

The Open Library Environment Project

A project to reconceptualize technology for modern library workflows

NOTE: This project description is adapted from the proposal submitted to The Andrew F. Mellon Foundation. Some of the content has been modified or updated since the original proposal was submitted. Up to date information about project activities, participants and events will be maintained on the project website:

<http://library.duke.edu/about/projects/oleproject>.

1. Project description - June 14, 2008

Objective

With support from the Andrew F. Mellon Foundation, Duke University will lead a multi-national group of libraries in designing a next-generation library automation system. During the next twelve months, we will convene the academic library community in planning an open library management system built on Service Oriented Architecture (SOA). Our goal is to think beyond the current model of an Integrated Library System and to design a new system that is flexible, customizable and able to meet the changing and complex needs of modern, dynamic academic libraries. The design document we complete in July 2009 will be a blueprint to inform open source library system development efforts, to guide future library system implementations, and to influence current Integrated Library System vendor products.

Project rationale

The commercial Integrated Library System (ILS) market works on a software development model that does not meet the needs of modern libraries. Today's vendor-based ILS applications are built on technology that is 15 to 20 years old. The typical commercial ILS is a single product with sub-components for acquisition, cataloging and circulation of materials as well as an Online Public Access Catalog (OPAC). Some ILS's also include a component for Inter Library Loan. The initial goal of providing all library functions within a single, tightly integrated system was to increase efficiencies across different units of the library. However, a byproduct of the tight integration is a closed software system that is expensive to purchase and maintain and which imposes rigid workflows. Because the software code is proprietary, it is not easily amenable to customization by libraries. Although new technologies create better options for carrying out a library function, we cannot make changes inside the ILS. For example, there has been an explosion of electronic resources and digitization of special collections and archives since the typical library ILS was developed. To manage electronic resources, we either have to use old and inefficient workflows built into the ILS, or have to support dual systems for managing print and electronic resources.

Many libraries have implemented new enterprise student information systems, personnel directory management systems and purchasing systems since the current ILS systems were developed. Because patron data management and library materials acquisition tools

are locked within a proprietary ILS, libraries end up creating complicated processes for extracting data from those systems, reprocessing work inside the ILS, and then sending data back to the enterprise university business systems.

It is nearly impossible for a library to integrate its commercial ILS with tools outside the ILS, such as a course management system or emerging social-networking tools. Such a lack of integration with widely used tools is a very serious deficiency, because it makes it inconvenient for faculty and students to utilize easily the scholarly resources acquired or licensed by the library. A number of libraries cope with these problems by developing add-on components or by purchasing new ILS components and writing programs to connect them to the ILS. For example, in the past few years, many academic libraries have stopped using the Online Public Access Catalog that comes with their ILS and have implemented Endeca, Primo, AquaBrowser or other tools. These new search interfaces improve the user experience, but purchasing and implementing a second OPAC is an extra expense and an extra support burden on top of libraries' costs and support for the ILS. Although a number of new options have emerged for the Online Public Access Catalog, there has not been as much innovation in the other major components of the library management system. Furthermore, libraries do not want to have to repeat the strategy they have used with the OPAC, of purchasing an separate version of a library component, then spending time and effort to integrate that new product with their ILS. The work libraries do in trying to improve library workflows from outside of one proprietary ILS is not easily transferable to other ILS products or to other libraries trying to solve the same problems. The burden of maintaining and supporting existing ILS systems is hindering libraries' ability to respond to new technologies and to scholars' information needs and expectations.

Our project is driven not only by inadequacies in current ILS systems, but also by an awareness of the rapidly changing research information environment. The formats of the information libraries purchase, lease and support are changing quickly. The ways in which individuals use our collections are also changing. In varying rates per discipline, library collections are shifting from print to electronic and multimedia content. The sheer quantity of information continues to grow exponentially. Researchers require tools to assist them in navigating this new, ever-expanding information universe. Outside the library environment, information discovery tools exist that provide convenient access to large bodies of information. Libraries require tools of the same sophistication to deliver high-quality, scholarly content. As relevancy-ranked results, faceted navigation, and social networking features become commonplace in the new generation of library interfaces, we also need back-end systems better optimized to interoperate with the new search paradigms. Proprietary ILS systems with tightly interlaced components make it difficult to respond to these changes and force us to adjust our workflows and operations to accommodate older systems.

Mergers and consolidation in the library vendor business have already narrowed options and make it likely that libraries will have even fewer choices in future commercial products. Dissatisfaction with current ILS systems is widespread, as noted in a [recent survey by library automation expert Marshall Breeding](#). A total of 1,779 individuals from

47 different countries responded to the survey between August 8, 2007 and January 5, 2008. The vast majority were from the United States (1,484), Canada (125), and the United Kingdom (51). Many library types were represented, including 1,012 public, 512 academic, and 53 consortia. The survey found that there were differences in libraries' level of satisfaction with different companies' products, but "dissatisfaction and concern prevail."¹ Frustrated with the amount of staff time and resources devoted to installing, customizing and maintaining existing ILS systems, libraries are seeking a better alternative.

In January 2008, members of the project team posted an inquiry to several listservs to determine whether other libraries would be interested in exploring the design of an open source, SOA-based alternative to current ILS systems. Within a week, over 100 institutions had responded, representing libraries that are large and small, public and private, located in the U.S. and in other countries and using a variety of ILS products. We heard from professional organizations, consortia and libraries currently experimenting with open source systems. A common theme in the responses was dissatisfaction with current ILS products and concern about what choices would be available as current products reach the end of their lifecycle. The vast majority of responding institutions indicated strong support for exploring the design and development of an open source library management system built using Service Oriented Architecture principles.

Despite a torrent of positive response from many influential people and institutions, we also received a number of questions and skeptical responses, especially related to open source catalog projects already underway such as eXtensible Catalog, Evergreen and Koha. The theme in these skeptical responses was either that the problem had already been solved in other projects, or that the problem is too large to be manageable. We disagree with both of these responses. Current open source projects are a step in the right direction but do not address fully the total rethinking of library management systems needed by academic libraries. At the same time, the work underway is likely to reduce the amount of time needed for rethinking and designing a new approach to library automation.

