



Article

MULER: Building an Electronic Resource Management (ERM) Solution at York University

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Abstract

Many university libraries now utilize an Electronic Resource Management (ERM) system to assist with operations related to electronic resources. An ERM is a relational database containing information such as suppliers, costs, holdings, and renewal dates for electronic resources, both at the database and title levels. While commercial ERM products are widely available, some institutions are custom building their own ERM in-house. This article describes how York University in Toronto, Canada, did just that by building a system called Managing University Library Electronic Resources (MULER). The article details the background and history of how electronic resources were managed pre-MULER; why a new ERM was needed; the planning process; the current and innovative functions of MULER, including integration of MULER data into York University Libraries search and discovery layer, Vufind; subject tagging in MULER; new functions to be added; and lessons learned from the project. Positive and negative implications of choosing an in-house project over paying for a commercial product are also discussed.

Many university libraries now utilize an Electronic Resource Management (ERM) system to assist with operations related to electronic resources. Acquisition strategies and budgets focus highly on electronic journals and electronic books as well as databases, with larger and larger packages of content being acquired. These packages can be subscriptions or purchases with perpetually accessible content, acquired both locally as well as through provincial and national consortia. Maintaining information related to these electronic resources, including URLs, costs, holdings and more, is a time intensive endeavour.

Electronic resource management involves all of the processes in the lifecycle of these resources: evaluation and assessment, trials, acquisition, renewals, cancellations, budget management, access issues, and troubleshooting. While many university libraries now employ a dedicated Electronic Resource Librarian to manage those processes, the reality is that electronic resources functions normally go through a number of people across the library including subject librarians who help make acquisitions decisions, acquisitions staff who process orders and record costs, and bibliographic services staff who catalog electronic resources. If information about these resources is not organized and kept centrally because the information is found in a variety of spreadsheets and emails, the aforementioned processes become inefficient. In response to this myriad of information and personnel involved in purchasing and maintaining electronic resources, university libraries now utilize ERM systems to organize records, smooth out processes, and promote collaboration by ensuring that everyone has access to the information they need by maintaining it in one place. Popular commercial ERM products include Ex Libris' Verde, SirsiDynix's ERMS, Endeavor's Meridian, and Innovative Interfaces' ERM. However, some institutions are custom-building their own ERMs in-house. This article describes how York University did just that, building a system called Managing University Library Electronic Resources (MULER). This article details the background and history of how electronic resources were managed pre-MULER; why a new ERM was needed; the planning process; the current and innovative functions of MULER, including integration of MULER data into York University Libraries search and discovery layer, Vufind; subject tagging in MULER; new functions to be added; and lessons learned from the project. Positive and negative implications of choosing an in-house project over paying for a commercial product are also discussed. It is important to note that MULER is a work in progress; it is a product designed to evolve with electronic resources management. This article will also touch on areas for future growth and development.

Organizational Structure

York Library departments that work mostly closely with the technical aspects of electronic resources include the Acquisitions department, Bibliographic Services, and Library Information Systems. The Acquisitions Manager is responsible for ordering electronic resources, processing invoices, and maintaining access to electronic resources through the library catalog and/or ERM. Bibliographic Services includes five

and one half Cataloguing Librarians, two of whom catalog electronic books, indexes and databases; a cataloging assistant responsible for copy cataloging of electronic journals; and the Electronic Resources Librarian, who oversees all electronic resource acquisitions, performs evaluation, promotion, license negotiation, budget management, and leadership in areas related to electronic resources. Library Information Systems (LIS) is composed of five staff members including a manager, a Unix system support specialist, two application support specialists, and one application programmer. They are responsible for all IT-related projects in support of the Library, and report to the Director of Library Computing Services who works in the office of the University Librarian. LIS staff built MULER, perform work on the more technically challenging areas related to electronic resources access (such as major migration from one vendor platform to another), and are responsible for building future MULER enhancements.

Background: Pre-MULER

York University Libraries first created an electronic resources database, eResource, in 2000 to manage electronic resources. It was built using Microsoft Access and programmed with Visual Basic. The database later moved to Oracle. Previous to this database, information such as titles, URLs, and costs were simply kept in an Excel workbook.

The eResource database contained a variety of information including the vendor, whether the product was acquired locally or via consortia, URL, format, and affiliated Library (see Figure 1). All of this information was kept in one table, which was linked to title information in another table. For example, from a record for the business research index ABI/Inform Global, one could link to each title within the index (see Figure 2). Each title within ABI/Inform Global has its own separate record containing the URL, holdings, and format information (see Figure 3). The database was programmed to run simple reports; e.g., a complete list of vendors, a list of products by renewal date, an expenditure report showing costs year to year.

