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Developing an Electronic Resource Management System: Verde from Ex Libris

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ABSTRACT

Rapid growth in the number of electronic resources and the complexity of managing e-collections has posed new challenges for libraries and hence requires the development of new tools. To meet this need, Ex Libris is developing a new product, an electronic resource management (ERM) system. The development process began in 2002 and has benefited from the company's 25 years of experience in providing libraries with various products - an integrated library system, digital asset management system, library portal, and link server.

Working with an international focus group and development partners and interacting with the Digital Library Federation's Electronic Resource Management Initiative (DLF ERMI) committee, Ex Libris explored the various aspects of the e-resource life cycle. As a result, the Ex Libris ERM system was designed to address the issues raised through this collaboration and the DLF requirements. The interface of the system represents all of its components; it includes navigation options and facilitates workflows that support the various activities that librarians perform when dealing with electronic resources.

This paper describes the development process of the Ex Libris ERM system. The emphasis is on the particular functionality required for managing e-resources and the ways in which existing systems in the library arena can handle specific tasks.

INTRODUCTION

Librarians often comment that colleagues who deal with electronic resources do not last long in this role. These librarians are facing a task that is becoming more and more difficult - but help is, indeed, on the way, as I intend to show here.

Several factors have rendered the job of such librarians extremely challenging: the amazing growth of electronic collections and the increasingly central role they are playing in libraries, the large budgets that are involved in acquiring these collections, the endless variation in the packages offered by the many publishers, interface providers and subscription agencies in the market , the frequent changes in business models, and, above all, the lack of automated tools to deal with the complexity of e-resource management.

As they attempt to maintain some control over their e-collections, librarians find themselves lost in a morass of spreadsheets and e-mail messages, and dealing with a variety of independent systems and data containers that are not integrated with each other. Too often librarians rely on their memory alone to co-ordinate systems such as the acquisition module of their integrated library system, their alphabetic lists of electronic journals and databases, a metasearch tool, and their local link server. In addition to the initial effort of setting up information in multiple places and the potential lack of consistency between systems, there might also be considerable duplication of effort. Much of a librarian's ability to carry out necessary tasks is dependent upon personal experience. Moreover, the knowledge and experience gained from dealing with e-resources is often vested in too few people - sometimes only one - a situation that leaves libraries exposed. Furthermore, providing meaningful metrics, such as detailed cost analyses and statistics on past performance and usage, remains problematic. Without such metrics, managers cannot make fully- informed decisions. With spending on e-collections increasing rapidly, a better solution is needed.

There is no doubt that libraries are ready for 'a system that supports management of the information and workflows necessary efficiently to select, evaluate, acquire, maintain and provide informed access to electronic resources in accordance with their business and license terms' (Anderson, *et al.*, 2004). A number of vendors are now working on providing such a solution. Some vendors will offer an ERM system as an integral part of their integrated library system, while for others - including Ex Libris - the system is a stand-alone module. The latter solution is increasingly the trend; in a recent article, North Carolina State University librarians Greg Raschke and Suzanne Weiner put forth a good case for such separation while emphasizing the need for tight integration (Raschke & Weiner, 2004).

Any new system needs to integrate well with the automated library environment, where existing systems already support various aspects of the e-resource life cycle. The new system should not duplicate existing data and procedures but rather complement them while streamlining the workflows; it should provide a central 'control tower' for librarians from which they can manage the e-resource environment.

WHAT CAN LIBRARIANS DO WITH AN E-RESOURCE MANAGEMENT SYSTEM THAT THEY CANNOT DO TODAY?

The first challenge is to define what is meant exactly by *e-resource*. An individual electronic journal such as *D-Lib Magazine* is an e-resource, as is an electronic book or an abstracting and indexing database such as MEDLINE; but an e-resource can also be a package of e-journals or a database of abstracts and indexes that includes the full text of some or all articles referenced by the indexes. Furthermore, we cannot consider an e-

resource without the interface through which it is offered; these elements are intricately linked, although they can be licensed separately.

