# An OpenURL resolver (SFX) in action: the answer to a librarian's prayer or a burden for technical services?

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***Abstract:***
*This paper will reflect on the experience of installing, configuring and maintaining the Ex Libris' OpenURL resolver - SFX. Particular attention will be paid to the extraordinary usefulness of this tool for gluing together the components of the resource discovery process. This paper will discuss the level of staffing required to maintain the resolver service, the skill sets required by those staff and the place of an OpenURL resolver within the extended ILMS. Finally the authors will speculate on the future of such a service within the portfolio of online services offered by a university library.*

# Curtin University of Technology's Library & Information Service

Currently, Curtin University of Technology offers more than 850 courses at undergraduate and postgraduate level to approximately 31,000 students, many of whom study part-time or through distance education mode. There are more than 1,000 academic staff and 1,500 general staff and an ever-increasing number of research students and specialist research centres.

The Library & Information Service (LIS) averages 49,000 visits per week to the main library, 60,000 print book loans per month, our Web pages average 2.5 million hits per month, we have 150 staff members, 200 scholarly databases and 16,000 serial (electronic and print) subscriptions.

The aim of these facts and figures is to give you an idea of how diverse the needs of our clients are. We are a heavily used resource both physically and virtually. The challenge for us, and we don't think we are unique, is to assist our clients to find the information they need quickly and efficiently. Life used to be much simpler for the undergraduate student, they were expected to use monographs quite heavily, and to do some research, but it was quite possible for students to do very little and successfully complete their first degree. These days an undergraduate is expected to use databases and find journal articles in their first year! Said undergraduate is also quite likely to expect results in the style of Google, one search and bingo – information in abundance. The library had long been looking for something that would at least come half way to meeting these requirements.

In this paper we will discuss the implementation of the Ex Libris suite of products, with particular reference to SFX, and the implications for the establishment of an integrated e-Library in the future. The paper covers several clear sections:

- Implementation of Ex Libris, including a broad illustration of how SFX works
- Linking and OpenURLs
- Implementation of SFX at Curtin
- Effects of Implementation on Staffing
- Advantages and Disadvantages of SFX
- Integration of SFX and Future Enhancements of SFX.

# Ex Libris to the Rescue

Curtin University of Technology's Library & Information Service (LIS) became premier partners with Ex Libris in 2001, and implementation of the full suite of Ex Libris products was completed in August 2003. MetaLib 1.4, which was branded Gecko by LIS, and SFX 1.3, together with Aleph 500 version 14.2.4, went live in July 2002, while DigiTool has only just gone live in August 2003. Aleph is the library management system, DigiTool is a digital asset management system, MetaLib provides a standard user interface for searching databases, and SFX provides context sensitive linking between electronic resources. The SFX application is incorporated into the MetaLib application and promoted as Gecko: gateway to library databases.