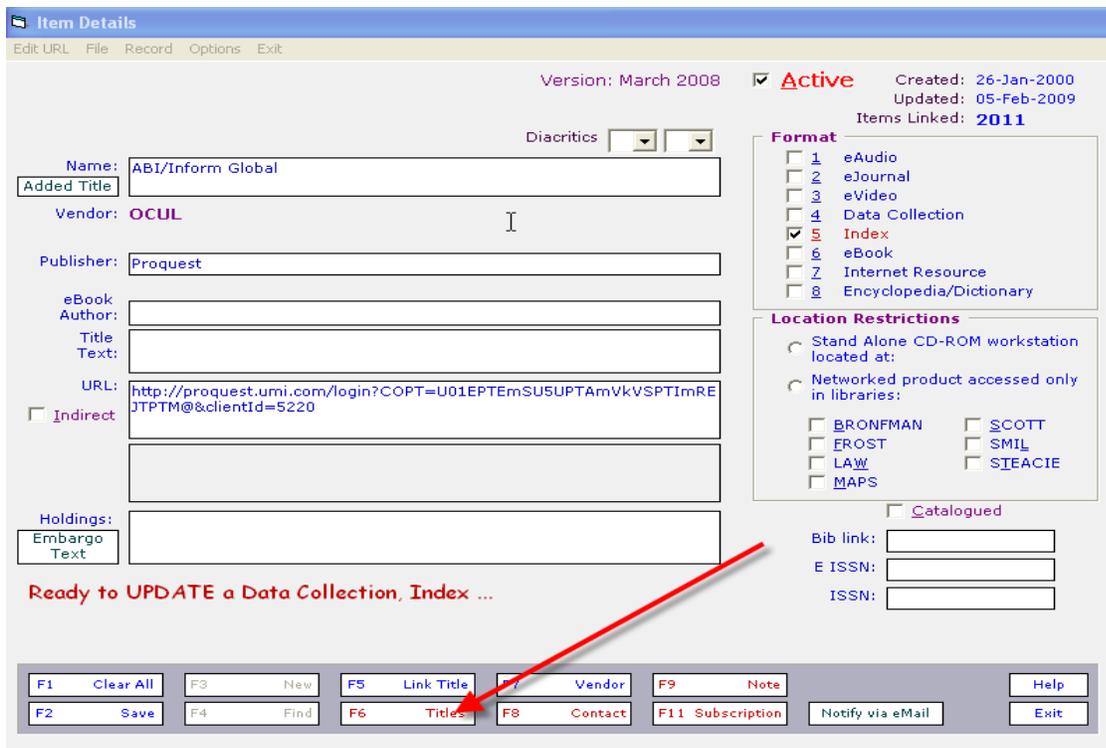


Figure 1. Sample index record in the eResource database.¹

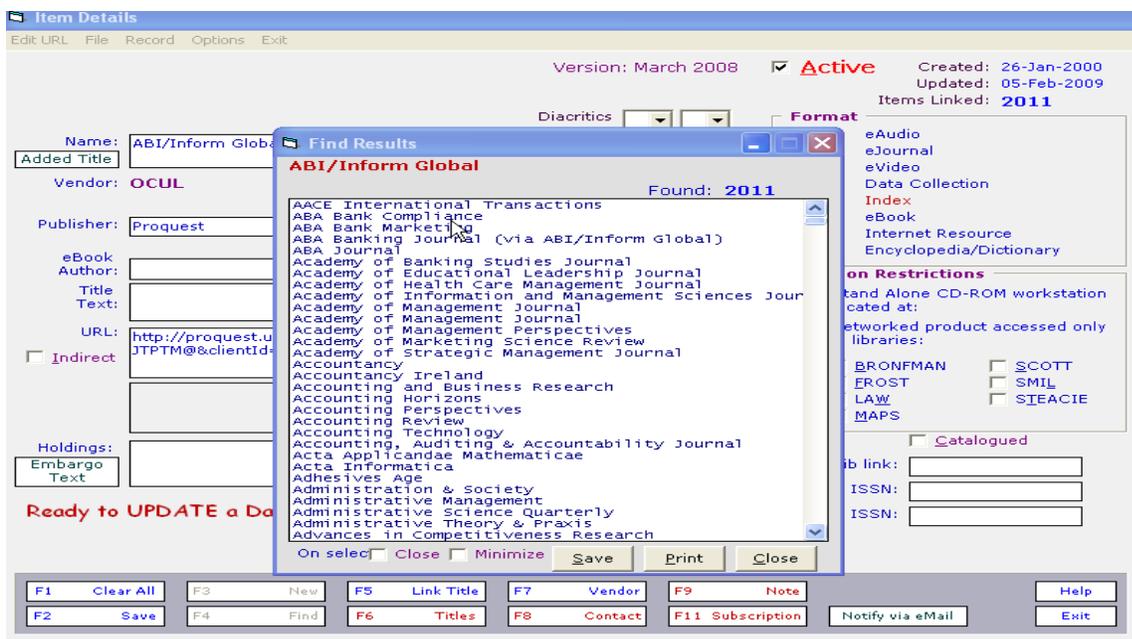


Figure 2. Sample title lookup.

¹ All screen captures in this article are reproduced with permission of the York University Libraries, Library Information Systems Department, 2011.

