Open-Source Electronic Resource Management System: A Collaborative Implementation

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Librarians and strategists at Simon Fraser University (SFU) have collaborated with a team of middle-sized libraries to expand the open-source CUFTS reSearcher suite of tools to include an electronic resource management (ERM) system called CUFTS ERM. This article focuses on the development and implementation of CUFTS ERM; the interoperability between CUFTS ERM and integrated library systems; and the impact of the ERM system on acquisitions, serials, and collections workflows and staffing at SFU Library and the University of Prince Edward Island (UPEI) Library.

KEYWORDS electronic resource management (ERM) systems, open source, CUFTS, electronic resource management (ERM) system implementation, systems interoperability, workflow

INTRODUCTION

The reSearcher suite of open-source library discovery tools developed at Simon Fraser University (SFU) Library under the aegis of the Council of Prairie and Pacific University Libraries (COPPUL) is composed of the CUFTS serials management tools, a federated search tool, and a citation manager system. The serials management tools integrate with the newly developed CUFTS ERM system. CUFTS is composed of a knowledgebase, link resolver, e-journal database, and the electronic resource management (ERM) system.

The CUFTS knowledgebase contains over 475 full-text resources. Libraries can freely download the software and set up their own installation, or have SFU host their CUFTS installation. The CUFTS knowledgebase is freely available and downloadable. The title list data that comprise each resource come from freely available resources such as the publisher's website. The link resolver capabilities of the knowledgebase work with various title lists downloaded directly from publisher sites, but some lists do have to be manipulated manually by staff at the SFU Library since the vendor-supplied...
data lack the necessary bibliographic and date coverage needed. The link resolver, called GODOT, uses the knowledgebase to resolve to full text and uses OpenURLs, Digital Object Identifiers (DOIs), or its own internal linking syntax to provide article-level linking in all major indexing and abstract databases. GODOT also works with interlibrary loan (ILL) software and major integrated library systems (ILSs) to provide direct or mediated ILL requesting for patrons.1 A table in the CUFTS e-journals database allows for the creation of MAchine-Readable Cataloging (MARC) records, which can be loaded into a library’s online catalog, thus displaying up-to-date bibliographic and holdings information for e-journals by utilizing data already in CUFTS.

Maintenance of certain resources in the CUFTS knowledgebase is now done collaboratively between SFU, the University of Prince Edward Island (UPEI), and some member libraries of the British Columbia Electronic Library Network (BC ELN), which is a consortium of post-secondary libraries in British Columbia. Collaboration began as an ad hoc process when one college offered to do the significant work required to create a resource in CUFTS when the vendor did not supply any useable data for a link resolver. SFU and other BC ELN members also started collaborating on open-access resources and recently UPEI started maintaining certain CUFTS resources such as the Directory of Open Access Journals (DOAJ), the journals published by Canada’s National Research Council, the Highwire list of freely accessible journals, and Canadian government periodicals. This collaborative maintenance of CUFTS resources is of benefit to all CUFTS users since it lessens the burden on SFU of constant maintenance, allows for a greater variety of resources to be added to CUFTS, and keeps CUFTS resources up-to-date and accurate. It led UPEI to cease subscribing to a serials management system outside of CUFTS, choosing instead to rely on the CUFTS community to provide these data.

The open-source CUFTS ERM system, part of the reSearcher suite of library discovery tools, was developed at SFU in collaboration with the BC ELN and COPPUL, with input from UPEI. It is extendable and changeable due to its open-source nature. The need for centralized licensing data drove the initial need for the ERM system. The initial design was drawn from the Digital Library Federation’s (DLF’s) Electronic Resource Management Initiative (ERMI) report,2 and modified in collaboration with BC ELN and COPPUL libraries. Modifications included adding functionality to display or not display data elements to the public, fields to link out to the e-journals database and to the library’s ILS, and additional fields for financial and renewal information.

The initial development discussions led to the realization that current workflows at SFU Library would need to be substantially altered, and this topic will be dealt with in-depth later in the article. However, to understand those workflow changes it is important to note that at SFU Library, the Collections Division, not the Serials Unit or Technical Services, was
responsible for the management of online serials due to historical reasons. One outcome of ERM system development has been to move some electronic serials work back to the Serials Unit, work such as CUFTS resources maintenance.

The CUFTS ERM resource record is composed of three main parts: the main record, which contains descriptive data, financial data, subscription information, and access data such as usernames and passwords; the provider record, which contains vendor information such as contact information and administrative module usernames and passwords; and the license record, which includes the DLF ERMI license fields.

The main record is unique for each resource in CUFTS ERM. Fields in the main record are arranged in a tabbed display according to function (see Figure 1). The main record is where the status of a resource is tracked and is the activity area where one will find most of the important data about a resource. It is also the record from which the provider record and license record are linked.

