Chapter 7

Other Linking Issues

Thus far, this report has presented an overview of the main issues associated with the current linking environment, but there are many more initiatives and developments in existence. For example, Google Scholar's acceptance of the OpenURL marks a giant leap forward for the entrance of the OpenURL beyond the library world. Additionally, open-access (OA) materials present special challenges to the OpenURL, and developers are working on better ways to link users to OA digital objects. Furthermore, OCLC is investing in several linking initiatives that strive to make link-resolver implementation easier, and like its Open WorldCat project, allow libraries to expose their content and services to users in a variety of new and exciting ways. This chapter will briefly examine these "other" linking issues.

Google Scholar and the OpenURL

Google Scholar (http://scholar.google.com), a freely available Web search engine that purports to search the Web for scholarly information, was released in November 2004. Immediately, the library community stood up and took notice of this finding tool, as it could represent competition for the proprietary abstracting and indexing and full-text databases and e-journals for which libraries pay a great deal of money.

Librarians also expressed immediate concern because, in its initial release, Google Scholar did not address the appropriate copy issue. For instance, if a user found a citation to a non-open-access information object in Google Scholar, it normally linked the user to the publisher's site without regard for the user's institutional affiliations (i.e., his or her subscriptions) and did not facilitate context-sensitive linking. Because of this, Google, "very quickly after [Google Scholar's] November 2004 release, in February 2005 . . . began a beta test with link-resolver vendors and libraries to implement institution-specific OpenURL linking in Google Scholar."[1] Then, in May 2005, this functionality became available to any library with a participating link resolver, and Google Scholar agreed it would turn on these OpenURL links for free.

Although librarians were pleased that Google agreed to allow institution-specific OpenURL linking within its native interface, this new functionality was not without its controversy. Google insisted that libraries (or by proxy their link-resolver vendors) send their electronic full-text holdings to Google. This additional step is not necessary to make OpenURL linking work, and librarians were a bit suspicious of why Google wanted, or claimed to need, this information. Anurag Acharya, creator and principal engineer of Google Scholar, provided a rationale for requiring libraries to submit their holdings: "the holdings information from libraries is used to determine when to emphasize the full-text links for users—to give users a visual indication that their institutional affiliations have made the full text available to them."[2]

In other words, Google uses the holdings information to create a larger and more prominent link next to the title of the citation in the interface to make it more clear to users that Google has identified their institutions as having the right to access the full text (see figure 5 on p. 40). If Google cannot identify that a user has full-text rights, then the OpenURL link appears down in the fray with the other possible links to resources, such as the National Institutes of Health or a generic Web search (in Google, of course).

Google's requirement that libraries submit their holdings information means that libraries (or their link resolvers by proxy) have to update data in yet another source to ensure that accurate linking continued to occur

for their users. Although this is not earth shattering, one of the appeals of the OpenURL framework, through its implementation via link resolvers, is the ability to update holdings data in one place and still facilitate linking amongst many resources.

Google Scholar can recognize users based on IP ranges, which are also sent to Google, usually through the link-resolver vendor. When working outside the institution's IP range, users can set a preference for a particular library. Regardless of concerns about the way in which Google has chosen to implement the OpenURL, many libraries have decided to participate for one main reason: they do not want their patrons paying for resources for which they have valid rights to access (see figure 4 below).

Some interesting open-source options also allow context-sensitive linking but do not require libraries to submit holdings, including the Openly Informatics OpenURL Referrer (www.openly.com/openurlref) and WAG the Dog (http://sourceforge.net/projects/gslocal). These options, however, require more effort on the user's part, whereas, if the local library sets up linking via its link resolver in Google Scholar, the most the user has to do is set a preference for a particular library.