Item Details
 Edit URL File Record Options Exit

Version: March 2008 **Active** Created: 28-May-2008
 Updated: **2011**
 Items Linked: **2011**

Linked to ... **ABI/Inform Global**

Diacritics [v] [v]

Title:
 Added Title:
 Vendor:
 Publisher:
 eBook Author:
 Title Text:
 URL:
 Indirect
 Holdings:
 Embargo Text:

Format

- 1 eAudio
- 2 eJournal
- 3 eVideo
- 4 Data Collection
- 5 Index
- 6 eBook
- 7 Internet Resource
- 8 Encyclopedia/Dictionary

Location Restrictions

- Stand Alone CD-ROM workstation located at:
- Networked product accessed only in libraries:

- BRONFMAN SCOTT
- FROST SMIL
- LAW STEACIE
- MAPS

Catalogued

Bib link:
 E ISSN:
 ISSN:

Ready to UPDATE a Title linked to a Data Collection.

F1 Clear All F3 New F5 Link Title F7 Vendor F9 Note Help
 F2 Save F4 Find F6 Titles F8 Contact F11 Subscription Notify via eMail Exit

Figure 3. Sample title record.

Need for a New ERM

With the increasing dominance of electronic resources within the Libraries' collections, the eResource database eventually became out-dated and inefficient. Once York University Libraries began acquiring larger packages of electronic books and electronic journals, it became far more labor intensive to maintain title lists. Each individual electronic journal title has its own record in this database. Acquisitions staff typically entered each title individually, with Library Information Systems staff performing batch uploads when needed. Data entry was not a highly automated process. Duplicate title records also created issues. For example, York currently has access to *ABA Journal* through four different providers: two from Gale, one from EBSCO, and one from ProQuest. In the eResource database, that one title required the creation and maintenance of four different title records, a process that was time consuming and caused technical issues because as more records were loaded into the database, the slower it became.

Another shortcoming of the eResource database was that it was a local install on users' desktops. With every PC upgrade, the database needed to be reinstalled. Since a local install was a time consuming process, only the Acquisitions Manager and some staff in Bibliographic Services had access.

Finally, all electronic resource tasks had to be managed and performed by Library Information Systems. Instead of those librarians whose job it is to acquire and catalog electronic resources, it was up to LIS staff to effectively manage access to the Libraries' databases, electronic journals, and electronic books. Reports had to be custom run by a staff member in LIS, not by Acquisitions staff as needed. Shortly before MULER was developed, a customized report interface was created in the Library Information

Systems department in order to enable the Acquisitions Manager to import titles from Microsoft Excel and to produce expenditure reports. Figure 4 illustrates the customized report interface for the eResource database. However, the importing of MARC records into the eResource database had to be done by the LIS department instead of Bibliographic Services. From a workflow perspective, it was felt that Library Information Systems staff were spending too much time uploading and maintaining library records.

The lack of local install, time investment by Library Information Systems staff, and most importantly, the sheer increase in electronic resource acquisitions were the impetus to begin planning for a new ERM solution that could meet and improve on all of the shortcomings of the eResource system.

E-Resource Items

* Required

* Database: Text Production

* Spreadsheet File:

* Source ID:

* Source Type: Index (I Group) Publisher (P Group)

* Format:

* Active?: Yes No

Fill in the column letters in relation to the spreadsheet layout if applicable.

* Title:

ISBN: or extract how many characters from the end of the URL?

E-ISBN:

Embargo: Text:

Coverage/Holding: (if there is only one column, leave the second field blank)

* URL: or PMID: Base URL:

* Starting Row: (Account for column headers, if necessary)

* Number of Records to Insert: or: All

Figure 4. Customized report interface in the eResource database.

The Planning Phase

The first step in planning for a new ERM was to take inventory of what was wanted and what was needed. These ideas came out of meetings primarily with the Acquisitions Manager who worked most closely with the eResource system, and the Head of Bibliographic Services who would use the new system for maintaining access to electronic books. To address the shortcomings of a local install, a Web-based system was preferred. The idea was to have a system that librarians could access from anywhere, whether on campus or off campus. Any librarian should potentially be able to access the ERM so that, for example, they could look up administrative information about an electronic resource while on the reference desk.

We also wanted a system that would present little learning curve for those used to the eResource database by mimicking some of the commands and shortcuts, such as lookup commands for title lists associated with a particular product. Ideally, the system

should be easy to use and manipulate so that no Library Information Systems staff intervention would be required when performing tasks specifically relevant to librarians and library staff.

New features and a new design would further address the shortcomings of the eResource system and facilitate tasks in a variety of library functions. In essence, we wanted a whole new design for the ERM. One of the most important of these new functions was the ability to perform batch record uploads. In other words, when a new package of electronic books or electronic journals is purchased, a single file of titles in an Excel workbook could be uploaded, thus automating the process of making titles accessible, as opposed to creating individual records one by one. In the same vein, we wanted to be able to see the databases or providers to which a title is linked. So as in the previous example, with *ABA Journal* being available from four different aggregators, each link should appear on the same screen. Users should only have to do one lookup for any one title, not four different lookups; one search result should include all four links. The ability to suppress records as needed should be retained, so that if one of them was redundant, it could be hidden.

Several new administrative functions were desired including the ability to include contact information with each product. At the time, contact information was simply retained in an Excel spreadsheet. Since problems and questions invariably arise with respect to certain products and titles (e.g., a title goes missing, or there is a technical problem with a database) it makes sense to have a contact closely linked to the product in the system, so that if the problem cannot immediately be resolved, at least the librarian quickly knows whom to contact. The bottom line is that all pertinent information about any one title should be located in one place.