Each tab of the main record holds specific information. The “General” tab includes basic descriptive details and some subscription information for the resource. The “Dates/Costs” tab holds further subscription information,

![General screen of CUFTS ERM main record.](image)
internal and external record numbers, and financial data. The “Statistics” tab is the access information for downloading usage statistics. The “Admin” tab includes administrative module access information, public usernames, general access information for the resource, access notes fields, and vendor contact information. The “Subjects” tab is for assigning subjects to databases that display in the public display side of CUFTS ERM. The “Links” tab provides the link out to the license record and provider record. Lastly, the “MARC” tab is an output of the main record in MARC format, which is primarily used to populate the order record in the ILS.

The provider record and license record can be linked to multiple main records. The license record is based on the DLF ERMI. Simon Fraser University was able to utilize a co-op student from the Library School at the University of British Columbia to enter the licensing data for the library’s electronic resource licenses.

Licensing data are displayed in CUFTS ERM records and also in a special staff view of the CUFTS e-journals database (see Figure 2). This allows library staff, particularly reserves and document delivery staff, to quickly view all relevant license data related to a resource in CUFTS ERM.

Development of the ERM system continued after licensing data were entered, since license records were separate and could sit on their own, unattached to anything while the rest of the ERM system was still undergoing changes during implementation. True to a collaborative project, not all development carried out at SFU is utilized by the SFU Library. For example, with the introduction of CUFTS ERM, it was decided that to save time and effort, the reference/liaison librarians would use the ERM system to maintain the public list of databases and retire the old tool that was used. This was a change in both tools and process. It also presented a case of where new ERM system functionality recommended by partners, namely the ability to describe a resource by the type of content and to limit searches by this descriptor (for example, labeling image resources with the content type of “images”), was deemed too time-consuming by SFU reference/liaison librarians who would be responsible for the initial description and maintenance. Hence, SFU, the development site, does not use this functionality.

IMPLEMENTATION OF CUFTS ERM AT SIMON FRASER UNIVERSITY

CUFTS ERM implementation at SFU followed a classic plan. First, establish initial parameters and go live with data entry. Meanwhile, run data-transfers to populate and synchronize the ERM system with existing orders from the traditional integrated library system (in this case, Innovative Interfaces’ Millennium ILS).

Initially a virtual link would be established so that records in CUFTS ERM, where details of the electronic subscription are recorded, could
correspond with those in Millennium, where all financial transactions occur. As an order is started in the ERM system, it is then processed and paid in Millennium, after which cost data are required in the ERM system for statistical analysis. How could the two systems be linked for data transfer or synchronization? The answer would be to code the stable CUFTS ERM accession number in an indexed local MARC field (930) in the Millennium bibliographic record.

Also, in preparation for going live for new orders, a new procedure was adopted to eliminate dual data entry. As collections staff enter new orders in the ERM system, along with their licenses and terms for access, they give the order a “to be ordered” status. Key fields from such orders are then transferred electronically to Millennium, and acquisitions staff are alerted by e-mail to activate and pay for them in Millennium.

The electronic transfer of new orders resulted in a workflow change as now staff rely less on printed forms and ordering information that had to be
physically walked from one area of the library to another. Other workflows were affected throughout the library (in ILL, circulation, and even reference), as licensing and other details for electronic resources that had hitherto been stored in a filing cabinet could now be consulted online. This first synchronization project, a transfer of new orders and alerts, was run manually starting in August 2008, and has since been scripted to occur automatically on a weekly basis.

Meanwhile, efforts were under way to populate CUFTS ERM with current Millennium orders. First, different types of electronic resources were identified: stand-alone journals, packages, and databases. These types are treated differently in Millennium and are presented differently to the public. Databases receive full cataloging and all formats are cataloged on a single record, whereas brief records for e-journals are downloaded from title lists and stored separately from their print counterparts. Each of these resources is represented in a public list of e-journals and databases, in addition to the catalog, whereas the orders for packages are suppressed from public view.

The next task involved inserting the linking MARC 930 field systematically in each corresponding Millennium bibliographic record. Several processes were run to accomplish this task. Stand-alone journals were identified in Millennium and exported to the ERM system to create new records, following which the newly-created accession numbers were imported back to Millennium, matching on the Millennium system number as exported. For databases, whose records were already presented in the ERM system, the task involved matching on title in Millennium, with close manual follow-up for problem and failed matches, to insert the linking MARC 930 field. As for packages, most would be created by hand due to the frequently inexact correspondence between what is tracked in the ERM system and what is paid for in Millennium.

Once the linking MARC 930 field is present in Millennium bibliographic record, it can be used for matching to import the cost data to the ERM system for analysis and reporting purposes. The chief problem encountered in this import involves data formatting. Cost fields that are not electronically parsed must be entered individually by hand. It is hoped that developments in the implementation of the National Information Standards Organization’s Cost of Resource Exchange (CORE) protocol will in time resolve this, and permit a more successful transfer of costs.

