little-used books.

The second option is to take advantage of the power of Tripod

and to treat the three collections as a single collection—one that is capable of providing resources similar to those of a comparably sized university library. Each of the libraries must, of course, retain a core collection that supports a liberal arts curriculum. Circulation statistics indicate that each of these collections should comprise 100,000 to 250,000 volumes. Beyond that core, the libraries have the potential to build their collections into a coherent whole that could support the research needs of students and faculty to a much greater extent than the individual collections currently do.

Developing such a collection means working together to shape the existing holdings with an eye to maximizing the range of titles held system-wide. It also means acquiring new materials in a collaborative manner in order to limit overlapping titles among the colleges, and ensure availability of funds to buy a wider range of more specialized research materials. The Planning Group recognizes that this model for library collections presents many challenges: defining a core collection, buying books collaboratively, and defining new areas in which to acquire materials, among others. At the same time, we believe that this model has great potential for providing the rich library collections that students and faculty need.

Changing the Ways the Libraries Work

As the libraries move toward a unified view of their collections, they are finding it necessary to create new ways of doing their work. In the last few years they have made considerable progress in creating mechanisms for managing collections in a collaborative environment, reaching decisions about new resources, and communicating about collection interests and opportunities. More significant changes are likely to be necessary as the scope of cooperation expands. To assess the scope of these changes, the Planning Group looked at four areas:

1. Organization of collection development across the three colleges
2. Development of tools to manage cooperative collections
3. Development of tools to reduce overlap and regain space
4. Creation of an environment in which cooperatively built collections can be used effectively by faculty and students

1. Organization of Collection Development.

Each of the three libraries takes a different approach to organizing its collection-development activities. Bryn Mawr has 17 librarians who serve as liaisons to academic departments and programs. Haverford concentrates the duties among eight librarians. Swarthmore has five librarian liaisons. The numbers, however, do not tell the full story. At Bryn Mawr, the liaison program is only four years old. Previously, responsibility for collection development had been largely in the hands of the director of the library, a bibliographer, and the heads of the branch libraries. All the Bryn Mawr librarians now have collection-development duties, but many of them are still learning the work, and collection development is a minor part of their jobs. At

Haverford, more than half of the librarians have been involved in collection development for many years, and this has long been regarded as an important component of their work. Swarthmore has the fewest number of librarians in collection development, and most of the work is concentrated in the hands of three people: the librarians for the humanities, social sciences, and sciences. Each library has a head of collection development who is responsible for coordinating the work.

The differing organizational structures at the three libraries present challenges to undertaking Tri-College collection projects. The decision-making processes also vary among the campuses and among disciplines. The burden of work falls most heavily on those responsible for the largest number of disciplines. Experienced bibliographers who have built strong working relationships with their faculty tend to have an easier time reaching decisions than do newer librarians, who are less familiar with both their faculty and the discipline. As collection decisions become increasingly interconnected, more opportunities will need to be found to upgrade collection-development expertise across the libraries through in-house training, release time for further academic work, and opportunities for experienced bibliographers to share their expertise with newer staff. A reexamination of the libraries' organizational structures for collection development may also be warranted to see whether a closer alignment of structures would help improve the quality and speed of decision making.

Increased collaboration presents an opportunity for moving toward the model of the university library subject specialist. Currently the libraries follow a liberal arts college model, in which librarians are generalists and provide reference, instruction, and collection-development services to a number of departments. In the subject-specialist model, the librarian has advanced training in the discipline and focuses on building strong research collections and supporting the teaching and research in that field.

How far to go in the direction of the subject-specialist model is a matter for more discussion and testing. At one extreme is a replication of the research university model, in which a single bibliographer would be responsible for all collection decisions and advanced reference work in an academic field for all three colleges. But there are also intermediate steps, such as establishing Tri-College subject specialists in fields where expertise is difficult to come by, such as East Asian languages, or as a way of taking advantage of the special expertise of certain librarians. The role of the Tri-College subject specialist is also open to different models. Overseeing all collection development in a field is one possibility; under another model, subject specialists could play more restricted roles that would still help elevate the level of collection decisions and research support that the libraries provide. They might, for example, serve as advisors to senior thesis writers at all three campuses, help with evaluating difficult collection issues, or provide guidance to new librarians on best practices in collection development.