Additionally, SFX has created an alternative, in the form of "ScholarSFX," for those libraries that do not have a link-resolver product. ScholarSFX essentially is a mini-SFX for a single source: Google Scholar. "It is a fully hosted service, with no equipment to purchase, and completely free-of-charge." Setup of ScholarSFX is relatively simple. Through a wizard available on the Ex Libris Web site (www.exlibrisgroup.com/scholar_sfx.htm), librarians can check off packages to which their libraries subscribe or batch upload holdings via a spreadsheet.[3]

The acceptance of the OpenURL standard in a non-library source is a huge leap forward, according to Ex Libris's chief strategic officer Oren Beit-Arie. The hope is that Google's acceptance will lead to further non-library acceptance of, and innovations with, the OpenURL.

Google Scholar
http://scholar.google.com

Openly Informatics OpenURL Referrer
www.openly.com/openurlref

WAG the Dog
http://sourceforge.net/projects/gslocal

"Google Scholar and SFX: New Opportunities for Libraries and Researchers"
www.exlibrisgroup.com/scholar_sfx.htm

"Scirus," Elsevier's Scholarly Search Engine
www.scirus.com

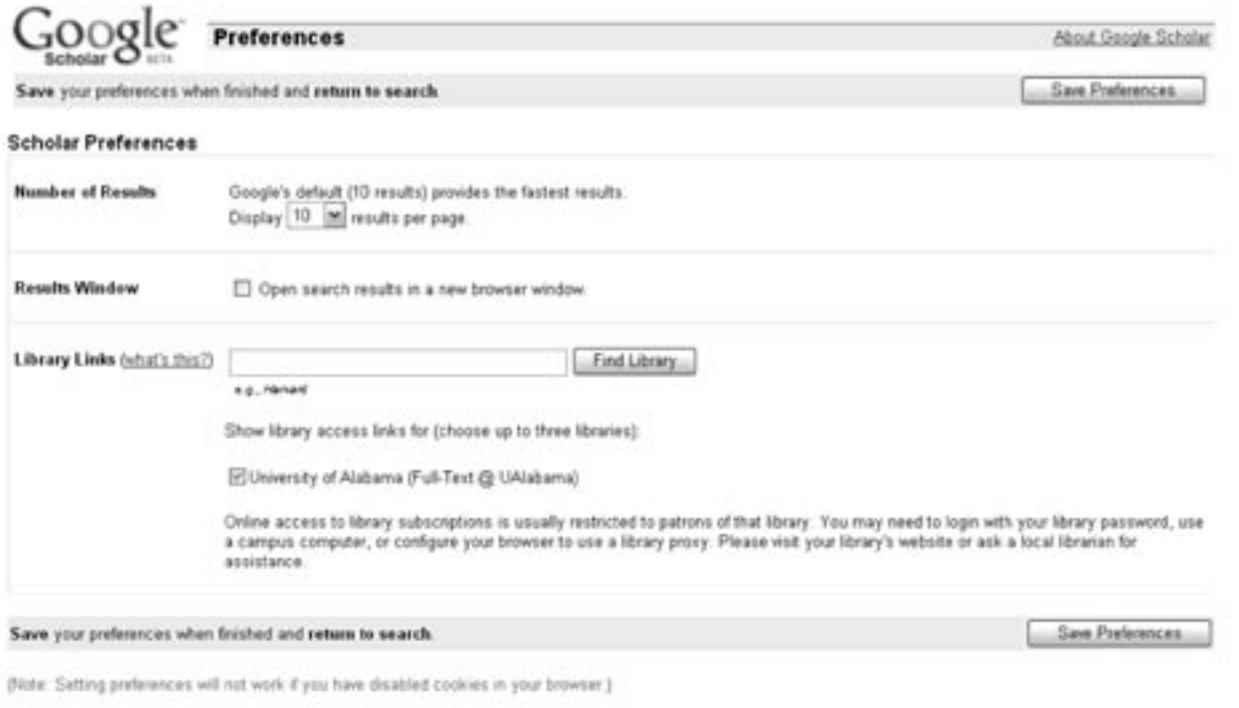

Figure 4
Users can set a preference for a particular library, or if a user is operating within a particular institution's IP range, then that institution is selected by default. Image appears courtesy of Google.

