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LIBRARY TRENDS

Library Resource Sharing Networks

Peter Webster, Issue Editor

LIBRARY TRENDS

Library Trends, a quarterly thematic journal, focuses on current trends in all areas of library practice. Each issue addresses a single theme in depth, exploring topics of interest primarily to practicing librarians and information scientists and secondarily to educators and students.

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Library Resource Sharing Networks

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The Online Computer Library Center's Open WorldCat Program

CHIP NILGES

ABSTRACT

This article describes the Online Computer Library Center's (OCLC) Open WorldCat program. WorldCat is a worldwide union catalog created and maintained collectively by more than 9,000 member institutions. Open WorldCat seeks to make library collections and services visible and available through popular search engines such as Yahoo! and Google and other heavily used sites on the open Web. In this capacity, Open WorldCat provides an important central connection between the shared information of the library network and the Web. The article describes the history and rationale of the project; explains how Open WorldCat works for information seekers, participating libraries, and partners; and reports on what OCLC has learned from the program to date.

INTRODUCTION

Today's Web users expect information at their fingertips, regardless of where they are searching. Libraries can meet this expectation only by reaching further into the network of information resources that their patrons use and delivering content and services to users at the point of need. Satisfying patron expectations means reaching beyond the library portal and into the commercial search engines, vertical information portals, and e-commerce sites that have become such an integral part of patron workflow.

The Online Computer Library Center's (OCLC) Open WorldCat program is one approach to integrating access to library collections and services into the "flows" of Web users. WorldCat is a worldwide union catalog created and maintained collectively by more than 9,000 member institutions. With more than 60 million online records representing almost 1 billion

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items held by member institutions, it is the largest and most comprehensive database of its kind. Open WorldCat seeks to make library collections and services visible and available through popular search engines such as Yahoo! and Google and other heavily used sites on the open Web. In this capacity, Open WorldCat provides an important central connection between the shared information of the library network and the Web.

Through Open WorldCat, OCLC partners with search engines and other Web sites to link from their search results to a "find in a library" service managed by OCLC and powered by the WorldCat database. The "find in a library" service provides the user with a list of nearby libraries with holdings in WorldCat. OCLC also manages a registry of Online Public Access Catalogue (OPAC) links for its member libraries, which are used to take the user to the record describing the item of interest in the OPAC of choice. A number of other services are available from the Open WorldCat interface, including such IP authenticated services as access to link resolvers, virtual reference services, e-books, and other digital licensed content. This article describes the Open WorldCat program, including the project history and rationale; how it works for users, libraries, and partners; results to date; lessons learned; and future plans.

Project History

The genesis of Open WorldCat was OCLC's 2000 strategic plan, "Extending the OCLC Cooperative," which charted a course for the evolution of WorldCat into a "globally networked, and globally available information resource" (OCLC, 2000, p. 12). The plan, developed by OCLC leadership and staff in 1999 and vetted extensively by OCLC's board members, had as one of its key tenets the notion of "weaving libraries into the web" by making WorldCat openly accessible "in many versions from many paths: through individual library portals. . . . And through information partner portals (e.g., through database aggregators, Web search engines, and Web portals)" (OCLC, 2000, p. 12). The report elaborates on the concept of open access to WorldCat: "Information partners, including database aggregators, Web search engines, and Web portals, will use Extended WorldCat Discovery and Navigation services as an ingredient to build enriched access to information. With this

Research

Following the publication of the strategic plan, OCLC undertook research in three areas to vet the concept of Open WorldCat: (1) research with potential users of the service, to test the value proposition of finding library collections and their location on the open Web; (2) research with OCLC member libraries, to test the value proposition of exposing their collections through popular search engines as a way of extending their reach; and (3) research with potential partners, to test the value proposition of enhancing their services by integrating metadata describing library collections and a service for connecting their users to local library catalogs and portals for service. This research took place in 2001 and the first half of 2002.

Research with Students

A key component of our research with potential users of the service focused on college students. We focused on these users because we knew that students were increasingly using Web search engines and other Web sites as a starting point for research assignments. We wanted to assess the value that these users might place on searching collections of nearby libraries as part of their broader Web searching. We commissioned Harris Interactive to conduct an online survey of over 1,000 college students in the autumn of 2001 (OCLC, 2002). The survey concluded that students in this group were likely to start their research online—in fact, 96 percent reported they begin their research for assignments with Web search engines. At the same time, nine out of ten respondents claimed to use traditional print library resources at least some of the time, including print journals as well as books.