Another administrative feature requested was notes fields, both public and private. The public note field could be used to communicate any extra information to patrons through search results. The administrative note field, which is seen only by library staff, contains any extra information that is important in the management of electronic resources.

The eResource system had limited reporting functions, but we wanted to improve these and make them more robust, including the ability to track expenditures; again, placing all relevant information together. In keeping cost histories in the system, we would be able to automatically see price trends and percentage increases, allowing for more accurate projections. Another desired function was the ability to run duplication reports for collection development purposes, so that if we were looking at a new offering of titles, we could run an analysis to see what we owned already and what was unique, giving us a better sense of the value of the offering.

To take the system to the next level, we envisioned it mimicking electronic resource workflows, such as cancellations or trials. A trial module would keep track of what products we have reviewed, who requested a trial, and feedback received, so that if questions arose about a product again, we could easily look it up in the ERM and review why it was not initially acquired. Another important module we wanted was one that

could keep track of license agreement information. At the time, license agreements were simply kept in hard copy in a filing cabinet, so we wanted the ability to link electronic copies to our records and we wanted to record specific terms of use, e.g., interlibrary loan or alumni access rights. Often times librarians receive questions from patrons about certain rights with respect to individual titles, and it would be convenient if there was one place to look up that information, as opposed to having to find a paper copy from a file.

Finally, the new ERM should have various levels of permission dependent on the role of the library staff member. Public Service Librarians would have access to a read-only version, so that there would be no threat to data integrity. This way a librarian on the reference desk could look up relevant information; e.g., the number of simultaneous users for a particular electronic book. Librarians and library staff in Acquisitions and Bibliographic Services would have full access to edit and upload content.

Weighing Our Options

The search for a new ERM began with visits and demonstrations of products by commercial providers: ExLibris' Verde, SirsiDynix's ERMS, Endeavor's Meridian, and Innovative Interfaces' ERM. None of these systems met all of our wishes and they all included features and functions in which we were not interested. For example, none of them could track expenditures and renewals the way we wanted, which at the time was considered a top priority. There was also the fact that getting one of these products would require learning an entire new system. The smooth transitions described above, in which functions within the eResource database would be programmed into the new system, were not going to happen with a subscription-based ERM. So the question came up: "why pay for something that isn't what you want?"

The best solution was to do something in-house. A home grown system could be built to do only the functions that we wanted it to do. Moreover, it could be designed to reflect specific electronic resource workflows at York. As these workflows change, so could the system. Building our own solution meant we could borrow as much from our old design as we wanted.

MULER

Managing University Library Electronic Resources—MULER—as the new ERM came to be known, was developed by Tuan Nguyen and Taras Danylak of Library Information Systems. A Web application, it was built primarily using Code Igniter PHP framework, a Web application framework; Blueprint CSS framework; and JQuery, a popular JavaScript library (see Figure 5). The project took place over the course of a year from fall 2008 to an official launch of 2009, with most of the work taking place during a three-month span, two months of which was dedicated to development and one month for data migration from one system to another.

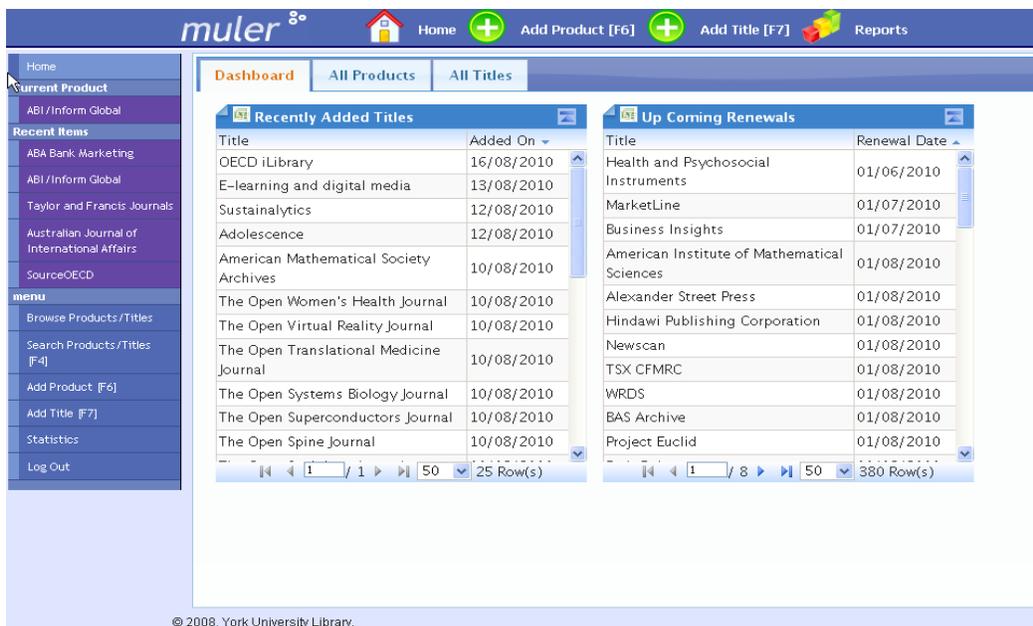


Figure 5. The MULER home page.