Another well-known freely available scholarly search engine, Elsevier's Scirus (www.scirus.com), does not currently allow OpenURL linking. Ammy Vogtlander, the general manager of Scirus said, "Scirus is exploring the possibility of implementing OpenURL linking," but that Scirus "has some concerns about how easy it actually is to implement OpenURL linking in free products in order to deliver high-quality content."[4] It remains to be seen whether or not OpenURL linking will move beyond Google Scholar into other free Web search engines.

Linking Users to Open-Access Materials

Open-access (OA) materials provide a unique challenge for context-sensitive linking efforts. Although, at first glance, linking to OA resources seems intuitive—because, by basic definition, OA materials are freely available to the everyday user—upon closer examination it becomes clear that linking to OA materials can be quite complex. In the past, linking efforts have almost exclusively focused on toll-based literature and toll-based indexes and abstracts. Yet there is a wealth of relevant scholarly (and non-scholarly) OA information available for users.

According to Peter Suber in his "Open Access Overview," generally, there are "two primary vehicles for delivering OA to research articles—OA journals and OA archives or repositories".[5] Suber also notes in his overview there are many other types of "OA vehicles... such as personal Web sites, e-books, [electronic discussion lists], discussion forums, blogs, wikis, RSS feeds, and P2P file-sharing networks." COinS, which was discussed in the previous chapter, attempts to provide context-sensitive linking in some of these other OA vehicles. This section mainly addresses how librarians can facilitate linking in OA journals and OA archives.

"Open Access Overview," by Peter Suber
www.earlham.edu/~peters/fos/overview.htm

Directory of Open Access Journals
www.doaj.org

OA journals are often tracked by link-resolver vendors and homegrown solutions in their knowledgebases; this is an important consideration when libraries are evaluating link-resolver products for purchase or adoption. Additionally, many OA journals and publishers, such as the Public Library of Science and Biomed Central, participate in CrossRef. Also, the Directory of Open Access Journals (www.doaj.org) provides one of the