Respondents were also shown a mock up of an integrated search of library collections through a major search engine, with records describing items held by libraries and links to local library catalogs. Fifty-three percent reported that they would use such an option to search library collections through search engines at least on a monthly basis. Forty-seven percent said they would use the library locator feature to find a nearby library that has a book they want, and 45 percent said they would go to the library in person to get a book found this way. A significant number of respondents (37 percent) said they would travel to another library to get a book they found this way.

Other studies confirmed the importance of the Web as a research tool for students. Chief among these was a study commissioned by the Pew Internet and American Life Project (2002), "The Internet Goes to College." This study reported that the strong majority of college Internet users say the Internet "has had a positive impact on their college academic experience," and 73 percent of respondents reported that they use the Internet more than the library for research. These kinds of results supported our belief that students were indeed moving their research activity to the open Web and, in particular, to popular search engines. It also suggested that the library could offer these students value in this new research flow.

Research with Member Libraries

In the same period, we also undertook a variety of market research activities to assess the value of the Open WorldCat concept to the libraries that OCLC serves. Our belief was that Open WorldCat would help libraries by making them accessible on the open Web, which would help them to reach an audience that was clearly shifting its research activity to nonlibrary portals of various kinds. We also believed that there was particular value in an organization such as OCLC undertaking this project because it would be possible for OCLC to develop a shared infrastructure that many thousands of libraries could use to expose their collections in multiple open Web sites without any additional work on the part of the library. This research took place in 2001–2002 and included a survey of members, a series of four discussions with library directors and staff in different parts of the country, extensive discussions with advisory committees and OCLC Members Council interest groups, and briefings/discussions with the OCLC Board of Trustees.

The member survey took place in the winter of 2002 and included 194 libraries that use OCLC services. Fifty-eight percent of those surveyed agreed completely and 26 percent agreed somewhat to the following statement: "My library, its collections, and its services should be visible to any Web user regardless of where they reside." Those surveyed were also asked how likely it would be to enable links from search engines and Web book vendors to their collections through WorldCat. Forty-nine percent of respondents indicated that they were very or somewhat likely to enable links from search engines to their collections, and 36 percent said they were very or somewhat likely to enable links from Web book vendors. While the results did not indicate that a majority of member libraries would enable links, we considered this a good result, given that the concept had not been described in detail. Also, for each type of link, there was also a relatively high "neutral" result (28 percent for search engines and 21 percent for Web book vendors), suggesting that the strong majority were neutral or positive at this very early stage in the project. In short, OCLC members were supportive of the notion of broad access to their collections and, like their users, were beginning to think of search engines as appropriate access points to their collections. It was clear from these results that additional

it should be positioned, who OCLC should partner with, and a variety of other questions along these lines.

The general recommendations of this group included a strong endorsement of the project. At the same time, the group was specific and clear that the service must meet a number of key objectives when released and that this project, if completed, would only mark the beginning of what OCLC needed to do to help its member libraries reach their users on the open Web. Some specific recommendations from this group included the following:

- Fulfillment services of some sort must be included in version one of the service—at minimum, the ability to find a nearby library with the item and link to the OPAC
- The service must be designed for end-users—students and public library patrons—and OCLC should continue research with end-users
- The service must include a critical mass of affiliates (including an "anchor" site such as Google)
- It must include all WorldCat bibliographic records and a critical associated mass of library holdings
- Informational materials to help libraries market the service and justify the service to decision makers (for example, city councils, provosts, etc.) must be included

Later in 2002 OCLC also conducted a series of four focus groups at the offices of four OCLC regional networks. These focus groups were attended by library directors and key library staff from OCLC member libraries served by these networks. The idea received support in these discussions, and participants offered important suggestions and articulated key concerns that had a direct impact on the development of the service.

Research with Partners

In addition to testing with potential end-users and the OCLC member libraries whose collections would be exposed in this new way, we of course needed to test the value proposition of the service with potential partners. That value proposition was, we felt, clear: that search engines and other kinds of sites on the open Web—such as book vendor sites—would see value in providing access, from within their sites, to a directory of the combined collections of thousands of libraries.

To test this proposition, in the late summer of 2001 we developed a prototype system that would accept simple queries (for example, ISBN, title/author) and return a Web page showing bibliographic information about the item, as well as a service that would allow the user to enter a postal code, state name, or country name and return a list of libraries near them that held the item they had found, based on holdings in WorldCat.

Between late summer of 2001 and June of 2002, we established partnerships with a number of Web-based book vendors, including Abebooks, Alibris, and AABA (Antiquarian Booksellers Association of America), to test the value of this approach to potential partners and to learn about the potential volume of traffic we would need to support, the technical model for delivering this kind of service, and the manner in which the service might be used. We chose these sites because there was a good fit between their catalog and WorldCat. We offered them access to WorldCat when a search against their catalogs failed to produce results, on the grounds that the book would likely be indexed in WorldCat. By starting with a restricted model of this sort, we felt we could learn what we needed to know to determine if there was in fact value in the approach—as indicated by real user activity—and to scale the system for broader use.

