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From Predictability to Managed Chaos: Managing the Change from Print Serials to Electronic Resource Management – Indiana University, Kokomo Campus Library

The Indiana University system is comprised of 8 campuses with 37 libraries, including the residential campus at Bloomington with 27 libraries, the urban campus at Indianapolis with 4 libraries and 6 regional campuses each with a library. Librarians have faculty status. Combined, the campuses serve over 92,600 students and have more than 4,700 faculty. The administration of each library is independent and campus-based, with library directors/deans reporting to a Vice-Chancellor or Vice-President of Academic Affairs on each campus. The Council of Head Librarians, comprised of the 37 library directors and led by the Ruth Lilly Dean of University Libraries at Bloomington, fosters communication and cooperation between the libraries. This council reviews and advises on major initiatives such as automation upgrades and large cooperative purchases. Other cooperative bodies exist in the Indiana University system such as the Indiana University Online Cataloging Congress (IOCC) and the Acquisitions/Serials Congress. Indiana University libraries purchase resources individually, through Indiana University system-wide agreements, through the Committee on Institutional Cooperation (CIC), and the Indiana Cooperative Library Services Authority (INCOLSA). The eight campus libraries share a SirsiDynix Integrated Library System (ILS).

Indiana University Kokomo (IU Kokomo) is a regional commuter campus in the Indiana University system located in North Central Indiana. IU Kokomo serves 3,300 students and faculty. Approximately 80% of the students work full or part-time. Because the students live and work off-campus, providing online access to resources is essential.

In 2002, library management recognized a need to enable online access for print subscriptions with a free online component. Though the library provided online access to journals through databases, direct access to individual journals was limited to a handful of titles. The library personnel at the time consisted of five full-time tenure-track librarians: the director, the head of public services, an instruction librarian, a government documents/web librarian, and the head of technical services. A half-time public service librarian and three full-time support staff members completed the staff. Although recognizing the demand for online access to electronic journals, the limited number of librarians made it difficult to devote the time needed to investigate and develop the procedures for enabling online access, let alone implement access for a large number of titles.

Changes and advancements in library technology and automation have been transforming libraries for decades. The shifting of collections from print to electronic, begun a little more than a decade ago, has now reached a critical mass where many libraries have more electronic serials than print serials through database collections and individual electronic subscriptions. Librarians often argue that electronic information will never completely replace print. Some academic libraries have already converted all content to electronic in certain collections. In 1998, Drexel University began ordering serials in electronic format rather than print (Montgomery 2002). In 2003, The University of Arizona "Virtual Depository" project investigated moving to electronic-only selection of government documents through the Federal Depository Library Program. After assessing user satisfaction and savings in space needs and staff time, the library determined the pilot project successful and continued selecting only online

documents (with the exception of maps and datasets) (Rawan 2003, slide 25-31). In August 2006, Indiana University conducted a Digital Futures Study to assess the ways that Indiana University will respond to a shift in mission "from supporting the creation, management and navigation of information in physical form to supporting its creation, management and navigation in digital form"(McRobbie 2006). This chapter looks at where the small and medium sized academic libraries are in the transition to electronic information, the immediate requirements and challenges of managing electronic resources using the IU Kokomo library as an example, and areas to develop further to manage the transformation from print to electronic.

In 2002, IU Kokomo library management created a part-time position focused on electronic resource management that was filled by a candidate with the required skill set (this author). The immediate challenge was identifying journals with free online access with a print subscription, activating the online access, adding the uniform resource locators (URLs) to the catalog record, and developing a system for managing administrative information. The state of online access to individual journal titles was evolving rapidly. Most publishers did not have their own online journal archive and relied on intermediaries such as Ingenta to host their individual journal titles on the web. IU Kokomo purchased the majority of its subscriptions through one agent, but the agent did not include online access registration as part of their services for the majority of publishers. In fact, the agent often did not provide the library with the information required by the publisher to register for online access. This lack of service is most likely indicative of the rapid transformation causing growing pains for the publishing industry.