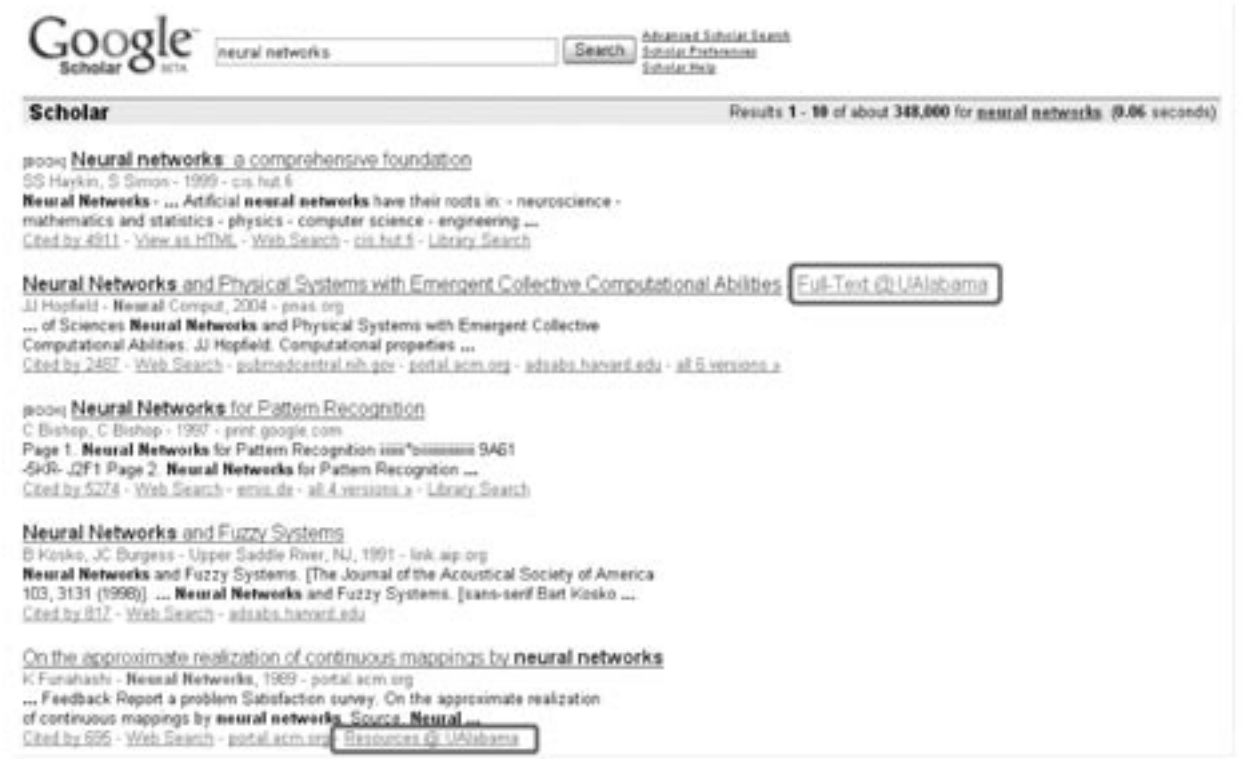

Figure 5
The "Full-Text@UAlabama" link is larger and more prominent because Google has conceivably identified that the University of Alabama has access to a full-text version of this article. On the other hand, the "Resources@UAlabama" link is smaller because Google could not identify the University of Alabama has access to a full-text copy. Image appears courtesy of Google.

most comprehensive listings of OA journals available. OA archives, which are usually classified as discipline-specific (such as the arXiv.org e-print archive) or institutional repositories, on the other hand, represent a different kind of challenge for context-sensitive linking.[6]

The Open Archives Initiative Protocol for Metadata Harvesting
www.openarchives.org/OAI/openarchivesprotocol.html

For OA archives, one of the key projects is *The Open Archives Initiative Protocol for Metadata Harvesting* (OAI-PMH), which "provides an application-independent interoperability framework based on metadata harvesting."[7] Carl Lagoze, of Cornell University, and Herbert Van de Sompel, of the Los Alamos National Laboratory, are among the editors of this document. Priscilla Caplan explains, in a narrow sense, "the OAI-PMH is a mechanism for harvesting XML-formatted metadata from distributed collections of metadata." Caplan goes on to explain that more broadly, OAI-PMH "is a framework for increasing interoperability that includes an architectural model, implementation guidelines, a registry of implementers, and a common descriptive metadata format, in addition to the harvesting protocol itself."[8] If an OA archive is OAI-PMH-compliant, then it achieves interoperability, thus allowing cross-archive searching. Information about and lists of OA archives are available at SHERPA (www.sherpa.ac.uk) and EPrints.org (www.eprints.org).

OA Archives Information

SHERPA
www.sherpa.ac.uk

EPrints.org
www.eprints.org

A well-known tool for cross-archive searching is OAIster, which is a project of the University of Michigan Digital Library (http://oaister.umdl.umich.edu/o/oaister). Other tools include ARC–A Cross Archive Search Service (http://arc.cs.odu.edu). Additionally, there are several tools and projects such as Celestial (http://celestial.eprints.org) and the Open Citation Project (1999–2002), which spawned Citebase (www.citebase.org). Institutions can register their institutional archives at http://archives.eprints.org and can register their official self-archiving policies at Eprints.org (www.eprints.org/openaccess/policysignup/sign.php).