These early partnerships were successful on several dimensions. Partners valued the connection to WorldCat, usage activity was climbing (it reached more than 140,000 referrals per month by the spring of 2002), and OCLC member libraries and industry commentators had received the concept favorably. At the same time, acceptance of the idea of open Web access to WorldCat continued to grow. Additionally, other organizations had also begun to experiment with open access models for similar kinds of resources. Chief among these was the Research Libraries Group (RLG), which in October 2003 announced the RedLightGreen project, through which it made the RLG database available and searchable on the open Web.

Encouraged by what we had learned in our initial pilot, we contacted Google in May about the possibility of providing access to a set of WorldCat records that would contain pointers to a "find in a library" service residing in Dublin, Ohio. This service, the second generation of the pilot service described above, would perform essentially the same function: enable a user to enter location information and find nearby libraries that held an item in their collection. But it would be supported by a much more robust technical infrastructure and a more complete set of links to library OPACs. We proposed releasing to Google a set of records representing the 2 million most widely held items in WorldCat in order to maximize the possibility that a user finding one of them could also find a nearby library for service. We

and Yahoo!, and for OCLC itself. Traffic on partner sites, including the book sites mentioned above (with the addition of Biblio.com), Google and Yahoo!, and www.BookPage.com, has grown to almost 9 million referrals a month (see Figure 1), significantly expanding access to the collections of OCLC member libraries.

In addition, links to Open WorldCat have expanded to 3.4 million records in Yahoo! and the Google main index (Google.com), and Open WorldCat has been featured in Google Scholar (ww.scholar.google.com). (Google, in fact, has harvested the entire WorldCat database for use in Scholar.) In providing this expanded record set, we have sought to begin to address the issue of providing users of Open WorldCat with access to the complete list of library locations for items they find. This expanded record set represents the 3 million most widely held items from a version of WorldCat against which the OCLC Office of Research's Functional Requirements for Bibliographic Records (FRBR) algorithm has been applied. As a result of this process, these records represent the most widely held manifestations of the 3 million most widely held works in WorldCat. We have also begun to expand what is available to include 400,000 of the least widely held items in the database, that is, the items held by a single library.

Google Scholar is notable in that it has signaled a clear shift in the approach of major search engines toward a more refined and comprehensive approach to providing access to scholarly/research information. Yahoo!'s beta of its "Mindset" service, which allows the user to specify the intent of a search (commercial to informational), is a different approach that also serves the goal of providing access to a more information-rich search experience for students, researchers, and information professionals.

Because of the affiliate relationships that characterize Web search, the number of sites providing access to WorldCat content has grown substantially in the past year. Today, over 800 different Web sites link to the Open WorldCat "find in a library" service each month, and this number continues to grow. These sites include non-U.S. versions of partner sites, such as Yahoo! Mexico, Singapore, and Canada; sites that access content from Google, Yahoo!, or both (Alta Vista, Dogpile, etc.); and sites that have embedded links to particular Open WorldCat records.

How Open WorldCat Works

Open WorldCat includes service components for users, member libraries, and partners. These are described briefly below.

User Services

Access Points Users can access Open WorldCat through partner sites (http://www.oclc.org/worldcat/open/partnersites/default.htm) and follow links in these sites to OCLC member libraries for service. In addition, OCLC and its partners have published a number of Open WorldCat search

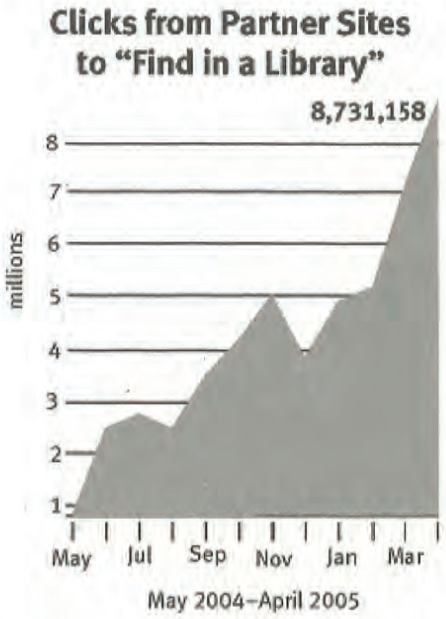


Figure 1. Monthly Accesses of Open WorldCat

tools that can be used to access Open WorldCat records directly from within partner sites. These tools, available from OCLC's Web site at http://www.oclc.org/worldcat/open/searchtools/default.htm, include a cobranded Yahoo! toolbar that includes a search capability limited to WorldCat records indexed by Yahoo!, a link to WorldCat records from within the Google toolbar using Google's "auto-link" capability, and Firefox extensions that allow a user of that Web browser to search the WorldCat records in Google or Yahoo! directly. Additionally, in summer 2005 we will publish a series of lightweight search tools and Web services to make it easy for libraries and other partners