Let us look at an example of a complex e-resource, Oxford University Press (as of August 2004):

- Oxford University Press (OUP) publishes about 190 e-journals. A library can buy a package of these e-journals from the publisher itself; via an agent (for example, the NorthEast Research Libraries consortium (NERL) in the United States; or through various information vendors.
- OUP provides an interface for accessing many OUP e-journals; however, other providers, such as HighWire Press, Periodicals Service Company (PSC), and ProQuest offer their own interface to OUP journals as well.
- OUP offers subscriptions to all the journals that it publishes.
- Through the OUP interface, users can access the full text of only some OUP journals. In the OUP journal list many journals are linked instead to the HighWire Press interface.
- Although HighWire Press offers an interface that allows OUP journal subscribers to access many OUP journals, the OUP collection is not available for subscription through HighWire Press [1]. For some of the HighWire-hosted OUP journals, HighWire Press offers free full-text access subject to an embargo period.

Licensing an e-resource, therefore, is far from trivial. In addition to all the limitations just mentioned, an OUP package might be governed by a set of license terms, whereas a specific OUP journal - for example, *JNCI Cancer Spectrum* - might be governed by a different set of terms. This particular journal was included in the 2000-2001 package of Oxford journals; at the beginning of 2002, the journal became subject to a separate license addendum with different business terms that were no longer tied to print.

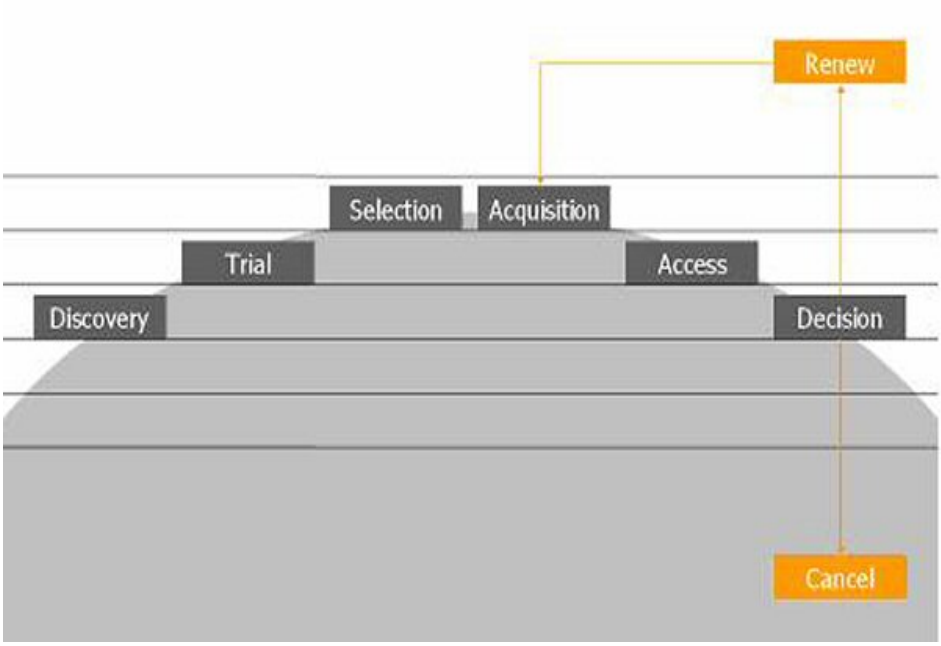
Other factors that are specific to e-resources and do not apply to the traditional print world include authentication, access, administration, usage, etc. These two types of resources differ in the manner in which they are acquired, accessed and licensed. An ERM system needs to support these differences by providing the infrastructure for both the data and the workflows that are characteristic of e-resources and are missing from systems dealing with print resources. The system should provide the tools to manage e-resources throughout their life-cycle while supplying the data that administrators need to make decisions about acquisitions, renewals and cancellations of e-resource subscriptions. Moreover, the system needs to be extremely flexible and open, capable of supporting rapidly-changing business models.

The electronic resource management system (ERM) of Ex Libris, Verde, was designed from the outset to address these issues.