This process of activation was completely unlike the process of ordering, renewing, and receiving print subscriptions. Each publisher has different purchasing policies, registration requirements, and web interfaces for registration that had to be discovered, deciphered, and completed. This was a painstakingly slow process for only a couple of hundred journal titles, growing more burdensome as the number of titles increased. In addition, this process was far from static. Servers and interfaces were upgraded, publisher subscription policies changed, publications moved from one host to another, or the publisher developed a platform of their own. These changes often resulted in journals that had been carefully registered one month becoming inaccessible in a matter of weeks. In order to address these registration and access difficulties, the IU Kokomo library began to centralize data on a shared server to allow for easier reference, but retained multiple paper and electronic files for consultation when problems arose. In December 2003, I resigned this part-time position to take a full-time position at another library.

Online access proved popular with students, faculty, and librarians. IU Bloomington purchased the link resolver SFX, and offered each of the IU regional campuses their own instance of SFX. The Council of Head Librarians approved the creation of a position based in Bloomington to foster more system-wide licenses of electronic resources. A team at IU Bloomington was investigating federated searching products. In addition, the Government Printing Office was positioning the Federal Depository Library Program to provide more electronic access to government information as a result of President Bush's E-Government Act. The need for electronic resources management at IU Kokomo library was imminent and inescapable.

As early as 2002 Duranceau and Hepner (2002, 316) identified that "the problem of staffing for e-resources has reached a crisis level in our profession that demands data, attention, and action." In early 2004, IU Kokomo Library management reorganized to create a full-time Electronic Resources/Documents Librarian tenure-track position within technical services from the part-time technical services position I had vacated and an open full-time public services position. Offered the newly created full-time position, I returned to IU Kokomo in July 2004. Because of my skill set and experience in the Indiana University system, and strong support from Public Services, we were able to implement SFX on the Kokomo campus in less than six weeks from my start date.

The duties of the new position were divided half-time between electronic resources management and managing participation in the Federal Depository Library Program (FDLP) which includes the supervision of one staff person and one student handling print materials receiving. IU Kokomo Library management coupled these responsibilities in anticipation of the transformation of the FDLP to electronic. Electronic resource management responsibilities were handled differently across the IU libraries. Bloomington had created an Electronic Resources Unit in 1999. Some libraries added electronic resource management to the duties of existing positions rather than create a separate Electronic Resources Librarian position. Wherever assigned, electronic resource management needs are considerable, and libraries often do not have the necessary staffing (Duranceau and Hepner 2002, 319).

IMPACT OF ELECTRONIC RESOURCES

Most discussions of the benefits of an electronic collection include:

- user demand for 24/7 availability of resources
- competition with online information providers
- economic concerns such as reducing staffing and storage needs
- simultaneous multi-user access
- protection from loss, damage or theft

Montgomery and King's study comparing the cost of print journals to electronic journals shows that total costs are less for an electronic collection because of storage savings, but staff costs increase. Their study found that at Drexel University, staff costs were three times greater for electronic collections in both collection development and acquisitions (Montgomery and King 2002, 6).

Managing print resources differs considerably from that of electronic resources. The processes used to manage current and archived print journals largely are controlled by the library. Print subscription processes are predictable and straightforward and do not vary from publisher to publisher. Fair Use alone determines interlibrary loan permissions. By contrast, subscription processes for electronic resources differ from publisher to publisher and the process is outside the control of the library. Once electronic access is enabled, it must be verified frequently because it can be modified or eliminated without notice. Access to archival content may be available only through a separate purchase or a higher subscription level or access is subject to change without notice. Interlibrary loan permissions must be interpreted for each purchase.

Electronic Resources Workflow

The workflow of electronic resources often is described using the term "life cycle" with the following stages: selection, acquisition, receiving/activation, ongoing access verification, and renewal assessment. However, the implication of a single repeating cyclic pathway that is the same for every product is an oversimplification. Instead, the process is recursive in some stages, repeating in multiple loops, with multiple communication points involving differing personnel. The activation stage is recursive depending on which resource discovery and access products, such as an A-Z list, proxy server, link resolver, or federated search product, are used by the library. Upgrades and changes by information providers can tangle the entire process. Marilyn Geller concurs, "for better or worse, the cyclical nature of electronic resources management is wrong. At best it is a helix, spirally upward and hopefully implying progress; at worst it brings to mind images of Medusa's hair" (2006, 6).