Additionally, the Grainger Engineering Library Information Center at University of Illinois at Urbana-Champaign has developed an experimental OAI Registry (available at http://gita.grainger.uiuc.edu/registry). According to the Web site, the UIUC OAI registry has "collected Identify, ListSets, ListMetadataFormats, and sample records from all of the OAI-compliant repositories we could find from various sources, added the data to a database, indexed them, and made them searchable."[9]

Another way to access OA materials is via the ubiquitous finding tool, Google. Google is OAI-compliant, although it is not alone; Yahoo! Search also "indexes OA material, in particular OAIster, as does Scirus."[10]

In terms of how institutional repositories or self-archiving fits into the OpenURL/link-resolver framework, Kat Hagedorn, OAIster/metadata harvesting librarian explained in 2005: "As I understand link resolvers, they need a handle to perform the search for the item." Hagedorn added, "In the case of OAIster, we provide a hack to link resolvers that uses the title of an item as a handle."[11] This OpenURL hack is available on the OAIster Web site, and both OpenURL and Z39.50 compliancy are on the agenda for future improvements.

Innovative uses of the OAI-PMH have been explored by Van de Sompel and OCLC's Jeffrey Young and Thomas Hickey.[12] Much work is currently being done to use the OAI-PMH and OpenURL framework to facilitate linking in the digital-library environment, i.e., in repositories and with digital objects.[13]

In his presentation at the NISO OpenURL and Metasearch (September 2005), Ex Libris's Oren Beit-Arie explained an OpenURL application for citation harvesting as well as an OpenURL application to access digital objects in repositories, which was based on work being done at the Los Alamos National Laboratory.[14] Part of this work is published in a February 2004 *D-Lib Magazine* article, "Using MPEG-21 DIP and NISO OpenURL for the Dynamic Dissemination of Complex Digital Objects in the Los Alamos National Laboratory Digital Library," written by Jeroen Bekaert, Lyudmila Balakireva, Patrick Hochstenbach, and Herbert Van de Sompel.[15]

In an interview with the author in October 2005, Beit-Arie explained that even within the domain of the research community there is need for linking beyond the textual or beyond the non-article. The work by the Los Alamos National Laboratory Digital Library team explores the opportunities that OpenURL v. 1.0 presents to enable, or to build, link-resolution services on top of digital objects, in other words, to enable the dissemination of services relating to digital objects. Jeroen Bekaert and Herbert Van de Sompel have recently written an article describing how they are working to enable OpenURL-based services in the context of digital libraries and digital objects; it is available in preprint at http://arxiv.org/abs/cs.DL/0509090.[16]

Beit-Arie further explained that one could think about disseminations as services in the same sense that SFX presents services to articles, except in this case, there would be services to digital objects. Of course, such services would vary depending on the digital object at hand. Many of these digital objects, and other types of material, are stored in repositories (of which institutional repositories are one type). The beauty of using the OpenURL infrastructure with digital objects is that one can build a service layer detached from the repository, much like SFX is detached from, for example, the full-text article provider. In other words, SFX provides full-text links for articles stored in Elsevier products, but it is not a part of Elsevier. If the service layer is detached from any given repository, then services can be cross-repository.

OAIster
http://oaister.umdl.umich.edu/o/oaister

ARC—A Cross Archive Search Service
http://arc.cs.odu.edu

Celestial
http://celestial.eprints.org

Citebase
www.citebase.org

Register Self-Archiving Policies at EPrints.org
www.eprints.org/openaccess/policysignup/sign.php

Caplan suggests, "a major advantage of the OAI model over distributed search engines is scalability . . . separating the functions of data provider and service provider lends simplicity and flexibility that encourages innovation."[17]

Beit-Arie emphasized the work that Bekaert, Van de Sompel, and others at the Los Alamos National Laboratory are doing is certainly on the cutting edge of innovative uses of the OpenURL. Furthermore, it is potentially a great advancement for the entire OA landscape. Beit-Arie noted that if repository owners can build repositories of content without having to invest a lot in the provision of services, that might actually lower the barrier and entice the creation of more such repositories.[18]