Current open source projects do address aspects of the current limitations in commercial ILS systems, and thus offer an excellent starting point for planning for a complete open library management system. For example, Evergreen, originally developed by the Georgia Public Library System, has attracted the interest of other public library organizations, as well as some academic libraries. The software does follow a Service Oriented Architecture to a large extent, using Jabber as the messaging transport. As a system built for a large consortium of public libraries, Evergreen currently lacks some of the functionality required for university and research libraries, although we understand that work is underway to build modules such as acquisitions and serials for Evergreen.

¹ Breeding, Marshall. "Perceptions 2007: An International Survey of Library Automation." *Library Technology Guides*. January 9, 2008.
<<http://www.librarytechnology.org/perceptions2007.pl>>

We are optimistic that the open source projects now in progress will inform our work, and possibly lead to some convergence or joint activities in the future.

In follow-up conversations with individuals who responded to our original email, we found that a number of libraries are actively planning for the possibility of developing or implementing open source library system components and consider Service Oriented Architecture as a promising approach to the complexity of library system redesign. These libraries are investigating current open source library projects, but feel further articulation of a framework for a next-generation management system for academic libraries is necessary. They consider our proposed project an opportunity to connect with other libraries to facilitate the development of better options for academic libraries in the near future.

Our project focuses on addressing the gaps in services, functions and workflows that limit modern day libraries. We will address the need for a new type of library automation environment that from its inception addresses library collections composed of electronic and print materials, including the increasing proportion of rich media content. We will articulate a library automation environment designed to interoperate with business and content applications beyond its own borders.

We plan to use a Service Oriented Architecture approach for our planning. A Service Oriented Architecture is a way of thinking about software as a set of interfaces that can be called to execute a business function. A service is a function that is well-defined, self-contained, and does not depend on the context or state of other services. Services communicate with each other by passing data or by coordinating some activity. Components can be based on existing software or built from scratch. The service uses mappings to translate messages into the form required by the underlying technology. SOA utilizes 'loosely coupled' systems that expose their resources and content as independent 'services.' These services can be combined to create new systems and services.

SOA is a business methodology as much as it is a technology approach. Developing a Service Oriented Architecture requires business leaders and IT leaders to work together to create a high-level map of how the business should work. They deconstruct workflows, determine how a process should operate, and then define reusable services. These services encapsulate best practices, use standard definitions and can be coupled together into a total business management system. In the case of libraries, this means that individuals who know the functional requirements of the library (such as reference librarians and catalogers) would work with technical staff in the library (such as system administrators and interface developers) to develop the requirements of what is needed in a modern library management system.

SOA is becoming widely accepted as best practice in the IT industry. Using a Service Oriented Architecture approach can result in significant efficiencies, because it uses a common shared technical infrastructure. Such an infrastructure enables innovation

because business owners and software developers have a shared understanding of requirements and directions.

As the National Library of Australia has pointed out in its [*Digital Library Services Framework Strategy Document*](#), a Service Oriented Architecture has the potential to offer these advantages:

- Services developed once can be re-used in a range of applications.
- Enhancements to one service are immediately available for use by all applications using it.
- Interfaces can be easily established with third-party applications.
- Prototypes are easy to develop, supporting innovation and iterative development.
- Functionality can be tested through a web browser.
- Legacy systems can be supported until they are no longer required.
- Underlying technology may be easier to interchange without changing the applications.²

A new functional design of library automation software based on SOA should expose a much richer set of services through new discovery layer applications, e-learning environments, courseware systems, and social networking environments that have proven to be extremely difficult to integrate with the existing legacy automation systems. An SOA-based library system, for example, might make it easier for a library to change the discovery tools its patrons use as newer and better search systems evolve, while keeping the circulation, authentication and acquisition systems the same. Or, a library could develop or add a component that feeds lists of new resources directly to relevant course web sites in the course management system. An SOA-based library system could facilitate sharing collections and bibliographic data among libraries and be easier to manage and deploy.

While there are a number of new products emerging from the commercial sector and the open source community to improve the “front end” of library systems (discovery tools for users to search and retrieve information), less attention has been paid to the “back end” – the systems for acquiring, cataloging, and circulating library materials. We seek a discussion beyond that of the “look and feel” of new OPAC interfaces, beyond the integration of social networking features into our catalog interfaces, and beyond designing an open source version of the current commercial ILS. We propose to use SOA and business process modeling to move away from large, self-contained, tightly-bound ILS systems and to move toward a smaller, loosely-coupled, more distributed set of services. These services will integrate the business processes of libraries with the core business applications of the many organizations which consume and/or provide services to libraries. We hope to provide a more fine-grained set of controls for an increasingly electronic set of resources and collections. Our goal is a design that improves the user experience, creates efficiencies in library workflows, and improves the way that libraries

² National Library of Australia. "Digital Library Services Framework." Strategy Document. February 26, 2008 < <https://wiki.nla.gov.au/display/LABS/Home>>.

operate within their parent organizations. An SOA-based software system should give us more control over our systems and services, allow more rapid prototyping and help us take advantage of new technologies as they emerge. We expect that a more loosely coupled system will support smaller community-sourced systems development and provide new opportunities for vendor development. The result should be a more diverse and competitive software ecosystem. Our project will yield important information about the value of using an SOA approach to achieve our goals.

As we review our business processes and define the necessary services in a modern library system, we will address:

- Managing objects regardless of record format (XML, MARC, etc.).
- Ensuring that the functionality currently accomplished through a number of non-integrated systems, such as the ILS, link resolvers, electronic resource management, interlibrary loan, consortial resource sharing, institutional repository, digital collections management, and federated searching can be more efficiently integrated into a unified architecture.
- Designing a system capable of managing and providing access to the electronic full text of monographs and serials resulting from the mass digitization efforts of the Google Library Print, Open Content Alliance, and other initiatives. “Search inside the book” has become commonplace in the e-commerce arena; libraries need more advanced full-text discovery tools. As libraries collect and provide access to a growing amount of rich media, it will also become important to provide “search inside the video” or “search inside the audio” functionality.
- Implementing a Service Oriented Architecture approach to the management of physical inventory (holdings), acquisitions, and patron data.
- Exposing the data and related services to other search and portal systems.
- Searching multiple sources simultaneously with fast response time, returning result sets that include the inventory of the library, as well as items from subscriptions and other sources. A more flexible and modular structure may make it possible to utilize social tagging systems both to tag items in the library and to feed tags to the library system as meta information.
- Full integration of library websites and repositories with the library management system
- Designing an inventory system that facilitates the purchasing of materials; delivers materials, regardless of location and format; identifies the single “best” copy; and manages serials and digital collections.
- Facilitating license management activities for maintaining electronic resources, including the ability to incorporate and mine information from emerging XMP-based licenses, such as ONIX-PL and PLUS. (XMP, Adobe’s Extensible Metadata Platform, provides resource creators and distributors with the opportunity to provide resource level licenses for electronic resources.)
- Providing ways to define workflows with a number of automated metadata creation steps.