Selection

Selection is a recursive stage that requires communication within the library, with patrons, the vendors, institutional Information Technology (IT) group, and with other libraries and consortia. The selection process must assess interest, package options, pricing, trial access and analysis, and collection and budget analysis. Pricing models and options may vary from year to year, such as the option to subscribe to the print copy plus the online, print only, the print with free online access, or an online only subscription. Additionally, the type of access authentication and the number of allowable simultaneous users may affect the final cost. An analysis of the product overlap with the currently held collections must be conducted. There may be a choice in platform or vendor availability, and evaluations of the vendor's stability, customer service and platform reliability must

be made. Resources must be evaluated for usage statistics availability and COUNTER compliance status, compatibility or availability with MARC record services, proxy servers, link resolvers, A-Z list management systems, and federated searching products. Because of the level of complexity and the coordination required, the process of selecting an electronic resource may take over a year and require facilitating extensive communication among all interested parties. Furthermore, products may go through this process and not be selected as new offers arise with different details.

Acquisition

Acquisition includes price negotiation, license analysis, ordering, and payments. Negotiation can benefit both the library and the vendor by improving a library's buying power while also increasing a vendor's customer base. The key is developing strong avenues of communication with as many libraries as possible and being willing to float ideas that have no precedent. License analysis has no parallel in print acquisitions. The industry as a whole has yet to develop standardized language or best practices. Negotiation and analysis of the license include institutional obligations, terms of use restrictions (off-campus access, interlibrary loan permission level, walk-in access etc.), administrative information, pricing terms, and archival or perpetual access rights.

Receiving/Activation

For print subscriptions, libraries must ensure receipt of issues and initiate claims if not received. For electronic resources the process is much more substantial. The receipt and activation of an electronic resources product requires performing the technical setup of the resource, configuring the user interface, and verifying access to the entire purchased content. Access verification is particularly important given the number of

purchase options and content hosted on the same web site. Do not assume that the entire range of purchased content is accessible.

The resource must be cataloged or MARC records added to the catalog. It must be added to the proxy server to allow access from off-campus, and to other resource discovery tools like the library A-Z list web page, the link resolver, and the federated searching product. Each step must be tested to verify that access is established properly. All data concerning the resource purchase and activation must be added to the appropriate files, ILS, or electronic resource management (ERM) system including the means of administrative and statistics access, usernames and passwords.

At IU Kokomo, the Electronic Resources Librarian is also responsible for managing the proxy server, the A-Z list, the link resolver, and the federated searching product. Thoroughly understanding the resource and its extent makes it easier to activate the resource correctly in the link resolver and the federated search product. Consolidating responsibility in one position speeds the process with all of the work going into one work queue rather than waiting for it to come to the top of multiple work queues. Managing the entire process of a complication-free activation has taken less than two hours. However, as the library moves further towards replacing individual print subscriptions with electronic, the print serials assistant will take over some receiving and ongoing access verification duties. In addition, with the recent retirement of the government documents assistant, that position was reconfigured to include electronic resources duties. While it is essential that information is shared among those responsible for managing electronic resources, the implementation and maintenance needs are far larger than one

person can manage on their own. Instead of proactively managing access and organizational issues, too much time is spent putting out fires to regain access.

Small and medium-sized libraries should take the time to activate connectivity of acquired resources to other information providers such as Google Scholar and Windows Academic Live. Libraries will remain relevant as long as they are known by their users to be an easier or more effective means of getting information. Integrating these competing tools into library resources absorbs their functionality and publicity into the library. Millennial Generation users who may begin their search at Google are brought into the library when the library's link resolver is registered with Google. These competitors become potential gateways into the library.

Ongoing Access Management

Publishers and vendors are transforming their organizations in response to the demand for electronic versions of their products. Faced with a highly competitive environment, vendors frequently upgrade online delivery platforms to meet increasing server demands and standards requirements resulting from greater usage through link resolvers and federated searching products. These changes, combined with a complex information delivery pathway and issues with subscription account maintenance cause frequent outages of service to the information content. The vendor changes often require maintenance to the library catalog, A-Z list, Link resolver, federated searching product, ERM system or other administrative data storage files to restore access.

Often libraries of all sizes do not monitor deeply enough to discover these outages and rely on students and patrons to report problems. IU Kokomo's large collections of resources offers alternative content should a certain article or resource not be accessible.

Very few report problems. The complexity of the catalog, link resolvers, and databases can confuse students who do not recognize that an access problem has occurred. Therefore, some method of ongoing access verification is strongly encouraged.

