DIKTUON: *Link Resolvers for Theological Libraries*

By Karl Stutzman

Link resolvers, first introduced in 2000, were designed to connect library users searching in one library database with the library's complete full text resources. Link resolvers have evolved over the years and developed new features. Today, link resolvers and their associated knowledge bases are being leveraged as core elements of various new library discovery and management systems.[1]

Theological libraries often play bit parts in library technology decisions. Divinity school libraries usually get the technology selected by university libraries; free-standing seminary libraries often get technology through consortia or simply do not have the resources for advanced library technology. This review is for the theological librarian using a link resolver and other library systems he or she did not directly select and perhaps does not maintain.

LINK RESOLVER BASICS

Link resolvers were designed to pass users from a database without full text to another database with full text. Link resolvers have also been used to present a complete listing of the library's electronic journals. Common link resolvers include Ex Libris SFX, EBSCO LinkSource, Serials Solutions 360 Link, and OCLC WorldCat Link Manager.[2]

Link resolvers rely on the transmission of an OpenURL, a standardized web link used to format citations. The OpenURL standard is generally accepted by the vendors of link resolvers and of various databases.

In order to know where the library has full text, the link resolver relies on an underlying knowledge base, a catalog of library electronic resources. Electronic resources often come in subscription packages that include a constantly fluctuating set of journal titles and coverage ranges. The link resolver knowledge base needs to know exactly what full text exists in which packages and code the parameters for accessing the database with OpenURL.

Most link resolvers have a centralized knowledge base which the link resolver vendor maintains on behalf of its customers. To ensure linking success, the link resolver vendor needs to ingest and normalize holdings data from a wide variety of database vendors. The link resolver vendor also needs to be attentive to changes in database platforms and must perform routine quality control checks.

Due to the volatile nature of subscription e-resource packages and discrepancies in application of OpenURL standards, all link resolvers tend to display links with a certain percentage of errors. Sometimes these are false positives, where the link resolver suggests there is full text where it is not present. Other times these are false negatives, where the link resolver does not find full text even though it exists within the library's holdings or freely

[1] I am indebted to an excellent recent comparative study of link resolver products, complete with research about vendor plans and customer satisfaction: Marshall Breeding, "E-resource knowledge bases and link resolvers: an assessment of the current products and emerging trends," in *Insights: the UKSG journal* 25:2 (July 2012): 173-182, http://uksg.metapress.com/content/5155lh5253114111/fulltext.pdf (accessed October 12, 2012).

[2] This is not a complete list of link resolvers. This author cannot express a preference for any particular vendor or reveal proprietary information about link resolvers and their associated knowledge bases.

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accessible content. When link resolvers were being used only to link between databases to find full text, librarians and link resolver vendors are most concerned about false negative results.

Newer Applications For Link Resolvers

Google Scholar. Link resolver vendors cooperated with Google Scholar to create library links within the Google Scholar system. This involves the link resolver regularly sending a specially formatted report to Google Scholar indicating the library's knowledge base activations. Google does not charge libraries for this service. Once a library has communicated its holdings and configured its links in Google Scholar, links to library resources appear when users search Google Scholar from within the campus IP range. Users can also choose to display their library's links at home with a simple configuration setting in Google Scholar.

Discovery systems. "Next generation" discovery systems, such as Ex Libris Primo, Serials Solutions Summon, WorldCat Local, and EBSCO Discovery, rely on large centrally maintained indexes of citations to provide a supposedly integrated search across all the library's print and electronic resources. The discovery system needs to know which of these citations are included in the library's full text electronic resources to narrow the results set to accessible library resources. Discovery systems often use data from the link resolver (e.g., the Google Scholar report) to determine which resources the library is able to access. In addition, the discovery system utilizes the link resolver to build a working link to the full text electronic resource.

If the link resolver knowledge base is inaccurate or incorrectly activated, the discovery system may display a large number of false positive results, serving dead e-resource links to library users. To mitigate this, libraries need to manage their link resolver knowledge base activations more carefully and work with their link resolver vendor to improve the centralized knowledge base. Using link resolvers in the discovery environment increases the concern of librarians and vendors for false positive errors in the link resolver.

Vendors with both a link resolver and a discovery system have the opportunity to tighten the integration between their products to improve linking success rates in the discovery environment. While this improves the experience of customers who have products from the same vendor, this trend makes it increasingly difficult for libraries to integrate discovery systems and link resolvers from different vendors. Similarly, vendors who control a significant amount of content are positioned to tighten the integration of their products with their content.

Library management systems. Several vendors are introducing a new generation of library management systems or "platforms" with a system architecture that is "cloud-based." Examples of this include OCLC WorldShare, Ex Libris Alma, and Serials Solutions Intota. Migrating to this new technology infrastructure is analogous to moving from several houses into a condominium unit. These new management systems offer operational efficiencies by scaling to accommodate lots of libraries on the same computing infrastructure. The new management systems are designed to bring the management of all library resources onto one technological platform. This means that the centrally managed electronic resource knowledge base becomes an essential part of the new management system, driving management of electronic resources, linking, and discovery. In other words, libraries will be purchasing link resolvers and knowledge bases packaged with the traditional functions of their integrated library system. The tighter integration of various vendor technology options means that libraries may increasingly be inclined to purchase all their products from a single vendor.

Implications For Theological Libraries

Due to the competitive nature of the market, link resolver and database vendors do not consistently share data; these policies or practices are usually beyond the control of any single player in the marketplace. Theological librarians need to interact regularly with link resolver and database vendors to ensure that theological content is well represented and successfully linked in library discovery systems. Theological librarians need to stay informed of potential gaps and errors in their discovery systems, many of which are related to underlying link resolver and knowledge base technology.

New management systems are promising in many ways. The workflows in the new systems are tightened by the overall integration of the technology platform. However, the complex relationships between vendors' various technology and content offerings create challenges for librarians. If theological librarians have any role in selection of discovery and management systems, they need to advocate for systems that are compatible with theological e-resources, which are provided by a narrower subset of library vendors. Choices about new management systems must take into account implications for the integration with discovery, link resolving and actual content.

Since theological librarians may have little say in selection of systems, they will need to continue to lobby various vendors to cooperate. The downside of more highly integrated and controlled vendor solutions may be less compatibility across vendors. Theological librarians' awareness of and ability to navigate the complex dynamics of "coopetition" in the vendor marketplace will be essential for the future of access to theological library resources.