Although our project focuses on design rather than software development, we anticipate that our final document will be suitable for planning a second project to develop the proposed system. Our design document should make it possible to determine what components of an ideal Open Library Management System are already available, what components are under development by other projects and what components would require new programming. We would expect any future project to leverage software developed by other community-source projects. For example, we would hope to benefit from some of the infrastructure under development in such projects as the [Kuali](#) student and financial systems or the [OpenCollection](#) project. We also expect that projects such as the [eXtensible Catalogue](#), [Evergreen](#) and [Koha](#) will offer models that will make future software development easier than starting from scratch. Finally, we envision synergies with projects that would make our Open Library Management System far more functional than the ILS systems of today. For example, [Zotero](#) would expand options for collaboration, citation gathering and archival object discovery. The [VUE project](#) might connect with our system to provide better research tools for library users by bringing semantic web and visualization features to large library data sets.

II. Project participants

We have assembled a very strong project team representing libraries of different sizes, public and private institutions and varied U.S. and international locations. Partners were chosen for their ability to contribute to both functional and technical planning for community-source SOA projects and for their influence in the library community. All the partner institutions have excellent academic reputations and experience in library innovation relevant to this project. The project activities provide ample opportunity for individuals outside of the partner libraries to participate in the project. By working with a wide variety of people and institutions, we increase the likelihood that our design document will reflect the full range of library needs. Working with a diverse group will help solidify a community that is highly motivated and well prepared to continue into the development phase in a second project. The project team for a follow-on development project may include different institutions from those in this planning project.

Duke University Libraries is leading this project along with a small group of Core Partners. In keeping with the scope of our project, most of our Core Partners are academic research libraries. Two of the Core Partners add the perspective of national libraries and also connect us with academic libraries in Canada and Australia. Core Partners will actively participate in all phases of the project. They will identify readings and other resources to be used in the meetings and throughout the planning process, will construct meeting agendas and will lead meeting activities. Core Partners in the U.S. will host project meetings on their campuses and will document information generated during the project. Core Partners will serve as leaders in engaging other members of the library community in planning activities that take place between workshops. Finally, Core Partners will be responsible for writing the final project design document.

Advisory Partners comprise a second group of project participants. The Advisory Partner libraries include public and private institutions, large and small libraries, and consortia.

Several of our Advisory Partners have strong relationships with other libraries in their region, thereby extending the number of libraries participating in project activities. Advisory Partners will play an active role in shaping the direction of the project and the final design document, but will have less responsibility for project management. Advisory Partners will be well versed in project plans and project materials, will participate in at least two of the meetings, will actively contribute to planning conversations and will provide evaluative feedback on project plans and project work.

Both Core and Advisory Partners will be interacting with other libraries, universities and organizations throughout the project; these interactions will bring additional expertise and feedback into the process. Our model allows for the efficiencies and accountability of a small core team while also bringing in additional committed individuals to contribute to the full range of perspectives and to help with the volume of project work.

Participant Roles

John Little, Head of Duke's ILS team, and Jean Ferguson, Head of Research and Reference Services at Duke, will serve as co-leaders of this project. They have overall responsibility for planning and implementing project activities, coordinating the work of other project participants, communicating with project members and with the broader library community, documenting all project activities and ensuring that the final project design document is written and delivered to The Andrew W. Mellon Foundation on time.

Core Partners' responsibilities are to:

- Have the knowledge, skills and inclination to contribute actively in all phases of the planning project.
- Propose readings and other resources that will be useful in the workshops and throughout the planning process.
- Advise on workshop agendas and planning activities.
- Potentially host one of the in-person workshops by providing meeting space, making arrangements for food and on-campus transportation.
- Attend all (or most) in-person workshops; help lead activities during workshops.
- Help document information that is developed during the meetings and share that information through our established communications plan.
- Serve as a leader in engaging other members of the library community in planning activities that take place between workshops. Engage other institutions from the sector of the library community he/she represents to help with feedback and planning.
- Work on planning activities in between workshops.
- Provide some of travel and lodging costs for attending meetings.
- Help write the final project design report.

Advisory Partners' responsibilities are to:

- Read project materials; be well versed in project plans.
- Attend at least two workshops in person or participate in some virtual meetings.

- Actively contribute to planning conversations; suggest ideas; give evaluative feedback on project plans and project work.
- Provide critiques and advice in writing.

The Core Partners during the planning project do not need to be developers during the build phase. Likewise, individuals who have an advisory role during the planning phase might be key players in the build phase.

Core Partners

- Lynne O'Brien (Principal Investigator), Director of Academic Technology and Instructional Services, Perkins Library, Duke University
- Jean Ferguson (Project Co-leader), Head, Research and Reference Services, Duke University Libraries
- John Little (Project Co-leader), Supervisor of the Integrated Library System Team, Duke University Libraries
(Other participants from Duke University include:
Deborah Jakubs, Rita DiGiallorardo Holloway University Librarian & Vice Provost for Library Affairs
Linda Martinez, Librarian for Engineering, Math and Physics in the Duke University Libraries
Sean Chen, Senior Cataloging Assistant, in the Duke University Law Library)
- Marshall Breeding (Project Advisor), Director for innovative technologies and research, Vanderbilt University
- Beth Forrest Warner, Assistant Vice-Provost, Information Services, University of Kansas
- Mary Roach, Assistant Dean, Technical Services, University of Kansas Library
- Timothy M. McGeary, Senior Systems Specialist, Lehigh University Library
- Doreen Herold, Catalog Librarian, Lehigh University Library
- Michael Winkler, Director, Information Technologies and Digital Development, University of Pennsylvania Libraries
- Joseph Zucca, Director for Planning and Communication, University of Pennsylvania Libraries
- Warwick Cathro, Assistant Director-General, Resource Sharing and Innovation, National Library of Australia
- Carmel McInerney, Manager, Information Services, National Library of Australia
- Jim Clark, Chief, Legal Deposit Internet Unit, Library and Archives Canada
- Steve Sekerak, Applications Project Leader, Library and Archives Canada