LIFE CYCLE OF E-RESOURCES

One of the main goals of the Verde electronic resource management system is to support electronic collection development. Currently, for each resource that librarians want to acquire, they must learn which of many diverse sources will enable them to acquire the resource - and, needless to say, a librarian cannot always be aware of all the available options. Verde facilitates this process by providing a global picture of the e-resource world: a comprehensive description of what is available, including the information about the packages, the interfaces, and the various providers. This description is the point at which the resource's life-cycle in the library begins.

Figure 1. The e-resource life cycle



The typical stages for resources not freely available would include the following:

Discovery: The awareness of a new e-resource originates from a faculty member's request, a recommendation from a subject librarian, an advertisement, a message in a forum, or another source. The librarian then locates information about the e-resource in the ERM system's global knowledge base; information that might include, for example, the bibliographic details of an e-journal, the coverage period available, the packages that include it, and the interface or interfaces through which such packages are offered.

Trial: In many cases, the librarian will want to try out an e-resource before reaching a decision about whether to purchase it. A trial enables the librarian to offer the e-resource to some or all users - who may include patrons and librarians alike - and then base a decision on their feedback. In the trial process, the librarian activates the e-resource in the desired areas of the library environment, notifies the relevant audience, and obtains feedback.

Selection: Once the trial is over, the librarian decides whether to acquire the e-resource. A decision not to purchase the e-resource results in its deactivation in the library environment (if it had been activated as part of the trial process).

Acquisition: If the librarian decides to go forward and subscribe to the resource, then the acquisition process somewhat resembles the process used for print resources; however, an additional level of detail is required, such as license information and information about the availability of the resource to various populations of users.

Access: Access is a major issue when you are dealing with e-resources, unlike print holdings. Once a library has acquired an e-resource, the librarians want to ensure that it is well used. First, they need to make certain that users can access it easily - for example, from an A-Z list; from the OPAC, if relevant; from a metasearch tool; or via a link server. Issues such as access by remote users (for instance, proxy setup) also need to be solved. After the initial configuration of access, which might have been taken care of, at least partially, at the trial stage, librarians must deal with maintenance - including routine maintenance, problems such as the temporary unavailability of the resource, and changes in the provider's address or the manner of access.

Decision to renew or cancel: An e-resource subscription is typically valid for a defined time period. When the period ends, the librarian needs to decide whether to renew the subscription or cancel it. Unlike the initial decision at the selection phase, this decision is based on the information accumulated in the system, such as the actual usage of the resource while it was available, the reliability of the interface, and the responsiveness of the provider. Whatever the outcome of the decision - renewal or cancellation - the system needs to support it. Furthermore, even after a subscription has been cancelled, the library might have perpetual access or archiving rights to the data, another area that librarians must deal with on an ongoing basis.

The description provided here is admittedly a simplified version of the stages involved. Many e-resources today are purchased through consortia, which wield considerable purchasing power. In a consortial environment, the procedures involved in acquisition, access and decision-making are much more complex. Verde, like the other tools in the Ex Libris suite, addresses the heterogeneous needs of these consortia, particularly the differing levels of information sharing and the diverse management requirements - centralized versus localized or a combination of the two. With a collection-management tool, consortium members should ideally be able to see what other members have acquired and are considering buying and to share resources when relevant.

PARTNERING WITH THE COMMUNITY

Ex Libris has been involved in the e-resource environment for a number of years, developing products that relate to various aspects of e-resource management. These include, in particular, the use of e-resources as sources or targets of linking and as resources for metasearching; and the way in which such resources are represented to end users. Because many of the Ex Libris customers are members of consortia, Ex Libris products already address issues related to consortial handling of e-resources.

SFX®, the original link server from Ex Libris, deals with many of the complexities of managing e-resources - particularly e-journals, which pose the greatest management challenge in the electronic world. Although developed to put linking into the hands of the librarian, SFX has in many institutions become the central repository of all e-journal information. SFX tools have been developed to automatically generate e-journal A-Z lists, for example, or provide unmediated document delivery.

MetaLib®, the Ex Libris library portal, provides resource-discovery tools and metasearch (cross-database search) capabilities. The focus of MetaLib is on databases and packages of e-journals and e-books rather than on individual constituents that might be required, for example, by a linking server for accurate linking. Nevertheless, MetaLib includes tools that relate to such constituents, such as alphabetical lists of e-journals.