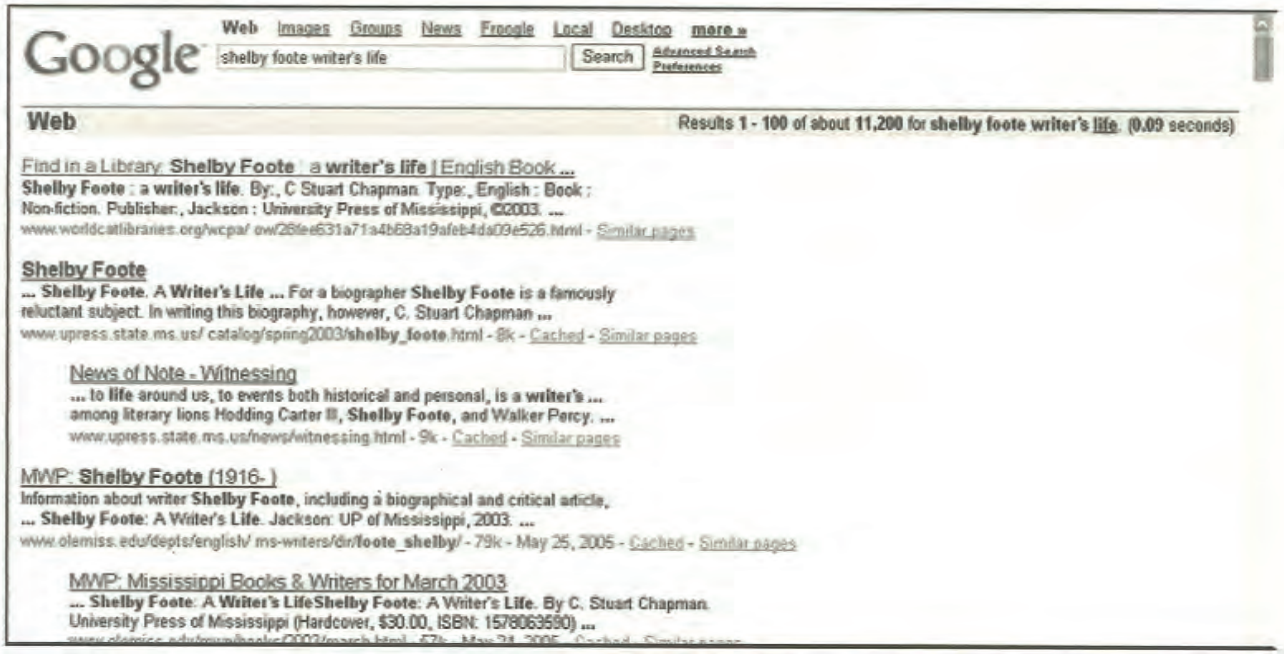


Figure 2. Results of a Google Keyword Search

mately the twenty-fifth result on the page, and a title phrase search of "A writer's life" would have brought up the same result as approximately the twentieth result on the page. (I will have more to say regarding page ranking and user search characteristics below.)

Every Open WorldCat record available through the Google and Yahoo! index is prefaced with the phrase "Find in a Library," as part of OCLC's effort to build the library brand within general Web search tools. The metadata in the "snippet" in Figure 2 is culled from the MARC record fields that we provide search partners. These include basic bibliographic information about the item, as well as subject headings (which can improve the hit rate). We are also beginning to experiment with other fields that may improve the performance of WorldCat data in these services. Users coming to Open WorldCat from a book vendor site, such as Alibris, or from a site that links to Open WorldCat from citations that it creates (such as Google Scholar or Bookpage.com) will not see a snippet formatted like the one in this example. Those users will see a link such as Scholar's "Library Search" or "Find in a WorldCat Library." From the "snippet" in a results set, the user will link to the "Find in a Library" page shown in Figure 3. (Here again, featuring the library brand is intentional.)