In addition to the transfers of new orders and cost data, a third transfer synchronizes databases in CUFTS ERM with those in Millennium. This particular transfer highlights several ongoing questions: How should records be updated? Which fields should be mapped, and which overwritten? More generally, since most fields are editable and transfers occur in both directions, in which system are data definitive? A final answer to these questions has proved elusive, although initial transfer parameters have been established and carefully documented for staff reference.
For successful electronic data transfers, it was recognized that the linking MARC 930 field should be diligently maintained in Millennium. Because of the current practice to catalog e-journals separately from the print, order records for this type of resource are manually tracked. The linking MARC 930 field in the bibliographic record is a stable number, but the whereabouts of its orders can vary. Some are attached to the print version and must be manually transferred to the electronic version, while others are attached to the electronic version and have no apparent relation to the print. Although other situations, such as title changes, also involve manual tracking, moving to a single-record approach for cataloging journals would certainly alleviate the manual work of maintaining the links.

In summary, the most ambitious challenge of this implementation has been to synchronize the two systems. The complexity of these processes is illustrated in Figure 3. Ongoing questions include how to maintain the virtual linking or correspondence between records and how to synchronize disparate data. However, the synchronization itself has resulted in positive outcomes on both the staff and public sides.

On the staff side, the change has been both functional and attitudinal. As records for electronic resources are centralized and standardized, staff can consult them more easily and manage them more effectively. Also, as staff adopt new strategies, they learn new technical skills for managing traditional print resources.

On the public side, the change is more subtle but no less positive. Searches for electronic resources are more reliable across the three interfaces (catalog, e-journals list, and databases list). Also, the catalog can be searched comprehensively for both print and electronic resources. Finally, with answers at their fingertips, staff are able to respond more effectively to questions from the public.

**Figure 3** Data synchronization between Millennium and components of the CUFTS reSearcher suite.
IMPLEMENTATION OF CUFTS ERM AT THE UNIVERSITY OF PRINCE EDWARD ISLAND

At the University of Prince Edward Island, implementation of the CUFTS reSearcher suite, including its new ERM system, has followed a different course than at SFU. At UPEI, open-source technology is an institutional strategy; Moodle and Drupal are used extensively throughout the campus. Robertson Library has a rich history of using open-source technology to deliver its technical services; the entire suite of CUFTS products, along with the Evergreen ILS, play an integral part in this strategy. The library also creates and hosts VREs (virtual research environments), digital repositories, and is currently digitizing local histories.

Part of the appeal of open-source technology is the way in which products can be changed and developed in a collaborative manner. This would become very important to UPEI as they worked with the CUFTS reSearcher development team to overcome some of the deficiencies of the Evergreen ILS. UPEI was the first academic institution in the world to implement Evergreen, going live in June of 2008.

In June 2008 Evergreen was not a complete ILS, having neither an acquisitions nor a serials unit. The early implementation of serial holdings was problematic, since only the title information was displayed. Discussions with the reSearcher development team resulted in the creation of two new CUFTS modules that allow UPEI to upload and display their print holdings. After making these changes, UPEI investigated if CUFTS could be modified to manage print journals as well. This too was accomplished by adding one field, the “coverage field,” and modifying others such as the “local note” field. Although these modifications required changing the CUFTS database structure, changes were completed quickly. UPEI’s work with CUFTS and the accompanying serials workflow transformation has been recognized nationally. In 2009, the Robertson Library received the Canadian Library Association/3M Canada Award for Achievement in Technical Services for transforming their serials workflow in an innovative manner.

The greatest workflow change that occurred following the implementation of CUFTS concerned the receipt and maintenance of print journals. Staff now log in to their CUFTS account and choose the print journal resource from the list of resources on the CUFTS main screen. Staff can now search for individual serial titles. A search for “circulation research” yields the results illustrated in Figure 4.

Serials staff click the identification number of the record they want to update, which results in a maintenance screen where serials data can be edited. The “coverage” field is a free-text field used to update holdings which are then displayed in the CUFTS e-journals database (CJDB). The CJDB note field contains important information about journals and displays in red. For example, the veterinary title Scientific and Technical Review is
## FIGURE 4
Print Holdings screen in CUFTS.
shelved under its French title *Revue Scientifique et Technique* because it is indexed in article databases under this title. The “local notes” field is viewable by staff only and contains information such as routing lists and subscription information regarding specific titles.

Other workflow changes include expanded responsibilities for collections and electronic resources staff at UPEI’s Robertson Library to include maintaining CUFTS resources and dealing with all e-journal-related work that was previously done in Library Systems.