Experimental OAI Registry at UIUC
http://gita.grainger.uiuc.edu/registry

OCLC Initiatives

In addition to its OpenWorldCat program, which "makes records of library-owned materials in OCLC's WorldCat database available to Web users on popular Internet search, bibliographic, and bookselling sites," OCLC has other initiatives in the works, which involve the OpenURL and e-serials.[19]

First, OCLC has developed the OCLC Alpha Global OpenURL Resolver Registry (www.oclc.org/productworks/urlresolver.htm); the registry "would eliminate the need for librarians to register their OpenURL link-resolver vendors with multiple information providers."[20] It would, in essence, centralize the registration process wi th OCLC and provide wider access to libraries' licensed electronic resources and other materials. Phil Norman of OCLC indicated in October 2005 the organization hired Scott Shultz, who will serve a new product manager for the resolver registry and will be investigating partnerships with libraries, link-resolver vendors, and information providers.

Norman noted that one interesting partnership is already underway with Dan Chudnov at the Yale Medical Library. OCLC exported a subset of OCLC OpenURL-resolver registry entries to Chudnov in XML format conforming to the registry schema, and Chudnov has made them searchable by institution name in his COinS browser-extension page. When a resolver is selected on this page, a link to that resolver appears on metadata displays from any COinS-aware information providers. By having the browser control the linking, authentication issues are solved. More information about this partnership is available at http://curtis.med.yale.edu/dchud/resolvable. Also, within OCLC, OCLC's Open WorldCat service is now using the resolver registry directly, meaning any resolver registered at the http://worldcatlibraries.org/registry will be visible in Open WorldCat immediately.[21]

In addition to the OCLC Global OpenURL Resolver Registry, OCLC has another pilot project: eSerials Holdings. The eSerials Holdings pilot is a method for libraries to efficiently contribute their holdings for eSerials to WorldCat without increasing their cataloging workloads. In November 2005, OCLC began setting and maintaining level-one holdings for 21 pilot libraries monthly, representing their eSerials collections, using journal title-level holdings data provided to them by pilot partners (TDNet, EBSCO, Serials Solutions, and Ex Libris); 270,000 holdings have been set and are being maintained monthly against 31,000 records in WorldCat. OCLC is testing a MARC record update process with three libraries. The pilot will continue through April 2006.

These two initiatives work together. E-serials MARC records for the beta libraries are being exported back to them for use in their OPACs. OCLC has added an 856 link in these MARC records, which contains an OpenURL link

"Using OAI-PHM . . . Differently," by Herbert Van de Sompel et al.
www.dlib.org/dlib/july03/young/07young.html

"OpenURL: Beyond Bibliographic Linking" (NISO Workshop Presentation), by Oren Beit-Aire
www.niso.org/news/events_workshops/OpenURL-05-Agen-FINAL.html

"Using MPEG-21 DIP and NISO OpenURL for the Dynamic Dissemination of Complex Digital Objects in the Los Alamos National Laboratory Digital Library"
www.dlib.org/dlib/february04/bekaert/02bekaert.html

"Access Interfaces for Open Archival Information Systems Based on the OAI-PMH and the OpenURL Framework for Context-Sensitive Services," by Jeroen Bekaert & Herbert Van de Sompel
http://arxiv.org/abs/cs.DL/0509090

to the OCLC Global OpenURL Resolver Registry gateway. This OpenURL includes the library's OCLC symbol in the requester entity, which allows the user to gain access to his local resolver through the library's OPAC even when outside the library's IP address range. Once the local resolver is reached, the library's access and authentication systems take over.[22]

Finally, on January 3, 2006, OCLC and Openly Informatics, Inc., announced OCLC's acquisition of Openly Informatics's assets. (The press release announcing this purchase is available at www.openly.com/pr/pr24.html). States OCLC/Openly Informatics: "Openly Informatics'[s] 1.2 million-record database of linking metadata for electronic resources will be used to enrich OCLC WorldCat. . . . OCLC WorldCat, in turn, will extend the Openly Informatics database by contributing metadata covering materials in other electronic formats, including electronic books, digital audio books, [and] digital theses and dissertations." (More information about OCLC's acquisition of Openly Informatics is featured in the February 2006 (26:2) issue of *Smart Libraries Newsletter*. Marshall Breeding covers it in, "OCLC's Ongoing Open Season on Acquisitions," p. 1.)