As planned, keyboard shortcuts were created to duplicate the commands of the eResource database. New administrative features were added, such as the public and private note fields, as well as a tab for contact information.

The design concept mirrored the description above. Resources in MULER are, in general, divided into “products” and “titles”. A product is a database or a package of electronic journals or electronic books. A title is an individual electronic journal or electronic book within one of those products. MULER includes records for both products and titles, with the title records linked to the appropriate product records. Each title includes links to each of its instances within products (see Figures 6 and 7). Most of the time it is a simple process to add the titles associated with a product, as long as a list of titles is available in Excel format from the vendor. What is more complicated to manage are lists of titles from aggregators where individual titles come and go constantly, making the content somewhat of a moving target. There is no way to automatically update title and holdings information; this must be done as new title lists are made available.

Product Details [F1] | Titles [F2] | Subscription Details [F8] | Contacts [F9]

URLs and Holdings - Click here to add a new URL

URL	Holdings	Embargo	Proxied	Notes
http://www.springerlink.com/journals/		<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Active: Networked: Last Update: 2011-12-08 (cassel) No. of Titles: 2521 Save [F3]

Name: SpringerLink

Type: E-Journal Collection | ISSN: | Publisher: Springer | Vendor: CRKN

Aliases: | Admin Notes:

License URL: http://york.scholarsportal.info/licenses/SpringerLink_Online_Journals

Public Notes: | Public Notes (cascade):

Description: Save [F3]

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Figure 6. A sample e-journal collection product record.

Title Details [F1] | MARC View

ABI/Inform Global | Expanded Academic ASAP (via Gale) | Business Source Premier | Academic OneFile

URLs and Holdings - Click here to add a new URL

URL	Holdings	Embargo	Proxied	Provider ("Linked" to)
http://infotrac.galegroup.com/itw/infomark/1/1/1/?url=rc1&ACONE_0_1n+ABA+Banking+Journal?	Jan 1 1989 -	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Academic OneFile
http://infotrac.galegroup.com/itw/infomark/1/1/1/?url=rc1&W5FEANW5FO	Jan 1 1989 -	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Expanded Academic ASAP (via Gale)
http://search.epnet.com/direct.asp?db=buh&jid=622ABA&2&scope=site	April 1 1979 -	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Business Source Premier
http://search.proquest.com/publication/477547accountid=15182	Jan 1 1987 -	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ABI/Inform Global

Active: Networked: Last Update: 2009-11-24 (cassel) Save [F3]

Title: ABA Banking Journal

Type: E-Journal | ISSN: 0194-5947 | Publisher:

Aliases: American Bankers Association, ABA Banking Journal | Public Notes:

Admin Notes:

Description: Save [F3]

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Figure 7. A sample title record with links to the instances in products.

New report functions were built. Figure 8 shows the report functions available in MULER. A “Check ISSN” report functions as a duplication report. When a spreadsheet of ISSNs is uploaded, MULER will check these across its holdings and deliver a report

of what is unique or duplicated. One of the distinctive features of MULER is the ability to manage bibliographic records in MARC format through the reports function. This feature was not available in the eResource database. The new reports that are used to manage MARC records in MULER are CatQC, Import Excel and Import MARC reports.

CatQC is an open source, Microsoft Windows Application program created by librarians and programmers at the University of Florida Library. As described by Jay, Simpson, & Smith (2009), CatQC is used to ensure high quality bibliographic data for batch-loaded records. CatQC analyzes a batch of records and creates a report and a modified batch of records. As described by the authors, one of the fields analyzed by CatQC is the 6XX MARC subject headings field with a second indicator of 4, 5, 6, or 7. These second indicators of the 6XX MARC fields indicate the thesaurus or control vocabulary that is being used for that particular subject heading. The 6xx fields with second indicators 5, 6, or 7 may contain non-English headings based on foreign thesauri that may conflict with Library of Congress Subject Headings, thereby creating split display files that can prove confusing for library users. CatQC deletes the subject headings 6XX fields with a second indicator of 5, 6, or 7 and creates a modified file with these headings removed.

The Head of Bibliographic Services at York University Libraries obtained the open source code for CatQC from the creators at the University of Florida. The application programmer in the LIS department at York University Libraries was able to integrate the code for CatQC into MULER. There were no major changes to how CatQC analyzes bibliographic data when it was integrated into MULER. The Cataloguing Librarian for Serials and Electronic Resources uses the CatQC report in MULER when processing large sets of MARC records for electronic resources. CatQC expedites the processing of these large sets of records by removing subject headings that are not indexed in the catalog and creating a corrected file of MARC records. It also assists in improving the quality of the bibliographic data in the MARC records while automating a manual task.

The Import Excel report is used to import a batch of titles from a Microsoft Excel spreadsheet into MULER. Some vendors supply bibliographic information in the form of a Microsoft Excel spreadsheet. The Import Excel report converts the bibliographic data into MARC format so that it may be displayed in MULER.