2. Tools to Manage Cooperative Collections.

As the libraries move toward increasing cooperation in building and maintaining their collections, it is essential that effective mechanisms for sharing information and making decisions be created. The libraries have already taken a number of important steps in this direction. For example, the three heads of collection development meet regularly, as do other groups with common interests, notably the science librarians. In addition, the following data-gathering and decision-making structures are in place:

- *Collection statistics*. The data gathering required for this report produced the most comprehensive view to date of the libraries' print collections and the way they are used. All of the subject bibliographers have access to these data through a Web interface. Steps are being taken to ensure that these statistics are updated annually and to eliminate discrepancies in the way the libraries record data.
- *Electronic collections data*. The technical services departments of the three libraries have developed the ERTS, a database that records critical information such as price, renewal date, and access restrictions for all the electronic collections to which the libraries subscribe, whether individually or collectively.
- *Electronic Resources Group*. To manage the acquisition of electronic collections, the libraries have formed the Electronic Resources Group, a committee consisting of two librarians from each campus and reporting to the heads of collection development. A member of this committee has been the chief negotiator for Tri-College electronic purchases for the last two years. To track information about resources being considered, the libraries have set up a "trials database" that lists the products currently under trial, the terms of the purchase, and the date the trial ends. The database has a comment board where librarians can post their assessments of the resource.
- *Analysis of curriculum*. During this study project, the Planning Group tried to compile systematic data on the curricular interests of the three colleges in order to quantify potential demand for collections in different subject areas. We obtained course lists from the colleges' registrars, converted them into a database, and began to catalog them. The project was too large to complete during the course of this study; however, preliminary findings demonstrate its potential for drawing a clearer picture of each campus's interests.
- *Last-copy policy.* The libraries have recently adopted a policy governing the weeding of collections. A key purpose of the policy is to ensure that weeding projects do not eliminate materials that are likely to be needed on other campuses.
- *Specific projects.* Over the last three years the libraries have undertaken a number of projects that have brought together bibliographers from the three campuses to work on common problems. These projects have included identifying Web sites for inclusion in Tripod, creating Tri-College subject guides for the Web, canceling standing orders held by more than one library, and agreeing on electronic journals to acquire through ScienceDirect.

As a result of these efforts, the librarians at the three colleges are building good working relationships, gaining an appreciation for the potential richness of the libraries' combined holdings, and developing tools to improve the understanding of existing collections and concomitant decision making. These structures and working relationships have been necessary initial steps toward building an integrated Tri-College collection, but more will be needed if the work is to progress.

3. Tools for Reducing Overlap

The two most important goals are (1) to reduce the overlap in existing collections to create shelf space for new books and journals and (2) to reduce the overlap of current publications to make funds available to strengthen collections in the colleges' fields of interest. To accomplish these goals, the libraries will need to develop more systematic and coordinated methods for weeding their collections and acquiring new materials.

- *Deaccessioning.* A high percentage of the Tri-Colleges' volumes show little or no circulation over the last 11 years, and a significant number of these low-use volumes are held by more than one library. If low-use overlapped and outdated texts can be weeded, the libraries stand to gain substantial amounts of expansion space without reducing the depth of the shared collection. To coordinate a large-scale weeding project, the librarians at the three campuses will need to work closely with faculty to gain a clear understanding of what books need to be close at hand and what can be housed off-site. The mechanics of making large-scale withdrawals in a collaborative and efficient way need to be worked out. The copy to be retained must be the one that is in the best physical condition, and no library should withdraw books that are of potential interest to either of the two others. During the most intensive period of weeding, additional Tri-College staff will be needed to manage the withdrawal process in order not to overwhelm the libraries' regular staffs and to ensure that the process moves forward in a timely fashion with appropriate communication in place.

- *Approval plans.* The libraries purchase more than half their monographs through approval plans. The purchases made through these plans total more than $500,000 yearly. Approval plans are a way for the libraries to receive new publications from major scholarly publishers automatically, thereby giving the libraries a high degree of confidence that they are acquiring the most important new works while substantially reducing the cost of acquiring them. Bryn Mawr and Haverford have had a joint approval plan since the early 1970s. By pooling their book-buying dollars and keeping their overlap rate to about 15 percent, these two libraries have been able to build substantially broader collections than would have been possible if they had worked independently. Swarthmore began using an approval plan five years ago. In the last year, approximately 80 percent of the books acquired through

the Swarthmore plan were also acquired by one of the other two libraries. The value of the Swarthmore acquisitions was approximately $170,000. If the three libraries can coordinate their approval plans, a substantial amount of money can be freed to invest in materials not currently being acquired.