Advisory Partners

- Kyle Banerjee, Digital Services Program Manager, Orbis Cascade Alliance
- Judith Nadler, Library Director, University of Chicago
- James Mouw, Assistant Director, Technical & Electronic Services, University of Chicago Library

- Bill Covey, Interim Director for Support Services, which includes responsibility for the information technology department and the Digital Library Center at University of Florida Libraries
- Michele Crump, Interim Director for Technical Services, University of Florida Libraries
- Marianne Gaunt, University Librarian, Rutgers University
- Grace Agnew, Associate University Librarian for Digital Library Systems, Rutgers University
- Katherine Gill, College Librarian, Whittier College
- Carlen Ruschoff, Director for Technical Services, University of Maryland
- Robert Wolven, Associate University Librarian for Bibliographic Services and Collection Development, Columbia University.

Background information about project participants

The **Duke University Libraries** are well prepared to lead this project. The Duke Libraries have a long history of working across institutional boundaries to explore new technologies and to lead planning for effective systems and services. Some examples of cross-institutional projects include the following:

- With the Triangle Research Libraries Network, Duke pioneered the nation's first consortial online catalog and recently introduced a new consortial front-end interface based on Endeca software. John Little's leadership in planning and implementing the TRLN interface project prepares him well to serve as technical co-leader of our proposed project.
- Duke recently worked with Dartmouth College in a planning project funded by The Andrew W. Mellon Foundation to explore the campus-wide management of digital assets. The Duke Libraries are working collaboratively with the Provost's Office, the Office of Information Technology, faculty and other groups to formulate a university strategy for digital asset management with input from a multi-institutional advisory board.
- Duke Libraries have an extensive record of using technology to integrate research, teaching and information resources. Jean Ferguson, who will serve as the functional co-leader of our proposed project, planned and implemented Duke's virtual reference services. Jean also worked with Public Radio International and the Duke iPod project to develop strategies for integrating new types of digital materials into libraries' collections and research services.
- Duke Libraries serve as functional leader for the Blackboard course management system. Library staff members have integrated electronic reserves and library research and reference services directly into the course management system. As libraries become increasingly integrated into the total fabric of teaching and research, direct experience with other enterprise systems, such as course management systems, adds valuable insights.
- Lynne O'Brien, who will serve as Principal Investigator on this project, is part of the leadership team for the Duke University Libraries. Lynne has nine years of experience leading major technology projects at Duke, such as the Duke Digital

Initiative and the Library's digital repository planning. Lynne founded the Center for Instructional Technology within the Library. The Center for Instructional Technology has had national visibility for leading innovative educational technology projects. In addition to directing the Center for Instructional Technology, Lynne also manages the Digital Projects Department in the Library, a group which develops tools and interfaces for accessing library resources, and the Scholarly Communications Office, which addresses issues of intellectual property, fair use and new forms of scholarly publishing. Lynne's work involves collaboration with multiple units at Duke, with vendors, and with other universities

The **University of Kansas** brings to this project a strong commitment and creative outlook to the management of scholarly and administrative data and systems. With an integrated Information Services division bringing together the Libraries and Information Technology, KU is able to bring both content and technical experts together to address issues and projects. In particular, KU has a long history of work in the arena of ILS and ILS-related functionality analysis and development. Over the past several decades KU staff have worked on a number of related projects including:

- expanding the capabilities of the current commercial ILS when feasible
- designing and developing a local cataloging and serials management system
- chairing a multi-institution collaborative project to design a distributed Interlibrary loan and Document Delivery system
- developing new methods of content delivery via the catalog including work on the Elsevier TULIP project and a UMI project to deliver journal articles from CD
- early implementation of a federated search environment that included the ILS and associated databases
- creating and selectively vetting an early proposal to develop an open source ILS based on an existing modified code-base
- participating in an invitational Digital Library Foundation effort to gauge interest in developing an open source ILS
- analyzing and designing a serials control module for a commercial vendor
- giving presentations on future directions for the ILS and electronic resource management including an American Library Association / Associations for Library Collections & Technical Services pre-conference and a presentation to Library of Congress staff
- developing and implementing a digital library program, including an institutional repository and an information management program with components addressing digital preservation, records management, data classification, and data security.

The KU staff who will be directly involved in the project are very active professionally in the Library and IT communities.

Project Advisor Marshall Breeding currently serves as the Director for Innovative Technology and Research for the **Vanderbilt University Libraries**. His research focuses on library automation and technologies used in the library environment. His work spans both high-level strategy and hands-on technical development. Breeding brings to this project:

- broad expertise on the software products currently available to libraries, their strengths, and limitations
- extensive knowledge of the current library software environment and an interest in exploring new models of automation
- an international reputation as an expert on library automation. Breeding has written extensively, is a frequent speaker at national and international venues on topics related to technology and emerging trends in libraries, has consulted with many libraries on issues related to technology strategies and project implementations, has authored six issues of Library Technology Reports published by the American Library Association's TechSource, including one on "Web Services and the Service-Oriented Architecture," and has written the "Automation System Marketplace" feature for *Library Journal* each year since 2002. He is a columnist for *Computers in Libraries*, and a contributing editor for *Smart Libraries Newsletter* published by ALA TechSource.

Timothy M. McGeary and Doreen Herold from **Lehigh University** have invested time, resources, and individual expertise into finding a solution that will catalog and administer electronic resources and subscriptions as effectively as the traditional integrated library system (ILS) has done for physical books and journals. Recent activities related to this project include:

- reviewing available electronic resource management (ERM) systems from a variety of vendors and analyzing the strengths and weaknesses of those systems.
- completing research using capital budgeting models to purpose an effective and objective way to analyze and optimize investments of electronic resources through usage statistics. McGeary published this work in volume 51, issue 4 of *The Engineering Economist* and is now designing a database and system architecture to efficiently display the results of the capital budgeting model for the use of Library collection management.
- working with technical services staff to catalog traditional and new electronic materials efficiently and effectively
- participating in an electronic resource management deployment team to manage the workflow process portion of the ERM system in addition to improving cataloging efforts through the integrated library system.