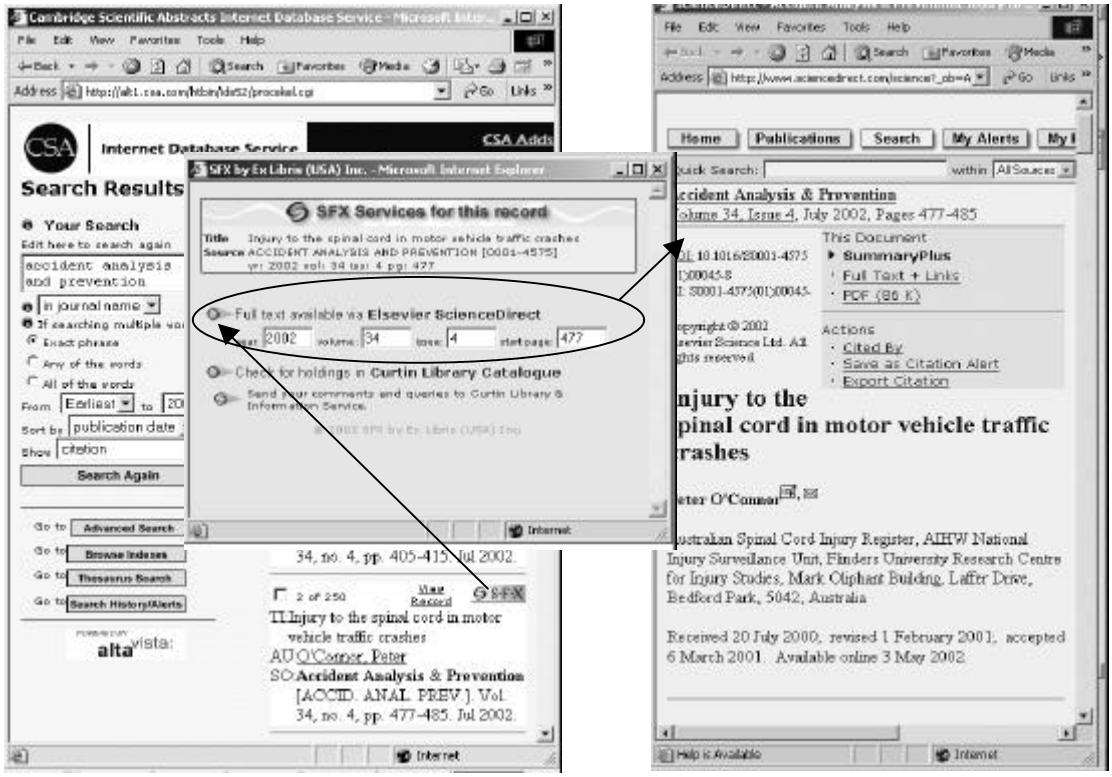
We were delighted with the notion of SFX, linking citations in a database with the appropriate electronic journals no matter where the electronic journal was held in the collection. MetaLib was looked on with equal favour; the prospect of searching multiple multi-vendor databases at one time being the solution to a long standing problem. It seemed obvious at the time that while it would be sensible for one person to co-ordinate the implementation, the work that would be involved would require assistance from both the Bibliographic Services Unit (Serials) for SFX, and the Information and Education Services Unit (Databases) for MetaLib, so the SFX team (consisting initially of 1.6 FTE librarians HEGS 5/6) from Bibliographic Services, came into being. The inter-relationship between the two products requires a close working relationship between the different Units and highlights the blurring of traditional responsibilities caused by this new approach to resource discovery and provision.

The initial emphasis of our implementation was to have a cohesive product that incorporated both MetaLib and SFX, to provide easy access to electronic scholarly information for the clients of LIS, by July 2002. It should be noted that MetaLib is reliant on Z39.50 compliance by database vendors to enable the cross database searching. At the present time of our 305 databases, 115 are Z39.50 compliant. Once implementation was complete, the co-ordinator's role was complete and the management of the MetaLib and SFX teams were mainstreamed to the appropriate area managers.

The post implementation phase of both SFX and Aleph 500 was really one of recovery. Bibliographic Services (BS) was responsible for three modules of Aleph – Cataloguing, Serials and Acquisitions – and SFX. The latter half of 2002 seems a blur in retrospect. We had to cope with modified procedures and work flows, took leave only where we needed it, and reviewed the work we had done. The SFX team, who had also been involved in working on the OPAC and Cataloguing modules, took a breath, and completed an excellent report detailing the work that had been achieved and indicating what was still to be done (Clift, Kelman & Martin 2002). This report then went forward into the planning process at LIS.

For clarification, an example of how SFX works at Curtin might be useful. Entry to the database or SFX Source is via MetaLib, and thus the user has been authenticated and doesn't require further authentication. In the graphic there are three windows. These are showing the SFX Source (Cambridge Scientific Abstracts), the SFX Services window and the SFX Target (ScienceDirect).

Thus a student has found an article in Cambridge Scientific Abstracts (the SFX Source) and selected the SFX button. She has then been presented with options for finding the full text, including a link to the full text as held by ScienceDirect, which is selected. With two button clicks the student has gone from citation to full text. The arrows show the two clicks required.




# Linking and OpenURLs

Basic linking occurs between an identifier and its location using a resolver. Identifiers contain specific information that uniquely specifies a particular object. Types of identifiers include:

- Digital Object Identifier (DOI)
- Serial Item and Contribution Identifier (SICI)
- PubMed ID (PMID) [not to be confused with Personalized Method for Interpretation of Dreams!]
- BibCode

At the beginning of September 2003 over ten million DOIs had been assigned.

The resolver makes the connection between the identifier and the location(s) of the identifier. The key value of the identifier to the resolver is persistence. No matter where the object moves to, the identifier will enable us to find the article using a resolver, as long as the resolver's database is kept current. For more in-depth technical information about this process please see both Priscilla Caplan's (2001) and Andy Powell's (2001) excellent articles.