The adoption rate of SFX and MetaLib has proved to be quite astonishing. Three years after the first customer went live, over 670 customers in 32 countries had licensed one or both products.[2] These products have answered a significant market need and successfully address the issues involved in the access of electronic resources.

The users of ALEPH®, the integrated library system from Ex Libris, handle another aspect of e-resource management through the ALEPH OPAC. They often manually catalog e-resources or import their e-journal holdings from SFX. The imported data consists of basic information or MARC-enhanced information (via the Ex Libris

MARCit! service). Furthermore, some libraries use the ALEPH acquisition module for subscribing to e-resources.

However, this set of tools does not address all aspects of e-resource management. Responding to a paper presented by the UK members of ICAU, the international consortium of ALEPH users, at the organization's 2002 meeting in Paris, Ex Libris started working with a focus group selected by Ex Libris users. Through this co-operation, Ex Libris explored the issues, defined the missing functionality, and considered ways of addressing it.

The Verde ERM system adds an important component to the Ex Libris suite of tools, primarily the management of business activities associated with the acquisition and licensing of e-resources and tools for collection development, decision making, and cost analysis. The Verde database enables libraries to maintain comprehensive information related to e-resources in one accessible location. A stand-alone system that is also readily integrated into a library environment, Verde is likely to rapidly become a focal point of the digital library.

ENTITY-RELATIONSHIP MODEL

Paying close attention to the development of the Digital Library Federation's Electronic Resource Management Initiative (DLF ERMI) committee's model, Ex Libris, with input from an international focus group, created an entity-relationship model that describes the various entities in the e-resource environment. Developed in parallel, these two models were somewhat influenced by each other, and, hence, the Verde model is actually a realization of the DLF vision (DLF, 2004). In addition, the Verde model includes two aspects that are not present in the DLF entity-relationship model: consortial support and cost analysis.

Verde is a tool for librarians who deal with e-resources. Reflecting the entity-relationship model, Verde's interface provides a sophisticated mechanism for navigating the complexities of e-resources, enabling librarians to view the various entities and their attributes and access related items. For example, a librarian can select an e-journal in one e-package and navigate to other e-packages to see the same e-journal. At each point, the librarian - if authorized - can add or modify information as necessary. In addition, the librarian can choose to follow a workflow to accomplish a specific task, such as managing a trial. In such cases, the system guides the librarian through the required steps until the workflow is complete.

Designing the interface of Verde with comprehensive navigation capabilities and workflow-oriented functions has been a great challenge. No less important is the design

of the knowledge base that serves as the heart of the system. This knowledge base, which is rooted in the SFX and MetaLib knowledge bases and contains additional information, provides the backbone for the discovery functionality required for collection development and supports the appropriate Verde workflow for setting up new e-resources in the library. Although the Verde concept is that of a stand-alone system, libraries that already use SFX and MetaLib will benefit from their localized knowledge bases, which will expedite the Verde implementation process.