Renewal Assessment/Statistics

Evaluations for renewals include comments from users and librarians, usage statistics compared to cost, budget data, product ease of use and reliability, and comparison to other resources covering the same subject area. The contract terms and price may be renegotiated. Gathering statistics presents a challenge. New standards such as Standardized Usage Statistics Harvesting Initiative (SUSHI) a National Information Standards Organization (NISO) standard for delivering usage statistics and new products such as ScholarlyStats from MPS technologies uses the library's user name and password to gather usage statistics from different vendors providing significant time savings. Comparing statistics presents a challenge. Although more vendors are indicating that they have COUNTER compliant statistics, these are not always complete or accurate in their compliancy. Davis and Price showed in a 2006 study that the number of downloads is inflated when the vendor requires a user to access the HTML version before being able to download the PDF version (Davis and Price, 2006, 1243). Statistics of varying levels of usefulness can be gathered from link resolvers, catalogs, web pages, A-Z lists, and federated searching products.

MANAGING STAFFING AND STAFF COMPETENCY CHANGES

Ellen Dureanceau and Andy Hepfer noted few "routine" tasks in electronic resource management in their survey, but instead identified "many complex and interdependent

tasks that require a broad knowledge of library systems, the campus network, and our proxy server, as well as broad and deep knowledge of the particular products we have purchased" (2002, 6-7). Managing proxy servers, link resolvers, and federated searching products requires some knowledge of the OpenURL standard, the electronic delivery of journals, web interfaces, searching syntax, the NISO MetaSearch Initiative standard, and web services, standards, and syntax, such as XML, Z39.50, HTML and others. The electronic resources librarian must understand how these products and services interact. Development of enhancements and plug-ins for additional services may require programming expertise. Along with technical expertise, the electronic resources librarian must have strong communication skills and should develop a network of contacts and communication channels within the library, the library system, other similar libraries, larger libraries, vendors, and consortia. New electronic resources librarians should be strongly encouraged to seek mentors among other electronic resources librarians and to make contacts for partnerships for training and joint purchases.

Geller outlines three options for reorganizing the library to handle electronic resources (2006, 22-23). The first is to develop a separate unit devoted to electronic resources that capitalizes on selecting and training staff with the skill set to manage complex, web-based, intertwined systems. As a separate entity, the unit is organized to work and effectively communicate information sharing among areas of responsibility. Zhang and Haslam at the University of Nevada – Las Vegas (UNLV) planned to use this method to handle a subset of electronic resources responsibilities within the serials unit (Zhang and Haslam, 2005, 88). UNLV created three new staff positions, one each to manage the proxy server, Serials Solutions and web links, and the link resolver. Not only was this

unit created to work together, but each staff person is cross-trained to handle the other two areas of responsibility. This is a very effective means of communicating the deeply intertwined nature of these services and the need for continuous communication within the unit. Cross-training or at least an introduction to the other areas is recommended for the entire scope of electronic resources management to foster more effective communication and ultimately better maintenance and performance.

The second option is to distribute electronic resources activities. In this model, electronic resources activities are assigned to the staff member with the most related print responsibilities. One benefit to this approach is that staff are already re-purposed should the decision be made to eliminate print altogether. However, the time for training, ongoing education, and maintenance needed to manage electronic resources is considerable, and unless there is a dramatic decrease in the print responsibilities, the workload may be unmanageable. In addition, the need for communication must be clearly delineated and strong and effortless means of communication must be developed. A unit that is territorial, non-communicative, or isolated by organizational silos will struggle to manage electronic resources effectively.

The third option is a hybrid of the two previous approaches: repurpose or create some positions with only electronic resources responsibilities and add some electronic responsibility to those with print responsibilities. Some areas allow for easier overlap between print and electronic than others. Budget management is one area that has similar workflows for print and electronic formats. At the first Electronic Resources & Libraries Conference (http://electroniclibrarian.org/moodle/) in 2006, the challenge of distributing electronic resource management tasks to staff without technical expertise was a frequent

topic of discussion (Carlson, 2006, 6). The challenge of providing training is considerable given the fast pace of change and the high level of technical expertise required. The electronic resources librarian may be unable to both manage the considerable workload and to create and continuously update training for staff.