There can be many places a resolver will find an identifier's location. SFX (our resolver) allows us to create a menu of options for the library user to choose from. The database upon which SFX makes these decisions, about location and what choices to present, is know as the KnowledgeBase (KB).

The OpenURL is a mechanism for providing the information that is passed between the citation in a scholarly database and the resolver, thus allowing the resolver to find the location of the object. The OpenURL in fact nominates the resolver, in Curtin's case SFX, and then passes the identifying information on to the resolver, in one appalling looking string of characters.

This is the OpenURL for the article in the example above:
http://134.7.171.56:8888/sfx_local?genre=article&title=accident%20analysis%20and%20prevention&date=2002&volume=34&issue=4&spage=477&__char_set=utf8

There is a NISO standard that was released in April 2003; Z39.88-2003: *The OpenURL Framework for Context-Sensitive Services*. The standard is currently still under development and a discussion list (openurl@caltech.edu) has been established to discuss the various issues that have arisen. The most fascinating issue that has arisen recently is a scheme in the UK to map the various resolvers used by different institutions, this is an EDINA (http://edina.ac.uk) project. EDINA is a JISC (Joint Information Systems Committee; http://www.jisc.ac.uk) funded national data centre.

The minimum requirement by the SFX resolver for generating a link is the presence of an ISSN and Year when a threshold is specified in the KB or only an ISSN when there is no specified threshold. A threshold determines the connection between a source and the services available for it. A hypothetical example is that one threshold could be the holdings for a particular journal and may indicate that volumes 1-5 are available on ScienceDirect, volumes 6-8 on Wiley InterScience and volumes 7- on SwetsWise, if we are looking for volume 7, we would be offered both Wiley InterScience and SwetsWise on the SFX services menu.

The ISSN is used to check the KB for a title. If the access threshold for the title matches the particular journal issue from the citation a URL is created (using all the available fields) with a link to the full-text target. It is important to note that the Target may not necessarily use all the fields that are transmitted. For instance it may not be possible to create a link that will take the user to the specific issue or article but may take the user to the target at a higher level, say the journal title. However this is a limitation of the target rather than the resolver.

When all the above fields are present in the OpenURL, linking is made directly to the relevant citation, for instance to those held by Gale, SwetsWise, and ScienceDirect. An option is then available from the citation record to display the full-text using a vendor's specified format [HTML, Acrobat (PDF), Real Page, etc].

SFX, Curtin's OpenURL resolver, is capable not only of linking from a citation on one scholarly database, to the article in another database, but can also provide links to searching on the WWW, links to inter-library loan requests, links to other library's catalogues, links to document delivery services and links to specific web pages. The information from within SFX can also be used to provide a comprehensive list of linked ejournal titles. An additional service, called citation linker, will allow users to simply type their citation into the relevant boxes, and be taken directly to the article, as long as we actually hold it of course! In this case the client is directly inputting the data elements of the OpenURL, while the resolver, SFX, creates the OpenURL in the standard form and then links to the target identifier.

# Implementation of SFX at Curtin

SFX consists of database tables (Source, Target, Service, Object and Object Portfolio), using MySQL as the database engine. Perl and Java is used as the Common Gateway Interface (CGI) between the MySQL database and the Apache web server. SFX includes a number of programs that can be used to export information. The LIS systems and technology unit manages the SFX server and the configuration files. When we started using SFX we were using version 1.2 of the software. In March 2002 the software was updated to version 1.3, then we updated to SFX 2.0 in July 2003. This latest version is a huge improvement, because it has introduced a feature known as SFX Admin. This feature allows us to configure SFX without having to ask for programming to be done. We have a new lease of life with the new software!

Ex Libris produce and maintain a master copy of the KnowledgeBase that they constantly update, and at the end of each month produce a summary update. This update is applied to our SFX server and relevant changes are made to our local versions.

KnowledgeBase contains the data that fills the tables, and allows us to manipulate and maintain that data. To access and manipulate the data in SFX we use SFX Admin. This web-based administrative tool includes the KBManager, KBTools, OpenURL generator, and Statistics Module. We can use the KBManager to edit, maintain and configure the data in the different tables. KBTools contains DataLoader, which can be used to batch load Object_Portfolio data. As its name suggests, we use the OpenURL generator to generate an OpenURL so that we can test our set up.

