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Journal of eScience Librarianship
putting the pieces together: theory and practice

Discussing "eScience and the Evolution of Library Services"

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Abstract

Following an eScience day at the University of Utah held on February 20, 2012, the National Network of Libraries of Medicine, MidContinental Region invited participants who attended either in person or via the broadcast to engage in an online discussion. This discussion provided the opportunity for them to debrief, continue to learn from each other, and share what was significant to them about the day. Using the research cycle as the focus, participants identified roles librarians could play, the skills and knowledge they needed, and the steps they should take in order to effectively support eScience. This article summarizes the ideas that resulted from their discussion.

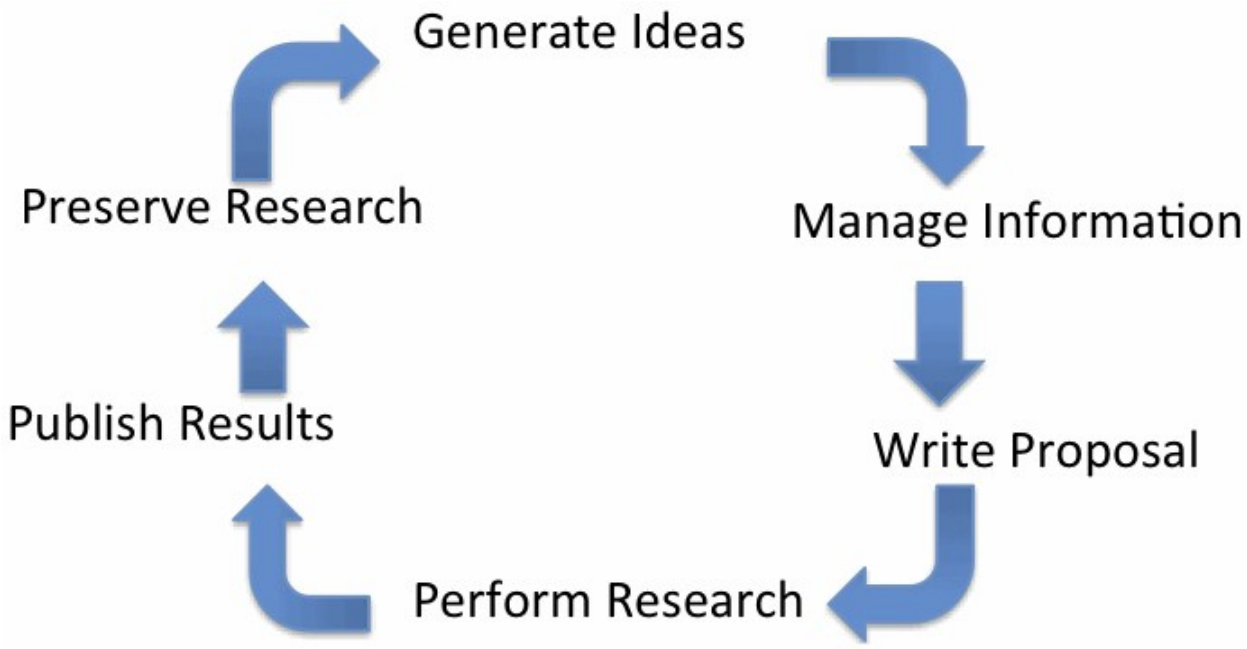
EScience Day, February 20, 2012, at the University of Utah. The Spencer S. Eccles Health Sciences Library decided to focus on eScience for its Priscilla M. Mayden Lecture, an annual event named after the first director of the library. The National Network of Libraries of Medicine, MidContinental Region (NN/LM MCR) is charged with promoting new roles for health sciences librarians, so it was a natural fit for the library and the NN/LM MCR to partner on an event that focused on the librarian's role in eScience. In the morning, Dr. Jian Qin of Syracuse University, taught "Developing Data Services to Support eScience/eResearch" to health sciences librarians. In the afternoon Bart Ragon from the University of Virginia, gave the Priscilla M. Mayden Lecture, "eScience and the Evolution of Library Services," and moderated a panel of experts. On the panel, representing the University of Utah, were Steve Corbato, Office of University Information Technology; Donald McClain, Center for Clinical and Translational Science; and Daureen Nesdill, J. Willard Marriott Library. Also on the panel was William Barnett, Center for Applied Research at Indiana University, and Ellie Phillipo, New England Journal of Medicine (the recording is available at http://library.med.utah.edu/or/pmayden/home.php).

The Priscilla M. Mayden Lecture and reaction panel was attended by University of Utah faculty and a mix of academic and health sciences librarians. Six Network members from the MidContinental Region were funded by the NN/LM MCR to travel to Salt Lake City and join their Utah colleagues. Librarians who could not attend in person were invited to watch a broadcast of the keynote and panel. On February 29, 2012 the

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Figure 1: Research Cycle



NN/LM MCR facilitated a discussion for the librarians who attended – either in person or via the broadcast – to debrief, continue to learn from each other, and share what was significant to them about the day. The session was attended by 22 librarians, primarily from academic health sciences libraries, most of whom had attended the events in person. Statements of librarian practices, roles, needs, and perceptions in this article refer to opinions presented by the attendees of the discussion. The NN/LM MCR's Betsy Kelly, Assessment and Evaluation Coordinator and Barb Jones, Missouri/Library Advocacy Coordinator, facilitated the discussion.