Joan Conger calls for a team approach for both responsibility and leadership,

> "the pervasive effects of electronic resources in a typical library require a different kind of management. Turbulent change disrupts stable efficiency, with the insistent voices of new situations and daily requires unprecedented, creative solutions from professionals throughout a library. Competence becomes less about static knowledge and the application of rules and more about daily, adroit innovation and the use of pooled talent through collaboration. Management becomes less about planning and direction and more about *collaborative management and adaptive learning* (Conger, 2004, 2).

We must reinvent the process of creating workflows and procedures to create an innovative iterative, open, collaborative process with involvement from an expanding and fluctuating number of subordinates, colleagues in technical and public services, IT, other libraries, consortia, vendors, and beyond. Decision making should not and cannot be done in isolation or within organizational silos because too many areas are interconnected. Changes in one area will most certainly have some consequence in another.

FOR THE FUTURE: AMPLIFIED COLLABORATION AND COMMUNICATION

Within the Library

With only five full-time librarians in the IU Kokomo library, the communication challenge is somewhat easier. Consolidating the management responsibilities of all electronic products under one person increased the awareness of how vendor changes, upgrades, policy changes, or report of a problem from a listserv for one electronic resource product affect the other products. The smallest change that appears limited to the proxy server or catalog, for example, may also cause access problems for the link resolver and federated search product. When responsibilities are distributed among several staff members, vigilance is critical in communicating every change to everyone with electronic resource responsibilities and to public service librarians. The creation of an automated means of notification of changes to all personnel would ensure that stakeholders get the needed information and reduces the workload of the electronic resources librarian.

With Other Libraries and Consortia

All libraries can benefit from sharing of management tools, checklists, and training guides, problem reporting, and product enhancements. Listservs for electronic resources, proxy servers, link resolvers, and federated searching products are invaluable for identifying problems and sharing solutions, but participation is still limited considering the number of libraries that use the products. Even the smallest library is able to benefit all libraries by reporting problems, since it is very likely that others will have the same problem. Training is a substantial challenge given rapid change in the industry and the varying levels of technical knowledge held by staff. Libraries should look to form partnerships and take advantage of training offers from vendors, consortia, and professional organizations. With the number of product upgrades done in any given year,

the main challenge then becomes focusing on training for the most long-term direct benefit to the library user.

With Subscription Agents and Multi-Publisher Vendors

Rick Lugg and Ruth Fischer in their paper assert that "agents have realized the need to innovate, to re-invent themselves as trackers, licensors, and brokers of electronic content"(2003, 3). Agents are increasing their support, but haven't reached the phase where all online access to subscribed content is enabled automatically. Agents are much more likely now to provide swift troubleshooting assistance and resolving access problems then in the past, a significant improvement of which libraries should take advantage. The IU Kokomo library purposely limits the number of individual online journal subscriptions to content unavailable in a collection because of the extensive amount of maintenance required and the greater likelihood of access problems. As more publishers move content from database aggregates as has been done by the University of Chicago most recently, we may not have this option much longer. Publishers must be able to provide easy and accurate activation to individual subscriptions before forcing libraries to subscribe individually.

ERMS AND OTHER TECHNOLOGICAL SOLUTIONS

The demand for an ERM system to address the challenges of electronic resources is very high considering the inability of current ILS systems to handle the selection, acquisition, maintenance, and presentation of electronic resources. Libraries look to the ERM systems for centralizing and standardizing electronic resource management information and presenting that information to library users as well as to staff. ERM

functions include tracking access problems and troubleshooting efforts and the ability to generate notification messages on web pages and in e-mails. Other functions include centralized statistics management and license restrictions that affect interlibrary loan. Some libraries and library consortia have created their own systems. There are many existing, new, and forthcoming products, but they are often expensive. ILS vendors are beginning to partner with ERM system vendors, e.g., SirsiDynix's new partnership with Serials Solutions to create an ERM module to interface with Sirsi Unicorn. The advantage is that the cost might be subsumed within the ILS budget. Open Source options exist and while there are no costs associated with the product, there are IT costs to install and maintain the software.

A product to verify access to an entire full-text article and that all subscribed content is accessible, perhaps operating in conjunction with an ERM system, is a critical area for development. Some progress has been made to speed the verification process. In January 2007, OCLC's Openly Informatics released Link Evaluator, a free add-on for the Firefox web browser that functions as an advanced link checker. Given the level of competition with other information providers, libraries must provide accurate and trouble free information products to patrons to remain relevant and viable.