Useful documentation that Ex Libris has provided includes the User Guide, Source-Configuration and Target-Configuration. As well as the documentation, help is provided by two email lists: SFX Support (Sfx_supp@listserv.exlibris-usa.com) provided by Ex Libris, and an SFX/MetaLib discussion list (SFX-METALIB-DISCUSS-L@listserv.nd.edu) hosted by the University of Notre Dame.

## SFX Sources

An SFX source is typically a scholarly database of some sort, something that is going to be searched for citations. To be an SFX Source the product needs to be OpenURL aware and in all instances we need to contact the vendor to determine how to activate their product as an SFX Source. When a product is not OpenURL aware we cannot make that product a SFX Source. This is a difficult issue, and we are now in a situation where this has become a selection criterion for product purchase. As at November 2003 we have enabled MetaLib, as well as the following Sources:

Avery
CSA
EI Village
FirstSearch databases (e.g. Art Index, NetFirst)
Gale Databases
MathSciNet
Ovid Databases
ProQuest 5000 (e.g. ABI/Inform)
SwetsWise
Web of Science

We would like to enable the following sources, but they are not OpenURL aware:

Current Contents (ISI)
Ingenta
Electric Library
Informit Databases

## SFX Targets

An SFX target is typically a full text database, electronic journal or book. Aggregated databases (i.e. those with full text components supporting an abstract and indexing database) such as ProQuest's ABI-Inform can be both an SFX source (providing a searching capability) and an SFX target (providing links to full text outside ABI-Inform). A database such as Wiley InterScience would only ever be an SFX target, because all of the contents are available in full text from within InterScience. We used the KBManager to activate the following SFX Targets (* indicates our most highly used targets):

| | |
|---|---|
| American Chemical Society (ACS) | Health Science Journals@Ovid |
| American Physical Society | Highwire |
| Annual Reviews | IEEE Xplore |
| Curtin Library Catalogue | *Infotrac |
| CSIRO Publications | Project Muse |
| *Elsevier Science Direct | *ProQuest 5000 |
| Expanded Academic ASAP | *SwetsWise |
| Factiva | Wiley InterScience |

If we subscribed to all of the journals within a particular collection, for example Wiley InterScience or ProQuest 5000, then we could activate all of the objects with the click of a button. Unfortunately this was the exception rather than the rule. For most of the Targets our electronic holdings are unique, which meant that we had to look at each object in the Target_Service to determine if we had access to it. If we did, we then compared the details of the global ParsedDate threshold with what our clients had access to. If the two were significantly different we then applied a local threshold containing the revised dates of access. If we felt that the KB details would be globally incorrect, then we informed Ex Libris. If we have applied a local ParsedDate threshold, then this overrides the global threshold.

Once the portfolios are activated, we need to check that they work, so we randomly check some of the objects in each Target. We also randomly check some titles for each of the following Targets: Curtin Library Catalogue, EBSCO*host*, Expanded Academic ASAP, ProQuest, and SwetsWise. We have learnt a lot about how SFX works, and came across a number of problems that Ex Libris have since fixed. We tended to find that about 20% of the portfolios did not work. This is hardly surprising, given that the software is so recently developed, and more reliability is expected as the product matures.

# Effects of Implementation on Staffing

In 2000 the serials team consisted of 1.6 librarians (HEGS Level 5/6), 2 library technicians (HEGS Level 4/5) and 2 library assistants (HEGS Level 3); the technicians and assistants were primarily involved with the print journals, including renewals, invoicing, claims and binding. The fulltime librarian was implementing and coordinating electronic journals with such products as SwetsWise and EBSCO*host*, as well as looking at the plethora of publisher packages that were available. The 0.6 librarian was responsible for updating catalogue records for print and electronic journals, including the aggregated databases. Both librarians participated in the annual review of electronic databases and co-ordinating responses to CAUL journal offers, their role being primarily to ascertain prices, renewals and licenses.

The advent of SFX, together with the increase in electronic serials, has led a change in staffing and a change in emphasis. We have added a 0.8 library technician, who has taken over some of the management of the combined print/electronic journal packages, and assists the other technicians where required. We have also had to move another staff member into the full time librarian position. This was an excellent opportunity to update procedures and to ensure the role has some structure. The 0.6 librarian has changed her role to one of coordination with Serials Solutions, and heavy involvement with SFX. The remaining serials team of two technicians and two library assistants still focus mainly on print, but it is expected that this will be an area of increasing change over the next year.

