Provision of Digital Library and Scholarly Communication Services in the Academic Library

I.   Introduction

There has been a great deal of discussion in the library literature about new roles for academic libraries in support of a broad range of research life-cycle activities (Libraries, U. of M., 2006; Gilman, 2010; Belzowski, 2013). By taking advantage of processing efficiencies, Oregon State University Libraries and Press (OSULP) was able to provide services related to the publication and dissemination of university research and unique university resources using resources formerly dedicated to traditional technical services. This new role is an opportunity for libraries to provide value relating to the cultural heritage and scholarly endeavors of our communities. OSULP and many other academic libraries, beyond serving as gatekeepers of knowledge, are increasingly becoming collaborators in its creation, dissemination, and preservation.

The University of Minnesota Libraries, in a 2006 report, analyzed and described a range of library services pertaining to research activities "in which scholars were regularly and consistently engaged," including those relating to publication and dissemination. They used a model developed by Unsworth that describes the research process in terms of "scholarly primitives" or categories of research activity that include "Discover," "Gather," "Create," and "Share" (2000). Libraries have traditionally not provided support for activities that fall within the "Share" category of the research process, activities that include: "all aspects of dissemination: participating in conferences and scholarly meetings; publishing; teaching; sharing data, ideas, resources, drafts, and completed works. Issues of intellectual property and copyright are especially important, as well as all activities scholars undertake while preparing reports, theses, presentations and manuscripts: identifying high impact journals, conferences, and publishers, and all the protocols

and procedures for successfully disseminating one's work (Libraries, 2006)." In this paper, the author describes new digital library and scholarly communication services that an OSULP department, formerly responsible for traditional acquisitions and cataloging technical services work, provides. The author describes the goals of the library in these areas and discusses the organizational and staffing changes that were necessary to provide this suite of new services. These services and activities have been in place for some time now and may prove instructive for other academic libraries around the world that are interested in engaging in these still emerging areas of librarianship.

Oregon State University is located in the small town of Corvallis, Oregon, in the Pacific Northwest of the United States, with a population of around 55,000 people. Oregon State is an international public research university with currently over 31,000 students enrolled in 200 undergraduate and 100 doctoral and masters graduate degree programs at 3 campuses. Areas of emphasis include programs of research and study in Engineering; Agricultural Sciences; Earth, Ocean, and Atmospheric Sciences; Forestry; Business; Public Health; Natural Sciences; Pharmacy; Veterinary Medicine; Social Sciences; and the Humanities. OSULP includes libraries at three locations across the state of Oregon. They hold over 2 million volumes and subscribe to nearly 70,000 journals and 360 databases. OSULP employs 50 library faculty--at OSU the library faculty, practicing librarians, are tenure-track with the same promotion and tenure process as other faculty of the university, 50 paraprofessional staff and well over 100 student workers.

II. New and Emerging Digital Library Services

Providing increased access to university research and cultural heritage materials and preserving those digital objects are goals found throughout the library's strategic plans over the last 15 years (Image 1). Emphases of these plans have

included ensuring staff support for implementing (although not maintaining) this digital library work. OSULP achieved success over the years in digitizing a large number of unique collections of cultural heritage materials and OSU scholarship, building a digital collections repository and an institutional repository for faculty and student research in the form of research articles, conference proceedings, research datasets, theses and dissertations, university publications, and technical reports.

The work involved in creating digital collections and developing the institutional repository became core services provided by the library. The most recent strategic plan builds on this work by focusing on making the content stored, described, and available in the open access repositories visible and usable specifically to citizens of the state of Oregon. Doing so promotes the use of the content. The plan also promotes partnering with faculty and academic units to create and disseminate research of the university. Preservation of this digital content so that it is available to current and future generations was also established as a library priority (Image 2).

The Center for Digital Scholarship and Services (the Center), established in 2010, combined existing metadata, repository, and discovery services that were already happening in a technical services, then a digital access services department, with related and emerging scholarly communication-related services (Table 1). New services provided by the department with the creation of the Center include data management and open access publishing. Copyright and fair use support services and training, promotion of open access on campus, and implementation of an open access policy that was passed, largely as a result of the promotional and day-to-day institutional repository related work of the department, by the university's faculty in 2013 are other services with which the department was engaged. Each of these services are briefly summarized below.

Digitization and Digital Collections

It is possible to do a lot of scanning without spending a lot of money on equipment. OSULP began by using a flatbed scanner to scan photographs and slides. Sheet-feed scanners including the one pictured below were responsible for the efficient scanning of textual resources such as theses and dissertations that were disbound and later stored in archival envelopes (Image 3). OSULP established a video digitization program, necessary because the library's most at-risk resources are films and videos (Image 4).