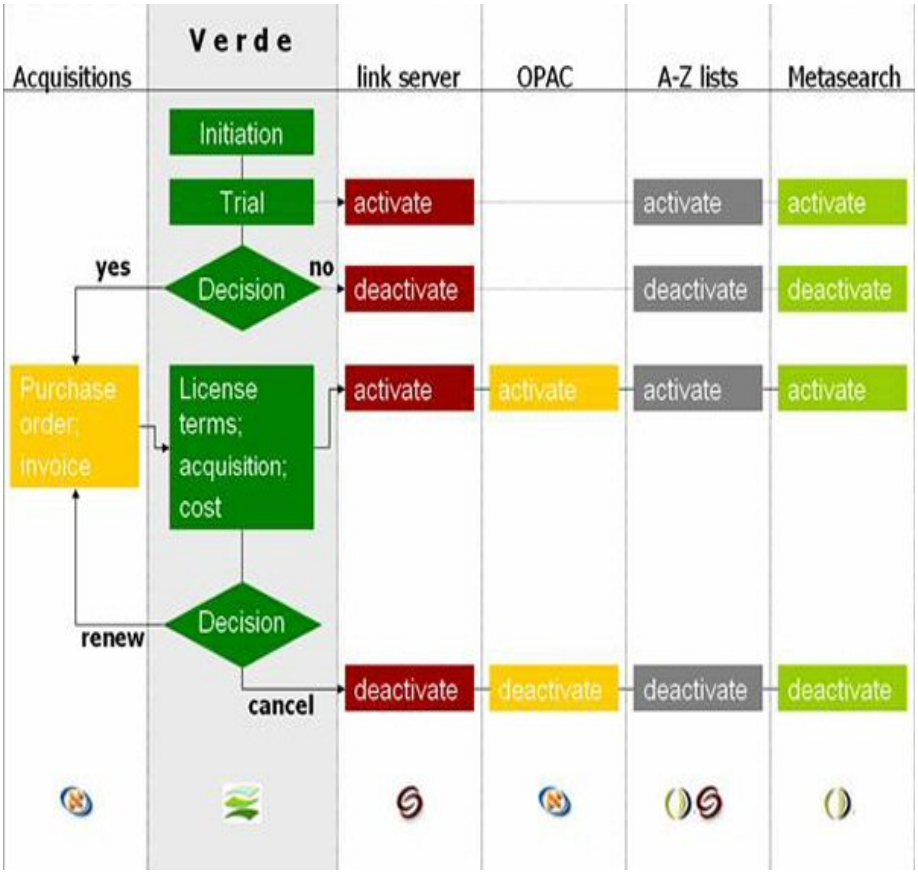
From the outset, Ex Libris designed Verde to support the various consortial models. Its data model permits libraries to share common data while maintaining their local or campus-specific data as necessary. Institutions can implement the model that best suits their needs, whether their administration is local, centralized, or a combination of the two.

BUILDING VERDE INTO THE LIBRARY ENVIRONMENT

Various tools already provide some of the functionality required for managing e-resources and end users' access to them. For example, end users can access an e-journal via an A-Z list, library portal, library OPAC, or link server. Verde has been constructed to integrate with such tools. An example of such integration is a Verde workflow that accommodates the activation of a specific e-package in other tools, thus enabling the user to link to the e-journals provided in the package.

Figure 2 shows how the Verde ERM system uses functionality from various components of the library environment to manage the trial, acquisition, and renewal of an e-resource.

Figure 2. Verde integrated into a library environment



As Figure 2 demonstrates, the Verde system is the linchpin of e-resource management activity. Verde interacts with other systems to deal with the various stages of a resource's life cycle. For example, setting up an e-resource at the trial stage typically results in the activation of the e-resource in SFX and presumably also in an A-Z list (created by SFX or in MetaLib); when relevant, the e-resource is activated in MetaLib as well. During the acquisition stage, the new e-resource might also be presented in the OPAC. Cancellation, on the other hand, results in the deactivation of the e-resource in all the components of the library system (but perpetual access or archiving rights to the data are retained when relevant).