Evergreen is developing a serials unit and an acquisitions unit that UPEI will investigate when they are released. Whether UPEI uses these modules or not, especially in conjunction with CUFTS ERM, depends on how well they fit into the current workflow. If UPEI adopts them, they will collaborate with SFU, which has already developed tools for data exchanges between ILSs and the ERM system.

Expenditures are currently tracked with a series of spreadsheets UPEI Library developed that offer up-to-date information on each account. Once invoices are received, the spreadsheets are updated, with the dollar amount shifted from “encumbered” to “paid” and the invoices sent to the business office for payment. Preparing for a new fiscal year consists of sorting the sheets according to which lines are “encumbered” and which are “paid,” deleting the titles that have been paid for and keeping the encumbered items. No interaction with the ILS is necessary.

The first stage of UPEI’s ERM system implementation consisted of combining these financial spreadsheets with others containing administrative information. The information was then entered into the ERM system, resulting in a basic implementation. Financial information is now more accessible and useable than ever and makes the task of analyzing electronic resource expenditures much easier. Only updating financial data in the ERM system also ensures greater accuracy and currency.

Once database invoices are received, they are assigned a fund number by the Acquisitions Librarian and passed on to a staff member for further processing. At this point the information is input into the ERM system. The creation of new ERM system records, as well as maintenance of current ones, is also part of this new workflow.

The inputting of licensing information will complete this first stage of implementation. Another positive aspect of ongoing collaboration with SFU is the sharing of this licensing information. The plan is to receive flat files of licensing information from SFU for resources to which both institutions subscribe. Since these data will be exported from CUFTS ERM, it will easily be imported back into the UPEI installation of the ERM system. This collaboration may also lay the groundwork for UPEI to share such information with other university libraries on a regional level in the Atlantic provinces, as CUFTS ERM has been suggested as a management tool for this information.
Just as at SFU, UPEI Interlibrary Loan and Circulation departments will benefit from licensing information in the ERM system. Currently staff consult paper files to determine the eligibility of an electronic resource for ILL purposes. This information will soon be accessible electronically and the process made much more efficient. The same applies to the Circulation Department, as licensing information regarding use of electronic resources for electronic reserves and in coursepacks will be readily available to circulation/reserves staff. UPEI hopes to utilize the public interface of CUFTS ERM to make this information more accessible in the future.

Other collaborative efforts may include the sharing of database provider information. The representative of each of the large database companies is the same for all the Atlantic provinces and sharing this information within the region would represent an efficient and effective way of working together.

Currently, UPEI’s Robertson Library has an in-house system for displaying databases, which is both an alphabetic and a subject listing of databases that works in conjunction with the study guides librarians developed. However, CUFTS ERM’s public interface (CRDB) offers faceted searching and also has the advantage of allowing students to search for databases by “resource type” rather than being limited to searching only by title or subject.

Adding historical cost data to the ERM system is also planned at UPEI. A field in the ERM system called “advanced costs” will receive the uploaded data. To accomplish this, programmers will be looking at the CUFTS code and writing the necessary scripts to allow for the upload of the information. At UPEI the data would be exported to spreadsheets for analysis.

**PLANNED FUTURE ENHANCEMENTS FOR CUFTS ERM**

Currently, tools found on the main ERM system screen allow the exporting of information on one or more databases based on a variety of search parameters. The information can be exported in a number of formats: JSON, HTML, and CSV. For the moment, all of the information about a resource is exported. CUFTS partner libraries would like to see greater control over this in the form of canned reports. Simple reports such as the contract dates and price data for one or more databases would be helpful.

The Robertson Library at UPEI is responsible for providing resources for both the University of Prince Edward Island and the Atlantic Veterinary College and consequently a number of databases are cost-shared between the two institutions. Another needed enhancement would alter the cost/date table to add a searchable field reflecting shared costs between institutions or between departments. Plans also include the full implementation of the Standardized Usage Statistics Harvesting Initiative (SUSHI) protocol, which is currently being tested and is almost ready for full production implementation.
in CUFTS ERM, and the ability to upload Counting Online Usage of NeTworked Electronic Resources (COUNTER) usage statistics individually instead of using the SUSHI protocol. Finally, a change audit system is planned that will send out a trigger to alert library staff to data updates or new records in CUFTS ERM. For example, any new online database records that are added or removed from the ERM system would result in cataloging staff being notified automatically for corresponding updates in the ILS.

The collaborating libraries view open-source technology not necessarily as a way of spending less money, but spending money more wisely. Open-source technology has allowed them to build staff skills and open themselves up to change. Several workflows have already changed since implementing CUFTS and CUFTS ERM, and others will continue to evolve with the full implementation of the ERM module. The participating libraries look forward to an ongoing collaboration with each other and new libraries to refine and develop CUFTS ERM.

NOTES


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