Certainly, OCLC projects and partnerships continue to be something to watch.

Conclusion

Other important issues for linking and the OpenURL include federated searching, authentication, and metadata standardization, each of which is a very complex topic in its own right. This report will not tackle federated searching or authentication, but will briefly conclude with a discussion of metadata standardization. The NISO workshop OpenURL and Metasearch, which was used heavily as a source for this report and is referenced in chapter VII, "Sources and Resources," is a good place to begin for an introduction to the current issues surrounding metasearch. Authentication schemas, such as Shibboleth (http://shibboleth.internet2.edu), are important factors in linking, as they, among other things, provide a way to hide the authentication process from the user.

Perhaps it is fitting that this report concludes with comments about metadata standardization, because it is the metadata that often causes the most difficulty with accurate linking. Many vendors transmit data in different formats, and although resolvers do their best to match data, they are not miracle workers. Perhaps one vendor historically handled volumes and issues in newspapers one way, while another vendor chose to handle it differently. Perhaps one vendor chooses to assign ISBNs to conference proceedings, while another chooses to assign ISSNs. Letters to the editor can be particularly problematic, with indexing and abstracting vendors (as well as other content providers) choosing to deal with them in different ways. Yet, these are only three examples of a vast sea of non-standard metadata.

Consistent vendor documentation can assuage some of the problems with metadata, but even more importantly, vendors must work together to facilitate increasingly accurate linking. Proquest's Mike Hoover emphasized the evolution and quick acceptance of the OpenURL framework has created an environment in which vendors simply *must* work well together. Many librarians expect to purchase a link-resolver product and have it solve all their linking-access problems, and although link resolvers do expedite linking amongst many types of electronic resources, they are not perfect. Hoover noted that when links fail, customers expect to make one call or send one e-mail message and have the problem solved. In the world of linking, one person rarely controls all the variables in any linking problem: at least two, if not three or more, companies or organizations are involved. Hoover provided one example in which seven different

OCLC OpenWorldCat
www.oclc.org/worldcat/open/default.htm

OCLC Alpha Global OpenURL Resolver
www.oclc.org/productworks/urlresolver.htm

COinS Browser Extensions for Your Library
http://curtis.med.yale.edu/dchud/resolvable

vendors were involved in fixing one linking problem.[23] Eric Hellman and Tim McCormick of Openly Informatics echoed Hoover's comments, saying that linking problems can be extraordinarily complex, which is why link-resolver vendors and linking experts are in the best position to assist librarians with their problems and issues.[24]

Lest we become too depressed at the complexity of it all, it is very encouraging to see the ever-increasing cooperation of historically competitive vendors and content providers. Perhaps the OCLC Global OpenURL Resolver Registry will further smooth the process, allowing vendors that use OpenURLs to share information with one another about how they are using those OpenURLs.

Ultimately, the OpenURL v. 1.0 is an elegant and versatile piece of technology. In August 2005, Herbert Van de Sompel and Eric F. Van de Velde, both of whom were instrumental in the v. 1.0 standard, won an ANSI Meritorious Service Award, "in recognition of their outstanding service in enabling ANSI to attain the objectives for which it was founded through significant contribution to the U.S. voluntary standardization system."[25] The speed with which this particular library technology has been accepted is truly impressive. Furthermore, while the OpenURL framework has yet to gain wide acceptance outside the library world, it is currently poised to explode with other possible implementations, as evidenced by Google Scholar's acceptance of this standard. As linking products and capabilities become more robust, we will begin to see a broader range of extended services and incorporation of the OpenURL into other information services.