The Import MARC report is used to import and process batches of MARC records from vendors. The York University Libraries catalog cannot index and display Unicode (UTF-8) characters, therefore all UTF-8 records must be converted to MARC-8. Files of vendor records in MARC-8 or UTF-8 are ingested into MULER and the processes of this report convert any UTF-8 records to MARC-8. This report also replaces native vendor URLs with proxy URLs. The records are then recompiled into MARC-8 and a file of MARC-8 records containing the proxy URL is created.



Figure 8. MULER reports.

Due to competing time priorities in the Library Information Systems department, not every item on the wish list was completed in 2009. Instead, only those functions that were requirements of existing job functions were implemented. For example, neither the trial nor licensing information modules were built since those were considered “nice to have” but not “must haves.” Similarly, a subscription module was built in which subscription costs are tracked over time, but there is no feature to perform automatic percentage increases, as was discussed during the planning stage.

One of the positive outcomes of having a home grown system like MULER is that it can evolve at the pace of the organization. Now that LIS staff has been able to complete other projects, they are returning to work on MULER, with the intention of adding more enhancements, including the creation of a read-only version of MULER and the addition of acquisition, trial, and cancellation modules. One new idea is to include whether individual electronic book titles are Single User license (SUPO) or Multi User license (MUPO) and have this information display in library search results. Now that we have a public note field in MULER, this task can be done, but it will not be easy to input that data for the hundreds of electronic book titles that are currently in MULER.

Integration of MULER Into Search and Discovery Layer

In 2009, York University Libraries implemented the search and discovery layer Vufind to replace both Webcat (the public interface for the Sirsi Integrated Library System) and the public interface for the eResource database (Denton & Coysh, 2011). Before Vufind, library users searched Webcat for most of the libraries’ collection and the public interface of the electronic resources database for all online resources separately, which was not effective from a usability perspective. Denton and Coysh (2011) explain that Vufind allowed for the integration of data from both MULER and Sirsi into one

searchable index. The ability for MARC records to be imported into MULER made the integration with the data from Sirsi simple, since Sirsi also uses MARC records. The new MARC data from both MULER and Sirsi are imported daily into Vufind and therefore become searchable via Vufind. Figure 9 shows a MULER record displayed in the search and discovery layer Vufind.

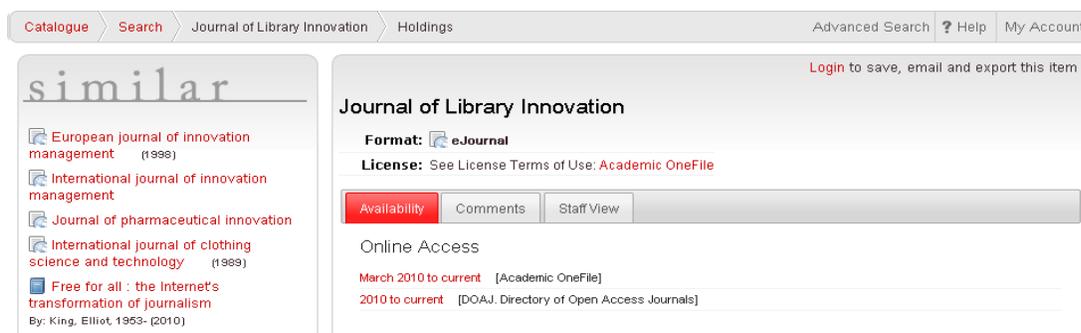


Figure 9. MULER record displayed in Vufind.

Subject Tagging With MULER

MULER has spurred the development of another major project at York. During 2010-2011, a Subject Guide Redesign Group undertook a project to assign subjects to existing licensed databases at York similar to the University of Toronto Libraries' "Find the best research resources for your topic" (<http://main.library.utoronto.ca/eir/articlesbysubjects.cfm?subject=0>) recommendations. The purpose was to add all relevant subjects to each electronic resource and allow users to assign electronic resources a ranking within the relevant subjects to produce a list of top five highly ranked databases for each subject.

To enable this user-driven recommendation system, Library Information Systems staff designed a database that is linked to MULER. A user can look up a product from MULER and then assign it a subject tag as well as a ranking in this new database (see Figures 10 and 11). In the example below, a user searches for the electronic resource Compendex in MULER, then assigns it a ranking of #3 for Biophysics, #5 for Kinesiology, and #3 for Neuroscience. Once Compendex receives a ranking for all of its relevant subjects, it will appear within the various "top subject database" rankings on the York University Libraries homepage (see Figure 12). This subject tagging exercise serves to illustrate how MULER is being utilized to make other projects at York University Libraries possible and to create new library products for patrons.