Lehigh University is a member of PALINET, a cooperative membership organization of libraries, information centers, museums and archives throughout Delaware, Maryland, New Jersey, Pennsylvania, West Virginia and beyond. Our Lehigh University participants are strategically located for reaching out to other institutions within PALINET for their input during the project.

Library and Archives Canada has the mandate of facilitating in Canada cooperation among the communities involved in the acquisition, preservation and diffusion of knowledge. As a Library and an Archive, the definition of a new business model for libraries and potentially other knowledge institutions is core to their mandate. LAC is currently embarking on replacing its legacy ILS and is perfectly positioned and motivated to advance the work of this group. LAC brings a number of strengths to this project, including the following:

- expertise as a national archive and representation of large libraries with their inherent complexities. By working with an organization with significant archives during our project, we have an opportunity to rethink the artificial separation between traditional libraries and archives. Many large academic research libraries have similar challenges in planning ways to integrate archives and special collections with electronic collections and presenting an integrated view rather than separate silos.
- implementation of Web Services and identifying a Service Oriented Architecture as a fundamental basis for its target application architecture.
- development of the first stages of an Open Archival Information System (OAIS). based Trusted Digital Repository and analyzing the integration with an ILS.
- potential to contribute significantly to both the planning and development phases of an Open Library Management System.

Library and Archives Canada will reach out to Canadian academic research libraries and may be able to host a regional meeting to work with those academic research libraries.

As with Library and Archives Canada, the **National Library of Australia** also has the capacity to reach out to academic libraries in their region and involve them in our project's activities. This expands our ability to connect with the international community while minimizing travel expenses. The National Library of Australia brings a number of strengths to this project, including the following:

- The NLA's strategic directions for information technology, as set in the report of its IT Architecture Group (<http://www.nla.gov.au/dsp/documents/itag.pdf>), include a commitment to a Service Oriented Architecture and a willingness to explore open source solutions;
- The NLA has developed a draft digital library service framework which will be of material assistance to this Project;
- The NLA has relevant experience in systems analysis techniques such as Business Process Modeling and Use Case Modeling;
- The NLA has recently successfully tested and deployed an open source solution (the VuFind interface developed by Villanova University) to provide a new version of its library catalogue; and
- The NLA has an active interest in the development of workflows to support the processing of original and archival collection material.

Over the last three years, staff members at the **University of Pennsylvania Libraries** have been developing skills in many of the target technologies outlined in the proposal including implementing the Java-based framework Glassfish and re-organizing their development efforts around a Web Services based architecture. Participants from the University of Pennsylvania Libraries bring many skills and advocacies to this project, including:

- pioneering efforts to integrate Web2.0 tools into the fabric of discovery with tools such as PennTags, a social bookmarking and annotation tool.
- investments in pursuing a more formal Service Oriented Architecture to support integration of legacy systems and community source projects. Penn's local developments are based on a tiered architecture that applies the development principles articulated in the proposal. Their developments of a Lucene / Solr based

digital library discovery system have given them direct and current experience with this type of enterprise-level application. Penn is also developing an event-based metrics capture protocol, metridoc, that uses a similar SOA approach.

- experimenting with Sakai as a collaborative research support system and, as a result, championing cross-institutional integrative technologies such as Shibboleth.
- managing and operating the University's Blackboard installation.

The Penn libraries' representatives are involved at the local, regional and national levels with innovative technology initiatives. Their participation in enterprise level planning at Penn as well as their activity in national projects will improve the integration of systems developed under this proposal with the development of Penn's enterprise applications.

Katherine Gill, College Librarian at **Whittier College Library**, and her staff bring to this project the perspective of a small liberal arts college and membership in NITLE, a network of independent not-for-profit colleges and universities. Recent activities relevant to this project include:

- researching and testing several open source library "products" and platforms.
- a hands-on working group composed of programmers, professors, librarians and a systems manager researching and testing alternatives to traditional ILS systems. Open source ILS and related issues (interoperability, shifting core functions, forwarding open source in a Microsoft campus environment, etc.) are of intense interest.
- discussions with NITLE to determine whether the use and/or development of open source library automation software could be a project hosted/supported by their D-Space program.
- experience working with LibLime to test exporting their catalogue into Koha and using federated search.

Project participants from **Rutgers Libraries** are prepared to contribute expertise in developing and supporting open source software for library applications. The Rutgers Libraries have been involved in numerous open source projects, including a statewide initiative to plan for an open source library system for academic libraries in New Jersey. Rutgers librarians and staff have researched available software, participated in an IMLS planning grant to the College of New Jersey on behalf of their state-wide consortium (VALE), examined the various options for open source and mounted the Evergreen software and tested it for their applications. After a recent state conference discussing options, Rutgers concluded that the effort needed to plan and develop a system useful for current and new applications needed to include a broader array of participant institutions. Rutgers Libraries are prepared to engage in that broader planning and brings these experiences to the proposed project:

- Rutgers' FEDORA developers are engaged in several local, statewide, and national efforts. Rutgers was the key technology architect and principal investigator on an IMLS grant to develop a statewide repository for resources related to New Jersey entitled the New Jersey Digital Highway (NJDH). The same repository infrastructure was used to develop the Rutgers University institutional repository, RUcore, and expanded to include a workflow the university now uses to manage the submission, reporting, preservation, and access of digital theses and dissertations.

- The Libraries are currently partners in an IMLS grant for the NJVid, a statewide video-on-demand repository to house and deliver "lectures-on-demand," licensed commercial videos, and locally owned videos. The project will also develop a statewide Shibboleth-based Identity management infrastructure, supporting statewide network authentication and authorization that can be used for many content resources.
- Rutgers currently has two grants related to the Library of Congress for open source projects. The first is the Moving Image Collections (MIC) catalog to the world's video collections that was funded by the NSF and hosted by the Library of Congress in partnership with the Association of Moving Image Archivists. The second is a grant from LC to customize the workflows management system (WMS) for Rutgers' Fedora repository for LC's applications. The Getty Foundation has provided a grant to develop the directory infrastructure that Rutgers is now using for the Women Artists Archive National Directory (WAAND), an open source web directory to U.S. archival collections of primary source materials by and about women visual artists active in the U.S. since 1945.
- The University is a major user and developer of the open source Sakai software for course management purposes, and the Libraries use it for managing committee collaboration.
- Rutgers has strong ties with other academic libraries in New Jersey and is planning to work with those libraries throughout this project.