In addition to the ability to "Find Libraries with Item," this page leverages the metadata in WorldCat records by providing hot links on author name, title, and WorldCat subject headings. These links will execute a search for WorldCat records on the highlighted term against the search engine the user has come from. From the Shelby Foote record, for instance, clicking on the subject link "Southern States—Historiography" produces a list of seventy-eight titles from Open WorldCat that have been indexed in Google. These subject links are heavily used, which is not surprising, given that most users find Open WorldCat records in search engines as a result of a subject search rather than a known-item search.

Many WorldCat records also contain an "Other Editions" link, which a user can follow to a list of all of the versions (in Functional Requirements for Bibliographic Records [FRBR] terms, manifestations) of the work they have found. From the Open WorldCat record describing *The Da Vinci Code*, for instance, a user has direct access to all of the manifestations of this work in

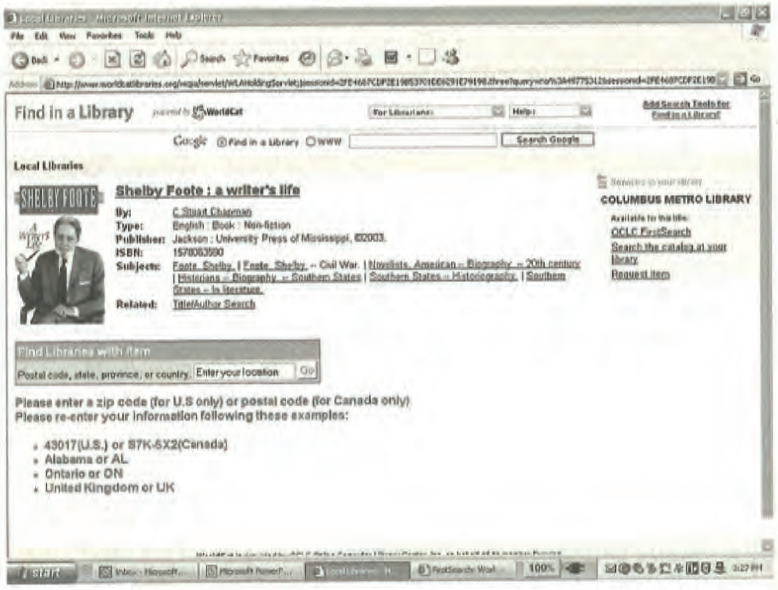


Figure 3. "Find in a Library" Page

the service will find a list of nearby libraries using a geo-location algorithm that retrieves up to ten nearby libraries or, failing that, broadens the search to regional and, ultimately, international libraries. In the example in Figure 6 the user has entered the Chicago zip code "60609" and retrieved ten local libraries holding the book. These libraries are sorted in descending order by proximity to the zip code entered, as indicated in the "distance" column.

The names of the libraries in the list are highlighted, indicating that the user can click on a name and follow a link to the library's catalog. In this example a user who clicks on the link to the Chicago Public Library, for instance, would be taken to the entry for this book in that library's OPAC, as shown in Figure 7. (Note the branding of Chicago Public Library on the Open WorldCat frame at the top of the page.)

As of this writing we have assembled a directory of 6,700 links to library catalogs, and approximately 65 percent of these will take the user directly to the page in the library's OPAC corresponding to the item found via Open WorldCat, using an ISBN, ISSN, or an OCLC number. We are actively harvesting and maintaining OPAC links, as well as links to OpenURL resolvers, library information pages, and library "Ask a" services. This "registry" component of Open WorldCat is a lynchpin of the service and an area that we will continue to invest in.

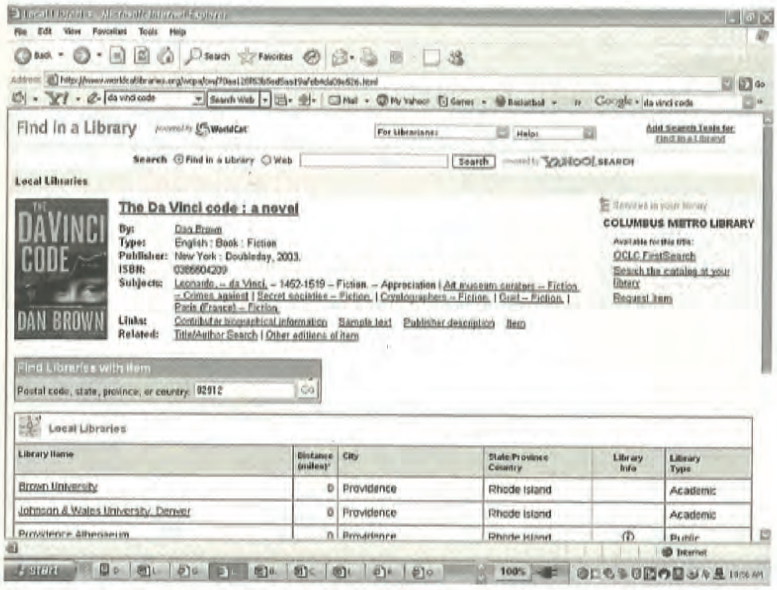
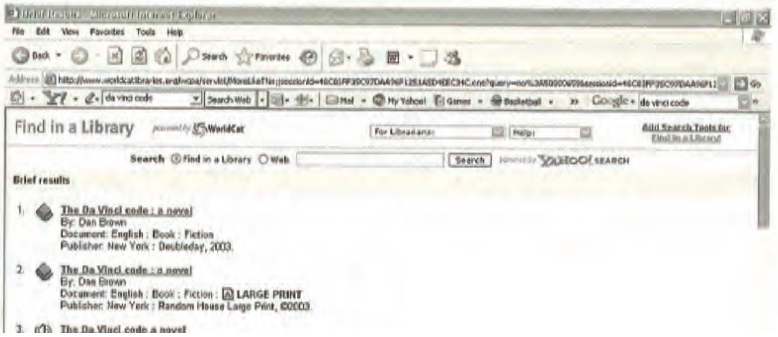