Another possibility for taming electronic maintenance is moving to an Applications Service Provider (ASP) model product in which the software company provides the hardware, hosting, maintenance, upgrades, and support for the software and delivers the product to the library through the Internet. The library need only manage its list of purchased resources and customizations. The software vendors handle upgrades and software, knowledge base, and server maintenance. No local IT staff is needed to install

and manage software and hardware, and knowledge base updates can be done more often. Serials Solutions updates the knowledge base for its Article Linker (link resolver) as frequently as daily. The Software as a Service (SaaS) product model takes the ASP model one step further with complete Web integration and the ability to quickly take advantage of emerging Web technologies and standards with faster product development cycles. The disadvantage to purchasing an ASP or SaaS product is that the library doesn't retain control over the content or software, doesn't control the timing of upgrades, and the price may be higher. The shorter development cycle means changes in procedures or training material may be needed more frequently.

Another means of reducing maintenance and increasing interoperability between information products is selecting one vendor to provide multiple products to ensure the patron is seamlessly connected to the information being sought. In some cases, this may have the added benefit of requiring the maintenance of only one configuration file and one set of web page customizations. Examples are Ex Libris with SFX (link resolver), MetaLib (federated search product), Verde (ERM system), and ALEPH (ILS) and Serials Solutions with Article Linker (link resolver), Central Search (federated search product), ERMS(ERM system), and the interface to SirsiDynix's ILS. Other vendors such as EBSCO, Innovative, and Endeavor offer multiple products. Maintaining information in one location creates a more efficient workflow and provides more powerful holdings and usage reporting and analysis.

CONCLUSION

While the electronic resources world is still quite chaotic, the library world has responded and begun to find the solutions to manage the chaos. Small and medium sized academic libraries should focus their efforts on the following:

One: Staffing and organization changes and realignments must be made to accommodate the extensive demands of electronic resources. Staff assigned to electronic resources must have problem-solving, technical, and web services competencies, an understanding of licensing and contract negotiation and commitment to continued professional development. In a library unable to add staffing, processes and services must be streamlined and an electronic resources transition plan developed to methodically downsize print and increase electronic resources. The processes for change in libraries must be reengineered to speed adaptability.

Two: Communication among library electronic resources, print, and public services personnel as well as users must increase and not be isolated or delayed by restrictive organizational silos within the library. An environment of active and open communication and education among all parties involved in electronic resource management is essential. Select electronic resource systems and structures for interoperability and faster but more quality controlled development cycles to remain relevant in the face of global competition among information providers.

Three: Cooperation and communication among libraries with similar ILSs, proxy servers, link resolvers, ERM systems, and other products must increase for the betterment of all. The Electronic Resources & Libraries Conference is one major avenue for sharing strategies between libraries in both formal presentations as well as more informal wikis and blogs that facilitate the sharing of checklists, implementation guides, quick fixes etc.

The very fluid and fast product development cycle of electronic resources means that our responses must also increase in speed and fluidity.

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Glossary

Collaborative Management. Term used by Joan Conger, "Responsibility for organization success is shared among members. These members have authority over their own work, contribute through teams to the work of others, and contribute through leadership to the decision making and overall purpose of the organization" (2006, 231-2).

COUNTER. (Counting Online Usage of Networked Electronic Resources) an international initiative providing guidance on usage statistics identifying and defining data elements, and usage report content and formats.

Electronic Resources. All information content and service products delivered online, such as e-books, journal databases, citation databases, e-journals, link resolvers, ERM systems, federated searching products.

Federated Searching Product. Software product that simultaneously searches multiple databases from multiple vendors from one location.

Interoperable. The ability of one system to communicate or work with another.

Link Resolver. A web-based application that uses citation data formatted according to the OpenURL standard to construct links to the content.

NISO Metadata Initiative. NISO sponsored move toward industry standards to enable metasearch service providers to offer more effective and responsive services, content providers to deliver enhanced content and protect their intellectual property and libraries to deliver services that distinguish their services from free web services.

Open Source. Software source code that can be freely used, modified, and distributed.

OpenURL. A definition and syntax for describing elements in a URL.

Recursive. A process, procedure, or mathematical function which calls itself either indefinitely or until a specified point is reached. A computer program that calls itself into operation or calls other programs which in turn recall the original.

SMUG. SFX/MetaLib Users Group, http://www.smugnet.org/.