Every masters thesis and doctoral dissertation, as well as masters level final research projects and most of the university's official undergraduate theses are now digitized or available as born digital resources in the institutional repository. Every publication in the entire history of the Extension and Experiment Station Communications office at OSU from the 19th century to the present, consisting of over 10,000 publications, is now available open access from ScholarsArchive. OSULP has digitized thousands of natural resources gray literature publications and out of print and in the public domain books and technical reports, and conference papers and proceedings.

OSULP engages in broad-scale digitization of unique archival and cultural heritage materials housed within the university archives and special collections of the library as well as content from other university collections and museums. This includes digitization of archival photographs, photographs of unique botanical type specimens, digital representations of fine art, maps, and rare books and manuscripts. OSU and the University of Oregon shared in the development and management of a digital content management system called OregonDigital which uses the open source Samvera/Fedora repository system developed at Oregon State, Stanford, University of Hull, University of Virginia, Princeton, and others.

One digital collection example exemplifies the reason that libraries are well-positioned to engage in this work. OSULP worked with the OSU Herbarium to digitize the original collected Oregon plant specimens in their collection along with the original descriptions of those specimens that appeared in scientific horticultural and botanical journals (Image 5). The Herbarium was interested in working with the library because they recognized the library's cataloging and metadata expertise, the library's commitment to standards and preservation, copyright expertise, and the ability to access the scientific articles associated with the original specimens.

Institutional Repository

In the spring of 2005, Oregon State University Libraries launched ScholarsArchive@OSU, a digital service for gathering, indexing, making available and storing the scholarly work of the Oregon State University community. The repository also includes materials from outside the institution that support the university's land, sun, sea and space grant missions and other research interests. The site's URL is http://ir.library.oregonstate.edu/. The library developed this service with two primary aims: to develop a digital collection of scholarly materials produced at OSU by OSU faculty, staff and students and to gain more visibility for that research. Content includes faculty articles, conference proceedings, technical reports, working papers, datasets, and theses and dissertations. ScholarsArchive@OSU uses open source software that ensures that resources are preserved and remain accessible in perpetuity.

Collecting these materials in ScholarsArchive@OSU increases their visibility. Research articles deposited in ScholarsArchive@OSU are indexed and accessible via Google and Google Scholar and appear alongside other library resources from the libraries' discovery system. Theses and dissertations provide a good example of how research visibility increases when the materials are deposited to

ScholarsArchive@OSU. Student theses and dissertations, added to ScholarsArchive@OSU continuously since 2005, have been downloaded over 11 million times.

Metadata Harvesting

OSULP seeks to identify, crosswalk, and reuse existing metadata as much as possible, and do metadata enhancement only as necessary. OSULP was able to automate the generation of Qualified Dublin Core metadata records from existing MARC records in our online catalog system and vice versa, we were also able to generate MARC format bibliographic records for theses and dissertations in the institutional repository and map those into the OCLC WorldCat bibliographic utility and into our consortial shared catalog (Deng, 2009). We were also able to automate the generation of journal article records from existing publisher metadata contained within Crossref. So, rather than requiring metadata technicians or faculty depositors to manually create metadata OSULP was able to reuse existing sources of metadata (Boock, 2016).

The Oregon Explorer is a natural resources digital library created by the library in partnership with the state of Oregon's Institute for Natural Resources. It allows anyone on the internet to access information in 7 comprehensive topic areas: 1) animals and plants; 2) climate, water, and air; 3) coast, ocean, and marine; 4) forestry and agriculture; 5) land use and planning; 6) landscapes and ecosystems; and 7) people and communities. It includes datasets, reports and publications, photos and multimedia, maps, and other resources. Users can access content by browsing by those categories, searching, or using a map interface. The digital library harvests metadata from repositories across the state, including universities and state agencies, using the Open Archives Initiative Protocol for Metadata Harvesting (Image 6). So long as a digital repository uses this protocol, OSULP is able to harvest the metadata from the repository, index it in the digital library, and

make the resources available alongside OSULP resources. OSULP uses this same protocol to harvest metadata from digital repositories into the library's discovery system, so patrons are able to use the discovery system to find not only books and articles held or licensed by our library but the digital resources that reside in the library's repositories.

Research Data Management

A variety of research datasets, primarily those that are associated with student theses and dissertations and faculty articles, are housed in the ScholarsArchive@OSU institutional repository. OSULP works with faculty and graduate students to provide support for the creation of data management plans now required by funding agencies and provides training and support for metadata creation pertaining to research datasets. The library helps faculty and students on campus with intellectual property related questions about what they can do with others data, what they can do with their own data, and what others can do with their own data. OSULP is in the process of developing a web-based tool that walks users through the process of finding answers to these questions.