Figure 4. "Other Editions" Link



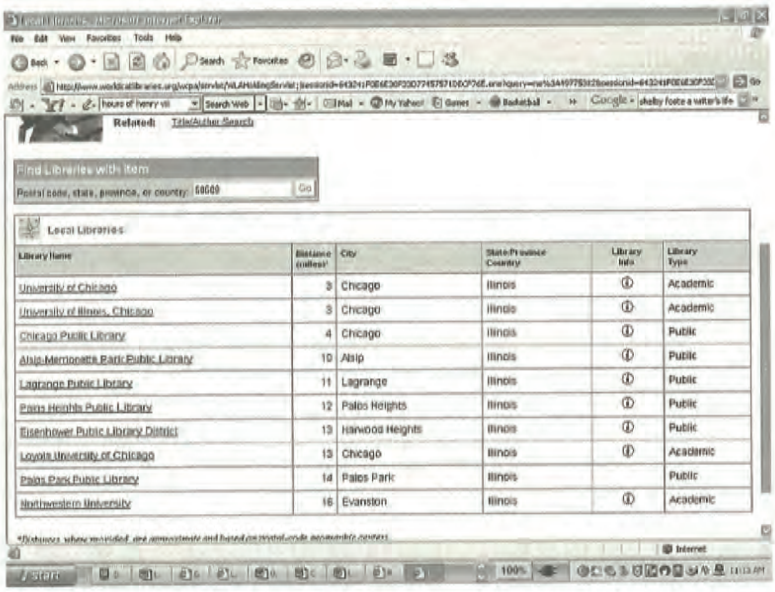


Figure 6. List of Libraries That Hold the Item

Users of the service who are coming from an IP address that OCLC recognizes are also able to access services that the library has registered with OCLC. In Figure 7, these links appear in the gray box on the left. Today, these include OpenURL resolvers, links to patron-initiated interlibrary loan (ILL), and links to other reference services (provided by OCLC and a variety of vendors). Approximately 15 percent of all links to "Find in a Library" interface come from users whose IP address is recognized by OCLC.

User Behavior We track a variety of user activity measures, which provide some insight into user behavior and guide enhancements to the service. In addition, we capture and analyze qualitative feedback through a comments link on the "Find in a Library" page.

Users most often access Open WorldCat via a simple keyword search (generally a subject search) of two to four terms. A recent one-day sample of searches that linked to Open WorldCat records included sixteen subject searches and four known-item searches in the top twenty searches for the day (see Table 1 for details). A 6,000-search sample of searches showed that the average number of search terms was 2.38, and the Open WorldCat record was, on average, approximately the sixth item displayed in the Yahoo! search results. At the same time, there is also significant linking activity from results found below item ten on an average results set, suggesting that Open WorldCat does serve a constituency of more determined researchers who