Through his work with the **Orbis Cascade Alliance**, Kyle Banerjee brings to the project the perspective of a consortium of 35 public and private colleges and universities in Oregon and Washington that collectively serve over 200,000 FTE. Many academic libraries are part of consortial arrangements; we need library management solutions that are designed for this environment. Working with the Orbis Cascade Alliance gives us the opportunity to understand that environment and develop plans that respond to it.

The Alliance has many programs, but one of the most successful is resource sharing within the consortium. The Alliance's need to manage diverse resources as a single unified collection cannot be satisfied with a "black box" solution designed not to work with other products. The Orbis Cascade Alliance recently announced that it is migrating its union catalog from a proprietary system to a consortial borrowing solution that includes a next generation discovery layer and standards-based delivery platform. This new system will provide efficient resource sharing and provide the cross-platform functionality needed to expand and improve services. It will also provide Alliance members with more flexibility in local technology decisions to serve local needs.

The Orbis Cascade Alliance has a number of talented programmers who may be able to help construct modules during a later build project.

The **University of Florida Libraries** will participate on their own behalf and as a representative of consortium of Florida state university libraries that includes 11 universities and the Florida Center for Library Automation (FCLA). Several years ago, the state university libraries migrated from an ILS that was developed by FCLA to the Ex Libris platform. The University of Florida representatives to our proposed project--Bill

Covey, Interim Director for Support Services, and Michele Crump, Interim Director for Technical Services--participated in the decision to suspend development of the in-house system and procure a commercial one, the requirements development and procurement process, and the installation and workflow changes necessitated by the transition to the new system. They can both assist in developing requirements for a new, more comprehensive system and share the lessons learned from both in-house and procured solutions. Covey and Crump will make available the views and experience of other individuals within the Smathers Libraries, FCLA and the other state university libraries.

The **University of Chicago Libraries** brings to this project a long history of working closely with Integrated Library Systems specifications. In 1971, with Council on Library and Information Resources (CLIR) funding, work began on the mainframe based Library Data Management System that was eventually implemented. In 1995 the library became a development partner with Ameritech Library Services for the client server based Horizon system and continued to beta test new releases of that system until becoming a development partner with Dynix in 2004 for the n-tier based Corinthian system. With the vendor's decision not to complete that system, the library is currently investigating options including participation in a gap analysis of the open source Evergreen system in conjunction with the CIC libraries. The University of Chicago Libraries employ creative approaches in working with their current ILS as they add functionality needed for their operations, and are committed to investing in technology that is well positioned for the future. A recent example of this commitment is their successful implementation of a new search engine using MediaLab Aquabrowser technology. This system brings together information from many diverse sources, including the ILS, SFX, Metalib, library web pages and archival finding aids, while also providing enhanced content from Syndetic Solutions, and outward links to Google content including books digitized by the Michigan Google project.

The **University of Maryland Libraries** bring diverse experiences with library initiatives and library management to this project including:

- Multi-institutional library technology planning. The University of Maryland Libraries have fiduciary and technical responsibility for the libraries of all four year public educational institutions in Maryland and can bring the diverse perspectives of those organizations into project planning.
- Early implementation of Shibboleth to improve the integration of library services and improve user access to library materials
- Large scale digitizing efforts and experience building a digital repository based on the open source Fedora and DSpace platforms
- Ability to draw on the University of Maryland's experiences as a founding member of the community source Kuali Student Service System.
- A deep understanding of acquisitions processes, the evolving cataloging standards, and the life cycle of electronic resources.

The **Columbia University** Information Services has extensive experience working with both commercial and open source software for library applications, and is especially interested in the integration of open source applications with vendor-supplied

components. Columbia was a development partner for Endeavor's Meridian e-resource management module, and a pioneer in implementing Shibboleth authentication for access to EBSCO e-resource offerings and for OCLC's hosted ILLIAD service. Bob Wolven, who will represent Columbia during this project, has been a member of the Steering Committee for the Digital Library Federation's ILS-Discovery Interface Task Force, which has worked on generalized specifications for applications to connect resource discovery systems with delivery services. Columbia has had considerable experience working to integrate data and services from multiple vendors (SFX, SerialsSolutions, Voyager, etc.) and has a strong interest in open systems and open data. Rob Cartolano, Director of the Library Information Technology Office has extensive experience through Sakai in working with an open-source community.

Columbia's Information Services organization integrates traditional library service components with well-supported units covering support for educational technology (the Center for New Media Teaching and Learning), research (the Center for Digital Research and Scholarship) and digital library services (the Libraries Digital Program Division.) This organization illustrates the need to view future library systems as embracing a wide range of processes, resources, and agents. Open systems will be essential to integrating services across these components.

III. Activities and timeline

Our project has an ambitious goal: the development of requirements for a business automation environment based on a thoroughly re-examined model of library operations. Our project activities allow for broad input and thorough discussion, while ensuring that the project scope is manageable and that a useful design document is completed on time. We have already begun conversations with our Core and Advisory Partners concerning the scope of the project and the process for developing our design document. Many of the key project participants have already done some workflow analysis; some already have skills in Service Oriented Architecture approaches; all are highly motivated to move briskly toward identifying the most critical services and producing a design document within a tight time frame. We also have consulted Thomas Erl and Robert Schneider of [SOA Systems, Inc.](#) to ensure that the project activities are appropriate for our goal, and that our timeline is realistic. Schneider is currently working with the [OpenCollection](#) project and will be leading several of our work sessions.

Project leaders will pay careful attention to ensuring that higher-level workflows are described for all the major aspects of library operations. Once these higher-level workflows have been established, more granular operations can be described, down to the level of individual services that can be technically formulated. The progression from higher-level conceptual work down to individual services should result in an organizational approach where project participants can complete their work within the project timeline.