Several approaches could be taken to coordinating approval plans. The first is a Tri-College version of the current Bryn Mawr-Haverford plan. With this approach, the three colleges would agree on a profile designed to acquire most new academic press books automatically. If the plan were to follow the existing Bi-College model, bibliographers from the three colleges would examine each week's shipment of books and then meet to decide where each new book should go and which books should be duplicated. One disadvantage of this model is the amount of travel and discussion that would be required of the bibliographers. Certainly some communication can take place by e-mail and conference call, but decisions on location and duplication can be difficult if the books are not examined first-hand. This approach could become much more practical if publishers and approval vendors provided substantive information about their new books in advance. The approval plan vendor for all three colleges, Academic Book Center/Blackwell, has expressed an interest in opening discussions toward creating a "virtual approval shelf" that could eliminate the need for much of the physical examination of the books.

The libraries should also explore other options for managing their approval plans, in the event that the virtual approval shelf proves impractical. One possibility is for the three colleges to have a single approval plan profile, but rather than the librarians discussing each book as it arrives, the books would be distributed automatically into the three collections according to a predetermined formula. Another option is to continue the current arrangement of separate Bi-College and Swarthmore approval plans, but with coordinated profiles that would reduce the amount of overlap.

4. Effective Faculty and Student Use of Cooperatively Built Collections

An integrated collection for the three colleges is desirable only if it is readily usable by faculty and students and if it provides them with a richer set of resources than they currently have available.

- *Browsing in Tripod.* The concern most frequently raised by students and faculty about the unified collection concept was the loss of the ability to browse the shelves. Tripod has a mechanism for looking at cataloging records in call-number order, but it is neither easy to find nor easy to use. Improving this system must be a priority.
- *Enhancement of recent cataloging records.* Even if browsing by call number in Tripod becomes easier, the lack of information in most cataloging records makes it difficult to determine whether a book is worth consulting. In order to make Tripod a more effective tool, the libraries have been buying table of contents information and

adding it to the cataloging records of new books. This information is now available only for books published since 1995. More enhanced cataloging information is available commercially, however, including tables of contents for books published between 1991 and 1995, book reviews, summary notes, and portions of first chapters. The libraries should purchase as much of this additional information as seems appropriate to make Tripod a reasonable alternative to physical browsing.

- *Enhancement of older cataloging records.* Catalog enhancements are available commercially only for books published fairly recently. If the libraries are going to eliminate overlap copies of many older books, it will be important to find ways of helping faculty and students evaluate the remaining copies through Tripod. A possibility worth considering is digitally capturing the tables of contents, indexes, and first chapters of such books and linking the images to the catalog record.

- *Expansion of the range of materials provided.* If the libraries could reduce the amount of money spent on acquiring multiple copies of books, funds would become available to acquire a broader range of materials than the libraries are currently buying. To determine how this money should be spent, librarians will need to consult with faculty to identify areas where the collections could be strengthened. Further studies of collection use will also help to indicate areas needing additional support. The most important measure of unmet need is the amount of borrowing the students do from PALCI and other libraries beyond the Tri-Colleges. Meaningful data on interlibrary borrowing was not easily available for this study, and further investigation is warranted. The libraries should also compare their holdings with those of comparable libraries to determine areas of relative strength and weakness.

Key Findings

- Each of the libraries organizes its collection-development activities differently, resulting in different approaches to collections and different methods of decision making. In a collaborative environment, the libraries might look at adopting other models for organizing their work, including the model of the research university subject specialist.
- In the last few years, the libraries have developed a number of tools for managing collection data and new structures for making joint collection decisions. Additional tools and structures will be necessary as the collaborative work increases.
- Large-scale, coordinated weeding projects are an essential part of any long-term strategy for recovering library space. Undertaking such projects without weakening the overall quality of the collections will require careful communication among librarians and faculty and, at least for a time, a central project staff to manage the process.
- Reducing the amount of overlap in new acquisitions has the po-

tential to free funds to spend on materials not currently being acquired. Since a major portion of the libraries' book budgets is spent through approval plans, coordinating these plans is critical.

• The greatest faculty and student concern about the move to an integrated collection is the loss of the ability to browse the shelves. The libraries will need to find methods of making the shelf-browsing function in Tripod more usable and of enriching the cataloging records so that virtual browsing is an acceptable substitute.