The SFX team also need to be supported by a programmer (HEGS Level 8). At the present time the allocation is estimated at about half a day per week.

We are in the process of planning staffing and projects for 2004 at the present time, but we would anticipate allocating another 0.5 librarian and more library technician time to the maintenance and upkeep of SFX and our electronic journal collection. The two are intrinsically linked in our opinion.

Looking at our statistics from May to August 2003, the highest number of hits in a single day was 6,414. Over this time period we averaged over 2,000 hits per day (this includes weekends and holidays!). The hits on SFX decreased during the semester break (June/July 2003), but there were still hit rates of 1,500 on most days. We recently ran focus group meetings to examine the way clients use our web services, as well as a recent online user survey, in both cases comments about SFX were generally positive. Where users were unhappy, the reason was generally because of “dead links”, but no specific examples were given. Hopefully in time we can provide a click on alert for clients; ideally this would ask the user to click on the “dead link” button, would automatically fill in the details of the link, and send it to the friendly SFX staff to fix.

Essentially we have implemented SFX at Curtin on a shoestring, and need to allocate much more time to enhancing our SFX instance so that we are able to take advantage of the full capabilities of SFX. The skills that are important for staff undertaking such work are; excellent organisational skills, and good project management abilities. They need to be able to work on several projects at once, have an ability to focus in on detail as well as keeping an eye on broader picture issues. You need talented staff who will not be afraid of technology, flexible staff who enjoy a challenge and enthusiastic staff who are excited with what the future can bring them.

# Advantages and Disadvantages of SFX

The obvious advantage of SFX for our clients is the clear line of linking from a database to a journal, whether the electronic or print version, that is available in the collection.

In many cases SFX can also direct students to the appropriate library's catalogue, so Curtin clients may be directed to a print journal in the Murdoch University Library collection. Wouldn't it be nice if this was to an electronic journal in a QUT library? Unfortunately we don't see this ever happening in the short term but it doesn't hurt to hope!

In time, when LIDDAS (the automated interlibrary loan system http://lsn.curtin.edu.au/LEARNING_matters/00july/liddas.html) is fully integrated into SFX, clients eligible for document delivery or interlibrary loan services will have those services offered from the SFX Services window. This will be another clear step forward towards a unified service point.

The biggest disadvantage for both clients and library staff are the ubiquitous dead links. It is a major cause of frustration to promise a link to the full text only to fail to deliver. The main cause of dead links is incomplete or erroneous indexing within the source databases. As a result the information contained within the OpenURL contains incorrect data. We recently had an example where a citation was listed with a start page of N/A. Of course this did not fit with the standard, and when the OpenURL was formed there was no corresponding match with the object. We dealt with this particular example by changing the thresholds for the particular title, but the concern is that many clients may not think to enquire why a link is dead, so then we don't always find out about it, so the link does not get fixed.

There are always going to be human errors in this linking. Full text journal interfaces such as SwetsWise and EBSCO*host* are reliant on the interface between their software and the publisher software, so the chance of error only increases. The same is true for authors of articles, vendors and publishers, who see their first priority as the provision of the journal articles, not the maintenance of their links. Now more than ever we need to build strong cooperative networks to achieve the sorts of checking and maintenance that is required. Maintaining accuracy within the KnowledgeBase is also critical to the success of the resolver and requires local effort and vendor cooperation. With OpenURL resolving services becoming more common in university libraries vendors are likely to become increasingly supportive.

# Integrating SFX into the e-Library

Ex Libris produce regular monthly updates. The update package includes changes to the KnowledgeBase, programs, and configuration files. Typically, we are notified that a new update is available via the SFX Support listserv and this notification includes a summary of the changes that have been made to the KB and software.

Once we have been notified of the new update, our programmer applies the update to our development version of SFX. When the update has finished the BS team take over, test the update using a script, including any sources that were updated and test sample journals from each target. We test using a Curtin IP and a non-Curtin IP address. We currently have 22 targets and 12 sources. Once the testing is complete, we run an update report, which will

indicate every change that has occurred. Where a new object has been added, we check to ensure it has been activated, where an object has been deleted, we ensure this was appropriate and where an object has been changed we ensure our holdings match the change. Once the team is satisfied with the update, the update is then applied to our production version.