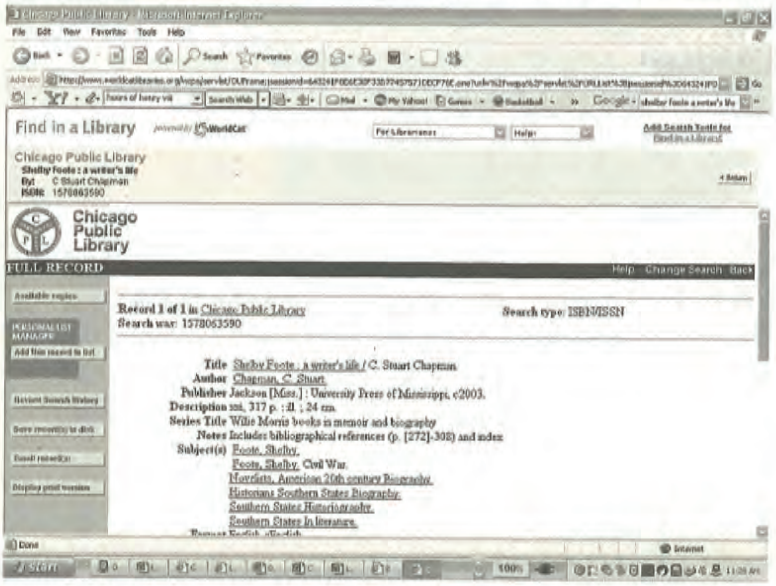


Figure 7. Link to Library OPAC

tend to dig deeper into results sets. We do not know how frequently users who see "find in a library" links on a partner site choose those links and click through to the "Find in a Library" service.

Users click on another link 15–20 percent of the time after landing on a "Find in a Library" page. Most often, they follow a subject link to another list of items. They click off to a library service of some sort (an OPAC, for instance) approximately 4–6 percent of the time after landing on a "Find in a Library" page. When they click to a library service, they go to an OPAC or library information page approximately 80 percent of the time.

Some users come to the "Find in a Library" page from an IP address

Table 1. Top Twenty Searches Leading to Open WorldCat Records

Rank	Search Term	Hits on May 20, 2005
1	Denmark history	38
2	0028 9604 (*Newsweek*) and WorldCat	36
3	Violence in the Workplace Prevention site (worldcatlibraries.org)	27
4	Teaching high school English	24
5	Find in a Library *Da Vinci Code*	24
6	0226103897 (*Chicago Manual of Style*) and WorldCat	22
7	Fuel injection	20
8	Medical	17
9	WorldCat	15
10	Lsyvygotskii site (worldcatlibraries.org)	14
11	Slideboard	13
12	Henry Frederick Prince of Wales site (worldcatlibraries.org)	13
13	9960340112 ("A brief illustrated guide to understanding Islam") and WorldCat	12
14	worldcatlibraries.org	12
15	Site www.worldcatlibraries.org-foxz1	12
16	Levente szasz site (worldcatlibraries.org)	11
17	Hannah Arendt	11
18	Greeting card thesis	11
19	Wendyl Marshall William Beaudine: From Silents to Television	10
20	Cooperative Learning	9

In addition to measuring system activity, we have also evaluated qualitative feedback. Figure 8 summarizes a sample of 192 comments submitted by users of Open WorldCat in the late autumn of 2004. The comments were analyzed by staff in OCLC's corporate marketing area and grouped into the categories shown.

A few of these areas reflect the relative newness of the service and relate to users and library staff praising the service and/or raising questions regarding their collections appearing or failing to appear in a search engine. Encouragingly, we received a relatively high percentage of testimonials from happy end-users who had discovered the service. "Find libraries with item issue" and "Library holdings issue," for instance, together comprised over 20 percent of comments. Most of these were library staff who did not know that only a subset of WorldCat records had been indexed by Google and Yahoo! or were asking questions about whether or not holdings had been set for their collection on a particular item. These kinds of questions, while important, were not surprising at that point in the project.

Other kinds of comments pointed the project in new directions. The largest category of questions, Reference, consisted of users who submitted what constituted a reference question through the comments box. As a direct result of this phenomenon, we have begun routing reference questions we receive to OCLC's 24/7 reference service and will integrate access to library "Ask a" and virtual reference into Open WorldCat in the summer of 2005.

Equally illuminating were comments regarding bibliographic issues with records and buying the items found through Open WorldCat. In response to the former, we are partnering with the OCLC Office of Research this