Open Access Publishing

With the University of Oregon, OSULP established an open access journal publishing service using the Open Journal Systems open source software. The two libraries provide support to OSU and UO faculty and departments for the creation, distribution and preservation of open access journals, including the migration of existing journal content from print to digital form and from other subscription-based publishing platforms to open access.

I find the example of the "Catalog: Oregon State Arthropod Collection" publication to be an especially interesting use case. The curator of the Arthropod Museum collection at OSU was interested in finding ways to ensure that he and his staff were given credit for what he (and I) consider to be scholarly contributions,

even if those are not traditional scholarly contributions. In the field of botany, entomology, and other biological disciplines, the 'attribution' and citation of 'specimens' and related scholarly 'curatorial' work has not been established. The editor of this open access "journal" provides documentation of this work, shares the curatorial work with other interested curators around the globe, and provides evidence of its impact based on download numbers and citations (Image 7).

Open Access Promotion and Implementation/Copyright and Fair Use

In 2013, the OSU faculty senate passed an open access policy that requires faculty to deposit a copy of their research articles in the ScholarsArchive@OSU institutional repository. My department has engaged in a variety of open access promotional efforts on campus over many years, from working with the Graduate School to require deposit of electronic theses and dissertations to the institutional repository to working with university publishers to make their publications available in the repository. The Center also helped faculty and students understand open access publishing options, and provided assistance in the negotiation of copyright for their publications. Training and workshops are provided in these areas as well.

III. Organizational Realignment

A number of organizational shifts and realignments took place in order to initiate and sustain this new work of our library. When I arrived at Oregon State University in 2003, I oversaw what was then called the Technical Services department which included many typical backroom functions of libraries such as the acquisition, cataloging, processing and preservation of physical materials. As the responsibilities of the department shifted increasingly to the management and development of digital, our department name has changed to reflect this new focus and these new areas of responsibility.

One of the great advantages of doing the work of digital collection building in what were formerly Technical Services and Cataloging units is that staff with cataloging expertise and a familiarity with the importance of standardization could be transitioned to take on the work of metadata creation and repurposing of existing metadata for our digital collections and repositories. Paraprofessionals and Librarians formerly responsible for tasks such as cataloging, binding, serials check-in, serials claiming and cataloging have been trained and transitioned to digital scholarship related activities such as metadata assignment and enhancement, digitization preparation and oversight, deposit of materials to digital repositories, student scanning supervision, and other tasks. In addition to continuing to have responsibility for traditional cataloging and metadata services, staff were able to transition to organizing and preparing materials for digitization projects. They provide metadata services to campus, provide workshops and training to campus on areas of their responsibility, and provide consultation on metadata issues.

Over time, subject liaisons and bibliographers primarily responsible for collecting in their areas of responsibility and working at the reference desk increasingly transitioned to digital project support positions. As librarians and staff retired, their positions were often repurposed. New positions within the Center include: Metadata Librarian (formerly serials cataloging librarian); Digital Applications Librarian (formerly maps librarian); Programmers (funded from former staff positions); Metadata Specialists (former cataloging staff); Data Management Specialist (new position funded by the university); Scholarly Communications Librarian (formerly a cataloging and materials repair staff position).

IV. Conclusion

In the future, librarians and staff throughout the libraries will continue to engage in campus and community outreach to identify sources of content for digitization.

OSULP is especially interested in working with museums on campus to catalog and digitize their resources and make them available in the digital repositories. OSULP continues to digitize unique archival materials in the form of manuscripts, photographs, and audio-visual materials housed in the libraries' special collections and archives.

OSULP has a commitment to the use of open source software and makes their code openly available; and, with the development of the two digital repositories--scholarsarchive@osu institutional repository and OregonDigital--as linked data platforms, openly share metadata for the widest possible machine distribution and reuse on the open web. The ability for OSULP and users to fully benefit from the linked data work that has already been done at the library will depend on the ability of the library to make it interoperable with other linked datasets on the web. OSULP does not yet take advantage of the potential linked data provides for leading users from the repositories to related information on the open web or for leading users of external systems to the content in the repositories. This will require pursuing collaborations with other content providers on the web.

As noted in its last two strategic plans, the library must continue to work to ensure that the digital content it maintains is preserved as long as possible for use by future generations. OSULP is a member of the international MetaArchive distributed digital preservation system that replicates digital content at geographically dispersed servers around the world. OSULP does not yet replicate or preserve all of its digital content though, and in the future the library should work to increase the amount of the important digital content that is preserved.

References