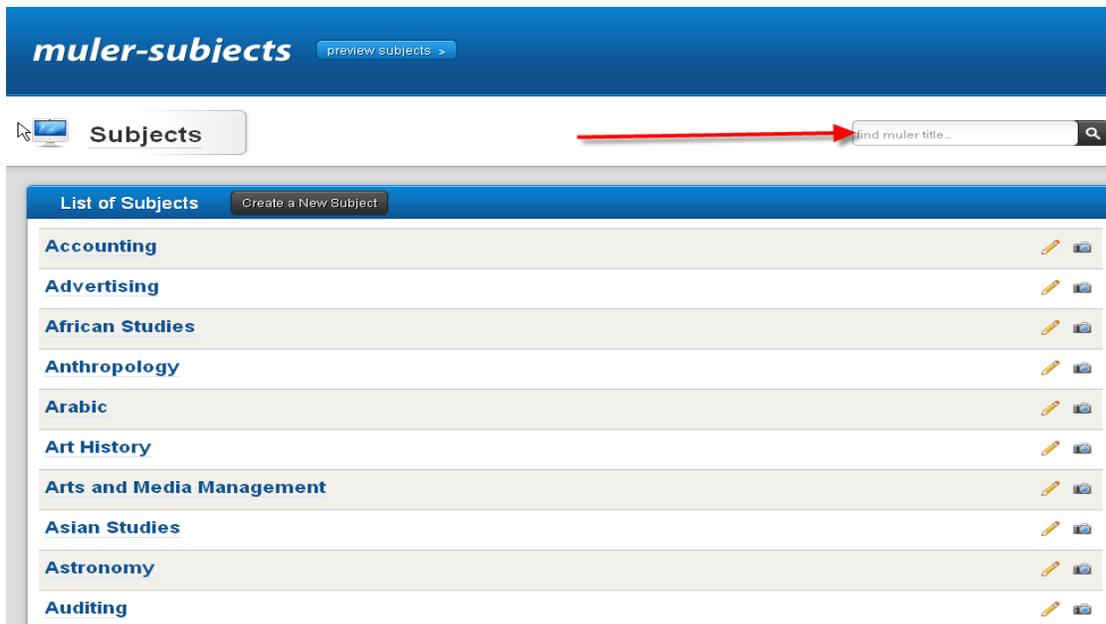


Figure 10. A user can look up an electronic resource from MULER and then tag it with a subject.

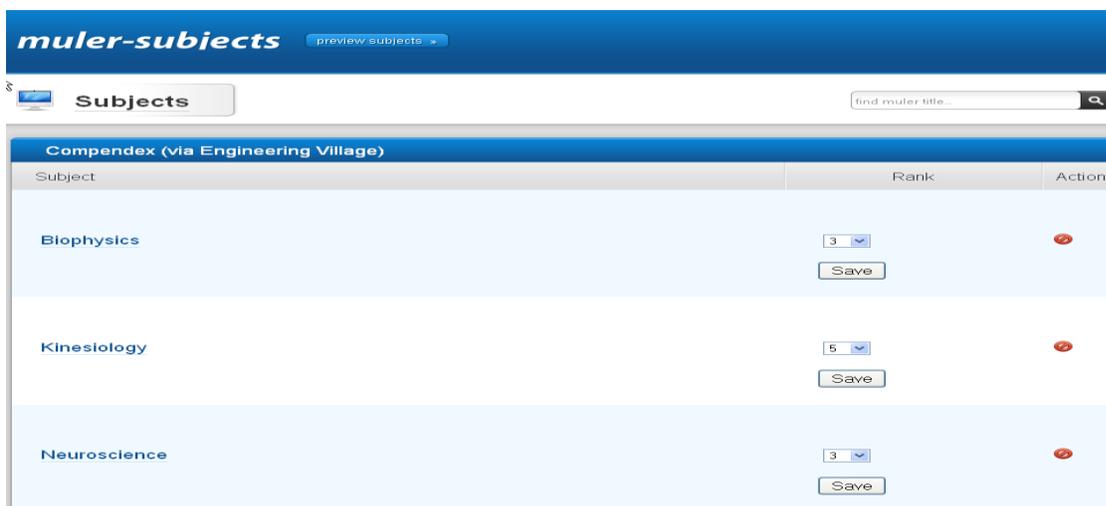


Figure 11. A user can look up an electronic resource from MULER and then tag it with a subject.

Major databases/indexes for Biophysics

Use databases and indexes to find articles and more. For additional help, see the [quick guide on how to find journal articles](#).

Sort by: [Top Picks](#) | [Alphabetical](#)

1. [Web of Science](#)
 SUBJECTS: Astronomy, Biochemistry, Biology, Biophysics, Biotechnology, [see more](#)
 DESCRIPTION: Indexes 8,500 research journals across the Social Sciences, Sciences and Arts & Humanities [see more](#)
2. [Inspec \(Via Engineering Village\)](#)
 SUBJECTS: Astronomy, Biophysics, Chemistry, Computer Science, Engineering, [see more](#)
3. [Compendex \(via Engineering Village\)](#)
 SUBJECTS: Astronomy, Biophysics, Computer Science, Engineering, Information Technology, [see more](#)
4. [Pubmed](#)
 SUBJECTS: Biochemistry, Biology, Biophysics, Health Informatics, Molecular Biology, [see more](#)
 DESCRIPTION: PubMed is a biomedical search system designed by the National Center for Biotechnology Information at the National Library of [see more](#)

Figure 12. Sample top five databases for a subject.