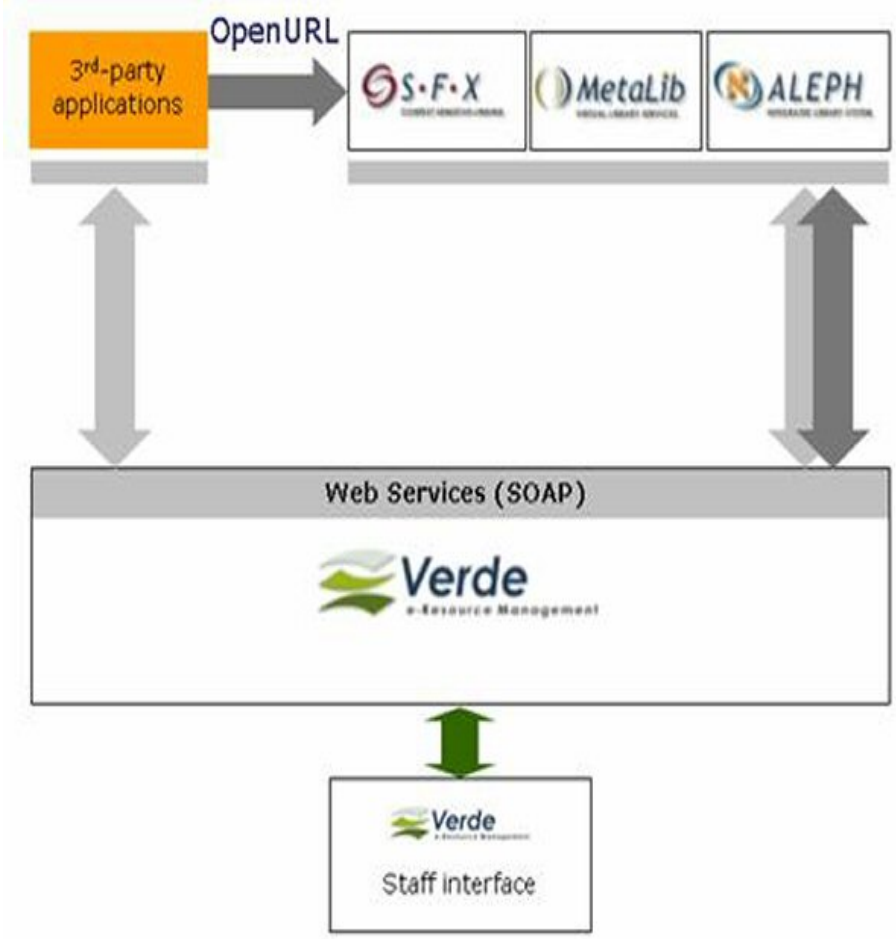
Even though other systems provide some of the functionality, such as acquisition, Verde logs all the information. Storage of such information in one place is crucial for providing a tool for making decisions based on cost analysis and a thorough examination of all related factors.

Verde can interact not only with Ex Libris products but also with similar products provided by other vendors. This interaction is based on industry standards, and hence implementation of Verde is the same in a non-Ex Libris environment.

VERDE ARCHITECTURE

A stand-alone system, Verde is interoperable with Ex Libris and third-party applications. These applications can communicate with Verde through either a Web service layer or SFX: they can send an OpenURL to SFX, which, in turn, provides Verde services.

Figure 3. Verde architecture



VERDE FOR COLLECTION DEVELOPMENT

The role of the Verde ERM system as a collection-development tool cannot be underestimated. With the global e-resource offerings described in the universal e-resource knowledge base, the library's e-resource collection described in the local Verde database, and the library's expenditures expressed in the cost entity, librarians can find

new e-resources of interest; take advantage of information already available in the system when adding local information; and, when deciding whether to acquire, renew, or cancel an e-resource, use existing information related to that e-resource and others.

In a consortial environment, these capabilities provide added value, enabling librarians to obtain information from other member institutions. For example, a librarian can learn about other institutions' experiences with a particular e-resource and even benefit from their agreement with the vendor.

CONCLUSIONS

Like other Ex Libris products, the Verde ERM system is a direct response to the market's needs and the outcome of a joint effort by Ex Libris, focus group participants, and development partners. The focus group and development partners have provided comprehensive information about the market and the workarounds that librarians frequently develop to deal with the complexity of e-resources. In addition, the DLF ERMI committee has made an invaluable contribution in setting the groundwork for a common understanding of the entities and workflows in the e-resource arena and for the development of standards for e-resource management (Digital Library Federation, 2004).

The timing of the Verde development process has ensured that the system complies with industry initiatives: it has been designed to adhere to the DLF ERMI model and also offer consortial support and cost information. And, of course, it is compatible with existing industry standards such as MARC, Unicode, XML, OpenURL, and SOAP. Future versions of the Verde system will support emerging standards for serials, such as ONline Information eXchange (ONIX).

There is little doubt that the industry is waiting for good tools to take the lead in the electronic resource management area. Ex Libris is confident that Verde is just such a tool.

NOTES

1. As this article was going to press, OUP announced that it had signed an agreement for HighWire Press to host the entire OUP journal collection, beginning in January 2005 (http://www3.oup.co.uk/jnls/press/2004/08/18/index.html)

2. Figures as of August 2004.

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DLF - Digital Library Federation. http://www.diglib.org/dlfhomepage.htm

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