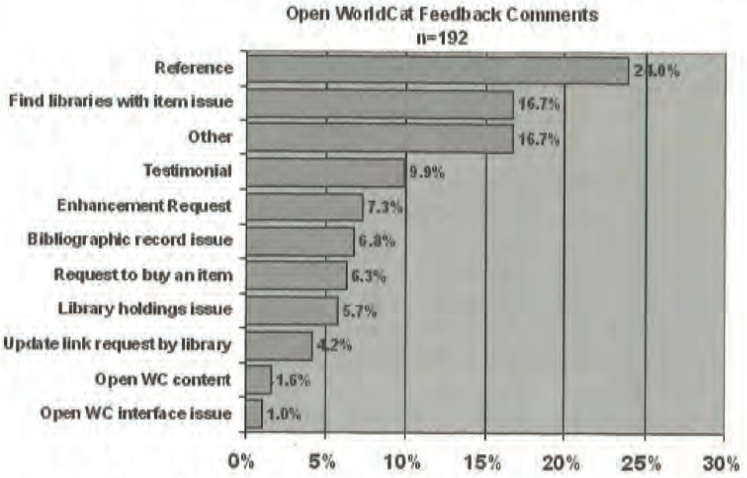


Figure 8. Open WorldCat Feedback Comments

summer to pilot a "meta-wiki" service through Open WorldCat that will give users the ability to contribute reviews, tables of contents, and notes regarding Open WorldCat records. In response to the latter, we plan to pilot a "buy it" link from Open WorldCat to determine the demand among users of Open WorldCat for purchasing the items they find in the service. The "buy it" option is also a way to test alternative funding models for WorldCat: proceeds from sales will be shared with OCLC member libraries directly.

Library Services

Libraries participate in Open WorldCat by setting their holdings in WorldCat and configuring their Open WorldCat profile. Libraries set holdings by cataloging with OCLC or by batch loading holdings directly into WorldCat. WorldCat includes holdings for approximately 12,000 institutions.

Configuration options for Open WorldCat include links to local services (OPAC, OpenURL resolver, "Ask a" service) and display preferences (for

partner site to their local site for service. This service, as well as the promotional materials we have developed, are intended to help member libraries promote Open WorldCat to their patrons and funding bodies and to show one way that they are seeking to meet their users at the point of need.

Partner Services

Open WorldCat also includes a variety of partner services. As mentioned above, the program includes a linking program through which OCLC provides partners with partial WorldCat records, as well as a program through which OCLC will accept known-item queries sent by partners to the "Find in a Library" service. Among current partners, two obtain metadata from OCLC (Google and Yahoo!); the rest are sending queries using a predefined syntax from metadata in their catalogs. OCLC also manages a version of Open WorldCat, called the WorldCat Partner Program, for sites that license content to libraries (http://www.oclc.org/vendors/worldcatpartners/default.htm). Through this program, partners can link into WorldCat and FirstSearch in a variety of ways.

A large component of partner services are OCLC's partner development and partner relations activities. As partner services evolve and change, so must Open WorldCat. Developing new methods of access (for example, Web services), maintaining and managing contacts within partner sites, working with partners to deploy Open WorldCat within new partner services, and managing data feeds and placement in partner sites are significant, ongoing activities that OCLC performs on behalf of its member libraries.

Conclusions

It is important to note that Open WorldCat is just one facet of a broader effort to provide open access to WorldCat. In addition to this program, OCLC offers its members a union catalog service, called the WorldCat group catalog, that provides library consortia with a publicly accessible catalog of their consortia holdings that is a customized view of WorldCat. There are currently more than fifteen group catalogs available on the Web (http://www.oclc.org/groupservices/access/default.htm). The OCLC Office of Research has also made a variety of views of WorldCat publicly accessible, including a fiction view and a "top 1000" view (http://www.oclc.org/research/researchworks/default.htm).

Open WorldCat is only a starting point for this broader effort. Over the coming year we expect the model to evolve dramatically, both by design and in response to the rapidly changing information environment. In addition to those already mentioned, our planned enhancements include an OpenURL registry and gateway that will enable us to redirect Web surfers to appropriate OpenURL resolvers. We also are actively pursuing new partners and plan to announce recent signings in the coming weeks and months. We continue to be interested in bringing more of WorldCat out into the

open, in particular the millions of uniquely held items it describes. And we are always looking to expand and improve the interface, the fulfillment options we can support, and the quality of the user experience. Finally, we are looking hard at simplifying and streamlining our services for enabling partners, whether members, other .orgs, or .coms, to integrate whatever components of WorldCat they wish to use into their applications.

We also expect to continue grappling with known issues. Page rank, for instance, is and continues to be one of the biggest challenges facing Open WorldCat and other services that seek to integrate content into user research flow/workflow in popular search engines. Specialized views, such as Google Scholar and Yahoo! Mindset, offer help for the specialized audiences that will likely use these tools; but more general audiences will need direct access.

Underlying this work is the understanding that the nature of search and, more broadly, the discovery-to-delivery chain for libraries and other information providers, is fundamentally shifting, and that WorldCat must shift with it. WorldCat must evolve from a monolithic reference database that is designed primarily for use in private networks by information professionals and researchers to a search service that combines vertical search, syndicated search, and Web services and is distributed across private and public networks. It is difficult to say today where this understanding will lead us, but it is easy to see that we must move, quickly, in the direction of broader and broader access options, and better and better methods for locating and getting the item, if we are to serve the needs of our members and their patrons.

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