### E-journals list

Finding ejournals in the catalogue can be challenging, holdings are not easily understood as journals come off and on aggregated databases. We can now produce a list of electronic journals, reasonably simply. We can simply use a script to generate an HTML page of our electronic journals, based on the information in our local KnowledgeBase. The HTML list includes the journal title, ISSN, name of the Target, availability details (taken from the threshold), and an SFX link.

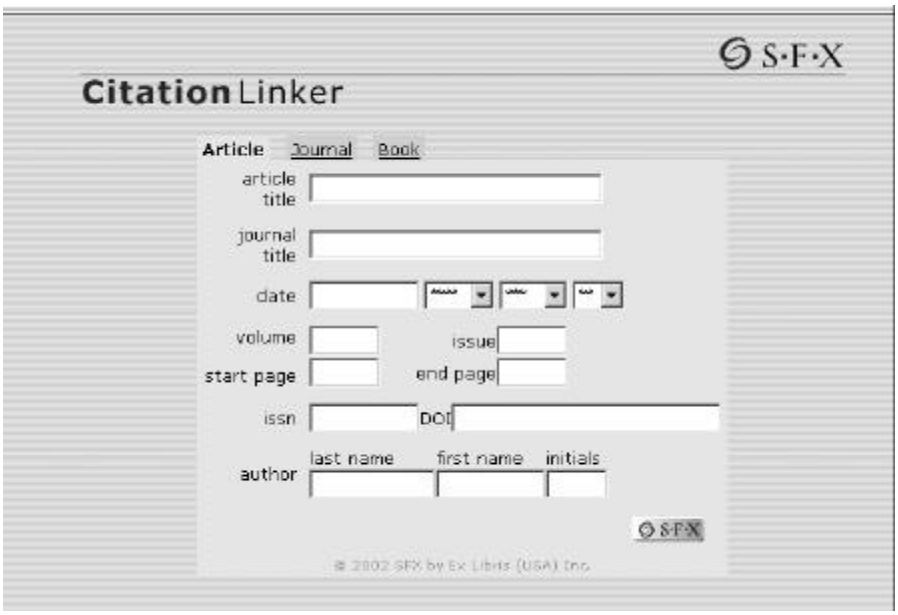
### Freely available e-journals

We have activated over 700 freely available ejournals via SFX; Internet Scientific, Miscellaneous Free and Highwire Free. These collections of free ejournals are not evaluated, and are presented to us through the regular monthly updates. We are able to suggest to SFX that particular free ejournals are added at any time, but they will only be available after the update has been applied. The process we use to add these journals to our collection does not involve any quality control, so the titles are not added to the Curtin Catalogue. Only free journals that have been assessed will be added to the catalogue.

It is anticipated that during 2003 we will finalise a process that will coordinate the free ejournals that are coming in via SFX with the free ejournals identified as useful by staff and students. We intend using SFX Admin and Excel to generate reports, and identify titles that should be added to the catalogue and titles that should be suggested to SFX for addition in future updates.

### Citation Linker

This is probably one of the most useful features, other than the linking, that SFX will provide. Citation Linker, as shown below, can be used by clients and staff to link directly to their given citations, simply by completing the boxes and clicking the button. As usual the next step would be an SFX services window opening providing the client with choices as to how to find that citation, whether it be by clicking a link to go to the electronic full text, placing an interlibrary loan or referring to a print journal.



# Conclusions

Work on SFX does not end with implementation! There is a significant monthly workload dealing with updates, as well as the constant attention to anything that might be changing in the various databases and ejournal providers interfaces. Ensuring that those links continue to work is all important, so a rolling programme of checking is also important.

Do not think that SFX will save you work. The beauty of SFX is that it provides seamless access to information for the client. But SFX is only ever going to be as good as the attention you give it. The potential for SFX combined with the other parts of the Ex Libris suite of products to provide seamless access to information is exciting and immense. When it works it is a beautiful thing to behold, on the odd occasions that it doesn't the frustration is overwhelming – it is all so near and yet so far.

We believe the key to success with many of directions we would like to move in with SFX will be collaboration and communication with suppliers and publishers, who need to understand how wonderful their products will be when fitting into the SFX/MetaLib scenario.

We believe we are just starting to tap into the potential of OpenURLs, and look forward to reading about the activities undertaken by EDINA. It will also be interesting to see in what directions the SFX/MetaLib users in Australia will move.

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