To keep the project scope manageable, we will focus on those services which meet a common need and which will be attractive to a wide set of developers for future programming. Initial discussions with Core Partners produced agreement that some service candidates (identity management, procurement transactions) are likely candidates for development outside this project. More common functional needs (archives management, collection services and metadata services) will become the focus of the progressive meetings and candidates for further description. Although some participants will have distinctive needs, they will individually resolve these needs using skills developed through the project but outside of the common goals.

By including a wide variety of participants in discussions, we increase the likelihood that the blueprint we develop will be suitable for different types of libraries. However, workshops will primarily be led by representatives from academic libraries and will be directed toward meeting the requirements of academic libraries in higher education. The academic libraries involved in this project have sufficient leadership skills and resources to ensure that the final design document will serve their needs well. Several of our project partners have some training in Service Oriented Architecture and/or with open source software development. That experience will be very useful to us as we move through a fast-paced project. At the same time, we are committed to a full discussion of needs and workflows and to careful development of the final system design. After discussion with our project partners and the SOA System Inc. consultants, we are confident that we can achieve our project goal within the stated timeline.

Our formal project work begins with an **initial meeting** where Core Partners participate in SOA training, team building and project scoping activities. We will work with Robert Schneider, Senior Instructor and Consultant from SOA Systems Inc. This consulting firm has provided SOA training to other Mellon-supported community-source projects. This first workshop will consolidate the planning and discussions already begun and ensure that we have a shared understanding of what we will produce and what common techniques we will use.

Our **second meeting** focuses on sharing our project goals, scope and process with the full library and academic community via a webcast presentation with a question and answer session. We will recruit an audience that includes librarians, higher education IT professionals and library automation vendors. The second meeting will provide a clear explanation of what we will produce and how individuals who are not project partners can have input throughout the project.

Our **third meeting** brings Core and Advisory Partners together for training in business process modeling. After this meeting, project participants will convene working groups (either virtual or in person) in their home institutions and geographical regions to conduct library workflow analysis and produce a set of business process specifications. We will have a number of project groups working in parallel to identify library business processes and services needed in a next generation library management system.

Core Partners will be responsible for ensuring communication among the different project groups and documenting the groups' work. We will share the results of the project team work with the full community through another webcast presentation and discussion. This webcast will generate feedback on the business processes we have defined and will continue to develop community understanding of and buy-in for the final product.

Our **fourth meeting** will bring Core and Advisory Partners together again for Services Oriented Architecture training. Participants will carry out a service-oriented analysis during which a previously defined business process will be decomposed and modeled into a series of service candidates. Core and Advisory Partners will return to their own institutions to conduct workflow analysis.

During the **fifth meeting**, the SOA consultant will work with the Core Partners for three days to apply SOA to work flow analysis. Core Partners will remain on-site for two more days to develop some design documents which would be refined and incorporated into the final design document. Core Partners will clearly define the remaining design work that needs to be done and return to their home institutions to complete those tasks.

After completing the design work, Core Partners will organize a final webcast to share their work with the library, IT and higher education community.

Core Partners will then utilize the feedback from the webcast and from Advisory Partners to consolidate work done into a full draft of the requirement document. Although listed as a **sixth meeting** in the schedule of activities, this final consolidation is likely to take place through a series of collaborative document editing sessions, phone conferencing and videoconferencing.

We also will post a draft of our proposed design document for community comment before we submit the final version at the end of our project.

A timeline of these project activities is presented below.

Pre-project activities (September 2007 - present)

- Review of literature
- Research on Evergreen, Koha and other relevant projects
- Email inquiry to other schools about level of interest
- Development of short term and long term communication strategy.
Communication activities will include a website and a listserv or blog. We will ensure continuing contact with the library community through participation in professional groups and presentations at conferences. Specific examples include planned presentations by Duke staff at JA-SIG and SOLINET in Spring 2008.
- Development of grant proposal to The Andrew W. Mellon Foundation
- Identification of Core Partners and Advisory partners

Meeting 1

Initial Service Oriented Architecture training and project planning for Core Partners

Purpose: Overview of Service Oriented Architecture for Core Partners.
Team building. Establishment of communication strategies and work process. Clarification of project scope and final product.

When: September 2008

Participants: Core Partners (15 people)

Location: on-site at Duke University

Duration: 2 day

Leader: Senior Instructor and Consultant from SOA Systems Inc.

Activities: 1 day facilitated workshop on Service Orientated Architecture
1 day group team building and planning activities

Follow up: Summarize key ideas and document on project portal
Write up concise scope document
Develop agenda for meeting 2
Develop outreach strategy for ensuring good participation in webcast

Meeting 2

Community discussion of scope and project process

Purpose: Gather ideas from a wide range of libraries, IT specialists and other organizations about the most pressing needs and components required in an Open Library Management System for academic libraries. Build an understanding of the Community Source model for developing an SOA blueprint of an Open Library Management System. Provide overview of project process and opportunities for participation.

When: October 2008

Participants: Core and Advisory Partners, general library, academic IT and vendor community

Location: Virtual. Hosted by Duke, technical set up by Duke

Duration: 2 hours

Leader: Core Partners

Activities: Send out project rationale statement in advance along with several articles and key discussion questions
Host live webcast. (Note: Marshall Breeding will be at Duke for the webcast.)
Record all comments
Allow one week for follow up comments

Follow up: Core Partners summarize main ideas and issues and post to project portal.
Invite all webcast participants to validate summary.
Send summary to SOA consultant and Business Processes Modeling Consultant to aid in planning remaining workshops.
Invite ongoing communication via project portal.
Develop agenda for Meeting 3.

Meeting 3

Business Process Modeling workshop

- Purpose:** Training in business process modeling.
IT Analysts and business analysts will work together to identify business processes associated with existing library businesses and workflows as well as those needed in a next generation system.
- When:** November, 2008
- Participants:** Core Partners and Advisory Partners representing both functional and technical/architecture roles (25 people)
- Location:** Core Partner Institution
- Duration:** 3 days
- Leader:** Business process modeling consultant
- Activities:** Facilitated workshop on Business Process Modeling. Decide on specific tasks for each participant group to complete before next meeting.
- Follow up:** Core Partners document work completed in the meeting and post analysis on project portal.
Core Partners and Advisory Partners take specific assignments back to home institutions and convene work groups to further define business process models.
Core Partners hold webcast to share workshop work with general library, academic IT and vendor community.