License Management With MULER

As mentioned previously, one of our original ideas was to incorporate license terms into MULER. While this item on our wish list was not completed upon the launch of MULER, we were able to address it when we were faced with a situation in 2011 in which York University Libraries was asked to make the license terms for all electronic resources as transparent as possible. As it turned out, University of British Columbia (UBC) developed a license database which details the specific permissions allowed for each licensed database, electronic journal collection, and electronic book collection. As a result of communication between Access Copyright (a Canadian not-for-profit copyright collective); the Association of Universities and Colleges of Canada (AUCC); and the Ontario Council of University Libraries (OCUL; a provincial consortium representing 21 Ontario universities including York University), legal counsel advised that an instance of this database be made public so that the same type of license terms are available to students and faculty. OCUL responded by creating an instance of the database for each member institution that contains licensing information for all electronic resources acquired through the provincial consortium as well as the Canadian Research Knowledge Network (CRKN) national consortium. Once the instance for York University Libraries was complete, the next step was to make the database discoverable by patrons. To this end, we connected the Licence Database known as the OUR database

to MULER, so that links to the terms and conditions of specific electronic resources are displayed in search result records through the library catalog.

Overall

In a recent article, Collins and Grogg (2011) note that according to survey results, librarians' top priorities for ERMS include workflow management, license management, statistics management, administrative information storage, acquisitions functionality, and interoperability across systems. Currently MULER meets some of these criteria but falls short in other areas. While workflow was a number one priority according to those surveyed, MULER is not built around workflows, and does not send reminders to assist users with tracking work stages. However, it should be said that at York the perceived need for integration within workflows is not that high, perhaps owing to the particular structure of York University Libraries' Acquisitions and Bibliographic Services departments. While license terms do not exist directly within MULER, links to these terms are facilitated. The next step will be to create a field where a PDF of the actual license can be attached. Usage statistics are not integrated into MULER in any way, so that is one priority that is not being met. MULER stores administrative information such as usernames, passwords, and historical information regarding resources. It is beneficial to not have to search email in order to locate a key piece of historical information. In terms of acquisitions functionality, MULER is a convenient place to store and look up historical costs and perform budget projections. It can also be used to produce fund reports. More can be done in this area, for example, having the ability to produce automatic calculations. Even better, if usage data were to be incorporated, then cost per use data could be calculated easily. Finally, in terms of interoperability, MULER does integrate quite well with other applications, but it does face challenges as noted by Collins and Grogg (2011), namely a "lack of integration with the ILS ... knowledge bases, and vendor systems" (p. 26). Due to this lack of interoperability, library staff often must manage records not only in MULER but in our ILS as well. We also work with the SFX knowledge bases for activating OpenURL targets. Having one system for all of our records, data, and functions in one place is an ideal we still wish to work towards.

Indeed, Collins and Grogg (2011) suggest that currently there is no such thing as the perfect ERM. Whether it is from a commercial vendor or developed in-house, no ERM exists that can do all things. MULER was developed to meet the current needs of York University Libraries staff and it is fairly successful at doing so. The goal is to continue to develop MULER, continuing that same philosophy of only spending time on York University Libraries' local priorities. Several enhancements have been noted throughout this article. The point at which we are likely to pause in our developments is the point at which a truly and fully interactive and interoperable system emerges.

Conclusion: Lessons Learned

There have been both positive and negative outcomes so far from York University Libraries' experience in building an in-house ERM versus paying for a commercial product. One of the best things about MULER is that it is truly customized and

customizable. It will only do what we design it to do and we can design it to reflect how we work at York. Perhaps more importantly, it promotes collaboration in that various librarians and staff members from different departments all use this tool to perform the work related to electronic resources. Whether it is a staff member who uploads records, a cataloger adding records, or someone trying to resolve a technical issue, all the information pertaining to electronic resources is kept and maintained in one place.

From a technical standpoint, MULER is very easy to maintain with the assistance of the Library Information Systems staff. We do not need to contact a vendor and wait for a response to fix the problem. Because our own people built MULER, they quickly respond to problems. MULER presents very few technical difficulties and is a very stable product.

Finally, MULER is easy to work with because we designed and built it to be simple. Those who were used to working with the eResource system experienced little learning curve since it imitated the commands. MULER is straightforward enough overall that virtually anyone can work with it with no formal training.

On the negative side, designing your own ERM means having a programmer on staff in order to build the system and to create enhancements later on. For the most part, librarians cannot simply design and build this type of system without significant collaboration time with an IT department. At York University Libraries we are fortunate to have great IT staff with whom to work, but this might not always be the case at every institution.

The other drawback to this process is the time investment required. Since we used in-house resources, we did not have to pay anything towards a commercial subscription, but we did have to make a significant investment of three months time from our programmers. Three months is a significant time investment compared to proprietary ERM options, with the exception of 360 Resource Manager, which reported an average of six to nine months to implement (Collins & Grogg, 2011). York's data migration took one month, slightly longer than the average implementation of other known in-house ERMs (Collins & Grogg, 2011). At York, our Library Information Systems department has many competing projects and few staff to complete them, so a project of this magnitude means less time spent elsewhere. Additionally, meetings with the Acquisitions Manager were held approximately every other week, representing six to seven hours of time. A cost-benefit analysis is a chief consideration in designing an in-house ERM.

Overall, the MULER experience at York has been a positive one. While it is not an ideal system, our in-house ERM is simple, flexible, and melds well with our daily workflows and tasks. If the librarians and IT staff at York had to do this process all over again, the Do It Yourself path is the one we would choose.

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