Although this report outlines the importance of the OpenURL and its role in context-sensitive linking, the fundamental reason for any of this technology is the desire and the need to provide better service to the end user. Let's again imagine a world where a user never fails to reach the resources he or she has the rights or the desire to access. Context-sensitive linking, particularly the OpenURL v. 1.0, has the power to fulfill the librarian's very purpose—to adapt Ranganathan's original five laws of librarianship in the digital world:

1. Links are for use.
2. Every reader his or her link.
3. Every link its reader.
4. Save the time of the reader.
5. The library is a growing organism.

Indeed, linking must be at the top of the librarian agenda, for to ignore linking is to ignore a core tenet of librarianship: the right resource for the right reader at the right time.

Notes

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3. Ibid., 44.
4. Ibid.
5. Peter Suber, "Open Access Overview: Focusing on Open Access to Peer-Reviewed Research Articles and Their Preprints" (October 27, 2005), www.earlham.edu/~peters/fos/overview.htm (accessed December 8, 2005).
6. Jill E. Grogg, "Linking Users to Open Access," *Searcher: The Magazine for Database Professionals* 13, no. 4 (April 2005): 54.
7. Carl Lagoze, Herbert Van de Sompel, Michael Nelson, and Simeon Warner, eds., *The Open Archives Initiative Protocol for Metadata Harvesting* (October 12, 2004), www.openarchives.org/OAI/openarchivesprotocol.html (accessed December 8, 2005).
8. Priscilla Caplan, "OAI-PMH," *Computers in Libraries* 24, no. 2 (Feb. 2004): 24.
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11. Ibid., 55.
12. Herbert Van de Sompel, Jeffrey A. Young, and Thomas B. Hickey, "Using OAI-PHM . . . Differently," *D-Lib Magazine* 9, no. 7/8 (July/August 2003), www.dlib.org/dlib/july03/young/07young.html (accessed December 8, 2005); OCLC, "OAI Viewer" http://errol.oclc.org/ (accessed December 8, 2005); Ibid., "ERRoLs for OAI Identifiers, www.oclc.org/research/projects/oairesolver (accessed December 8, 2005).
13. Oren Beit-Arie, "OpenURL: Beyond Bibliographic Linking" (National Information Standards Organization, OpenURL and Metasearch: New Standards, Current Innovations, and Future Directions, September 19–21, 2005), www.niso.org/news/events_workshops/OpenURL-05-Agen-FINAL.html (accessed December 8, 2005).
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15. Jeroen Bekaert, Lyudmila Balakireva, Patrick Hochstenbach, and Herbert Van de Sompel, "Using MPEG-21 DIP and NISO OpenURL for the Dynamic Dissemination of Complex Digital Objects in the Los Alamos National Laboratory Digital Library," *D-Lib Magazine* 10, no. 2 (February 2004), http://www.dlib.org/dlib/february04/bekaert/02bekaert.html (accessed December 8, 2005).
16. Jeroen Bekaert and Herbert Van de Sompel, "Access Interfaces for Open Archival Information Systems Based on the OAI-PMH and the OpenURL Framework for Context-Sensitive Services" (Draft, Preprint, of an Accepted Submission for PV 2005, Ensuring Long-Term Preservation and Adding Value to Scientific and Technical Data, September 28, 2005), http://arxiv.org/abs/cs.DL/0509090 (accessed December 8, 2005).
17. Caplan, "OAI-PMH."

18. Oren Beit-Arie, telephone interview with the author, October 11, 2005.
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21. Phil Norman, e-mail correspondence with author, Nov. 10, 2005.
22. Ibid.
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25. ANSI News and Publications, "ANSI Announces Recipients of the 2005 Leadership and Service Awards" (August 15, 2005), www.ansi.org/news_publications/news_story.aspx?menuid=7&articleid=1008 (accessed December 9, 2005).