Meeting 4

Service Oriented Architecture training and library workflow analysis

- Purpose:** Develop understanding of SOA among Core and Advisory Partners.
Building on output from business process modeling activities, participants will carry out a service-oriented analysis during which previously defined business processes will be iteratively decomposed and modeled into a series of service candidates.
- When:** January 2009
- Participants:** Core Partners plus Advisory Partners (25 people)
- Location:** Core Partner institution
- Duration:** 3 days, in-person
- Leader:** Senior Instructor and Consultant from SOA Systems Inc.
- Activities:** Train attendees in service-oriented analysis and service modeling.
Develop standard way of documenting service profiles. Practice assembling service candidates into composition candidates. Assign participants specific analysis and modeling tasks to do before the next meeting.
- Follow up:** Core and Advisory Partners conduct work flow analysis at their institutions and document their work in a standard format.
Core Partners summarize main ideas and issues and post to project portal.

Meeting 5
Design work

Purpose: Finalize workflow definitions. Apply SOA to workflow definitions.
When: February - March 2009
Participants: Core Partners (15 people)
Location: Core Partner institution
Duration: 5 days, on-site
Leader: 3 days with facilitator from SOA Systems Inc.; two days with Core Partners on their own
Activities: The first three days of this meeting will be continued facilitated training and practice on how to apply SOA to workflows. During the remaining two days, the Core Partners will work to develop some design documents which would be refined and incorporated into the final design document.
Follow up: Core Partners divide up remaining work to complete at their home institutions.
Core Partners hold webcast to share workshop work with general library, academic IT and vendor community

Meeting 6
Develop draft document of Open Library Management System requirements

Purpose: Consolidate work into a requirements document
When: April/May 2009
Location: Virtual
Duration: Several weeks / virtual
Leader: Core Partners
Activities: Identify small group of writers to create draft
Circulate documents via email and on-line tools
Hold video or web conference with full core group to discuss draft
Small group finalizes draft
Circulate to Advisory Partners for review and comment

Publish draft version of document for public comment

When: May 30, 2009
Post draft document for public review. Provide 4 weeks for public comment.

Create final Open Library Management System document

Drawing on comments, finalize the Open Library Management System requirements document
When: Mid-July, 2009

Create and send final project report to The Andrew W. Mellon Foundation

When: July 30, 2009

Send final report, including the Open Library Management System document and description of project activities and budget accounting to The Andrew W. Mellon Foundation to close out grant requirements.

The final report will be a set of detailed functional requirements and proposed development strategy that can serve as the basis for a second proposal for funding a software development project.

IV. Assessment

Our assessment benchmarks are:

- Project activities were completed (e.g., all meetings and workshops were held, final document was written)
- Library community was involved in the process (participants gave presentations that drew feedback from others, representatives from a range of academic libraries participated in meetings, multiple individuals provided feedback on our draft document)
- Design document demonstrates clearly whether an open source alternative to ILS is feasible and desirable (clear response from libraries, vendors, others indicating whether we should move forward on a proposal to carry out the design document).

V. Summary

Through this project we will convene representatives from across the academic library community to design a new library system that is flexible, customizable and able to meet the changing and complex needs of modern, dynamic academic libraries. By the end of our project, we will have a design for a next-generation library system using Service Oriented Architecture. We also will have built a community of interest that could be tapped to help build this system.

Appendix: Respondents to initial inquiry about project

Individuals from the following schools provided comments on our initial posting about the proposed project for creating an open source, community-drive library management system.

Association of Southeastern Research Libraries
Auburn University
Boston College
Boston University
Canada Institute for Scientific and Technical Information
Case Western Reserve University
Center for Research Libraries
Clemson University
CLIC Consortium
College Center for Library Automation
Connecticut College
Cornell University Library
Creighton University
Dartmouth College
Departamento de Contenidos
Embry-Riddle Aeronautical University
Florida Center for Library Automation
George Washington University
Georgia Tech Libraries
Gonzaga University
Harvard University
Imperial College London Library - England
Indiana University
Institute of Museum and Library Services
JA-SIG
Laurentian University
Lehigh University
Luther Seminary Library
McGill University Library - Canada
McMaster University - Canada
Michigan Technological University
Middlebury College
MINITEX Library Information Network
Minnesota State University
MIT Engineering & Science Libraries
MuseGlobal, Inc.
Nash Library/University of Science and Arts of Oklahoma
National Archives and Records Administration
National Library of Australia
New Jersey Institute of Technology
New York State Library
North Carolina State University
Northeastern University
OCLC
Old Dominion University Libraries
Open University Library, UK
Orbis Cascade Alliance
Pacific Lutheran University
PALINET
Penn State University
Pittsburg State
Princeton Theological Seminary Library
Princeton University
Purdue University
Rice University
Rowan University
Rutgers University Libraries
Sheridan Libraries/Johns Hopkins University
Smithsonian Institution Libraries
St. Cloud State University
Stanford University
Stellenbosch University – South Africa
Texas A&M University
U.S. Geological Survey
U.S. Library of Congress
University Central Florida
University College of Bangor - Maine
University of Alberta - Canada
University of Amsterdam - Netherlands
University of British Columbia - Canada
University of California, Riverside, Libraries
University of Central Florida Libraries
University of Chicago
University of Chicago/South Asia Union Catalogue (SAUC)
University of Colorado at Boulder
University of Denver- Penrose Library
University of Florida at Gainesville
University of Hull - England
University of Illinois at Chicago
University of Illinois GSLIS
University of Kansas
University of Kentucky
University of Louisville
University of Manitoba - Canada
University of Maryland
University of Massachusetts at Dartmouth
University of North Dakota
University of Notre Dame
University of Oregon at Eugene
University of Pennsylvania
University of Pittsburgh
University of Portugal Library
University of Tennessee
University of Utah
University of Utah Libraries
University of Virginia
University of Virginia Charlottesville
University of Washington
University of Wisconsin Madison Libraries
University of Wisconsin Wendt Library
University of Zambia Library - Zambia
Utah State University
Villanova University
Wake Forest University
Washington University, St. Louis
Whittier College Library
Wingate University
York University Libraries - England