There was no question that librarians have a role in eScience. If participants weren't convinced before the day's events that librarians have a role, they most likely were by the time the last presenter spoke: No one argued that eScience was outside the librarian's realm of responsibility. Using the research cycle as the discussion structure, participants talked about librarians' roles in the different stages of the research cycle (Figure 1).

Stage 1: Generate Ideas

As researchers begin the process of articulating a hypothesis and writing grant applications to support their investigations they need to know that librarians have the skills to aid in the generation of ideas. These include discovering existing data related to the proposed project, identifying others working in the area, the scope of other projects, identifying appropriate databases and searching for reports of similar research already funded or completed.

Stage 2: Write a Proposal

Researchers can differentiate themselves from the applicant pool by demonstrating the results of their previous work and the impact it has had in health care. A tool developed at Becker Library at Washington University, *The Becker Model (*http://becker.wustl.edu/impact-assessment/information-resources*),* is proving extremely useful in assisting researchers to compile evidence of the impact of their work (Sarli et al. 2010; Oermann etal. 2012; Niederkrotenthaler 2011). The model

includes five components, all of which are within the realm of librarian expertise. These include:

- Advancement of Knowledge - research outputs and/or activities that contribute to the scholarly record.
- Clinical Implementation - research outputs and/or activities integrated into or adopted by clinical applications.
- Community Benefit - research outputs and/or activities that enhance the health or well being of a community.
- Legislation and Policy - research outputs and/or activities codified into public law, guidelines, standards, or policy.
- Economic Benefit - research outputs and/or activities that impact the economy.

Librarians can be partners in the process, applying their skills not only in doing citation analysis impact, but also in identifying collaborations, presentations, and other research based on the original work.

Funding agencies' data preservation policies require the applicant to address the process to be used for managing data. Librarians can contribute to the development of this section of the proposal by consulting on the researcher's data plan and suggesting appropriate taxonomies, standards, and metadata.

Stage 3: Perform Research

While librarians have identified their eScience related skills and interests, the scientific community may not yet have identified the librarian as an appropriate member of the research data management team. In order to participate with the researchers, librarians need to find ways to present themselves as collaborators capable of adding value. This is similar to the concept of the clinical librarian – the librarian moves into the clinical arena providing information services to the health care providers and/or patients at the point of care. In eScience, the librarian may need to move from the library to the lab, interacting with scientists where they work. Establishing a presence in the research arena creates heightened awareness of the availability of the librarian and the skills they possess that contribute to successful data management.

It is equally important for the librarian to be in the research setting to learn how research is done, its workflow, and vocabulary. To become involved in an eScience program, the librarian must be willing to explore the local research community, identify current and proposed research projects, and determine how a librarian's skills can make a contribution. Strategies for engaging researchers and getting involved with scientists' projects may include interviewing the researcher about their needs as in Purdue University's Data Curation Profile, or offering suggestions for what the librarian can do to make the data management easier and more effective. Establishing working relationships may take time and repeated effort as researchers and librarians become acquainted, and acceptance and trust are developed. It is important to be realistic; start with a small and manageable contribution. As projects develop and teams are formed that include the librarian, the role of the librarian is likely to expand as others realize the value of the librarian's skill set.

Stage 4: Publish Results

Librarians participating in the discussion focused on roles related to data management, data curation, and collaborative technology. They had no comments on this stage of the research cycle.

Stage 5: Preserve Research

Librarians are knowledgeable about and skilled at using controlled vocabularies to search literature and understand the hierarchies that illustrate the relationship of concepts. Metadata was recognized by the participants as being important both as a dis-

covery tool and a management tool and was considered the default role for librarians. Though librarians may not have the vocabulary to offer granular indexing, they can work with the research team and apply their skills to create descriptions that will make the data discoverable. Standard data values generally include author, title, organization, key words and/or controlled vocabulary terms. Librarians should be aware of different metadata standards used by various disciplines. Several worth exploring include Dublin Core (http://dublincore.org/metadata-basics/), MeSH, Data Documentation Initiative (http://www.ddialliance.org/), CCLRC Scientific Data Model (http://epubs.cclrc.ac.uk/work-details?w=30324), and the NISO Metadata for Images in XML (http://www.loc.gov/standards/mix/). This will be helpful as librarians work to increase researchers' understanding of the need and process for describing their data. It will be important for librarians to convince and train researchers on the significance of adding metadata and how standardized vocabulary facilitates data sharing. As the scientist generates data the librarian can use skills for determining or developing appropriate descriptive taxonomies (terms that classify data within the domain of the research) or ontologies (terms that describe relationships between research data) and create discoverable records by providing searchable content.

Librarians are developing services to ingest published reports of the research into institutional repositories, identifying faculty publications in open access resources, applying appropriate descriptive terminology, and adding or downloading them to repositories. They are discoverable by Google, Google Scholar, and other search engines that crawl the web, bringing the research cycle back to the idea generation stage of identifying completed research or research in progress.

Need for Additional Knowledge and Skills

While the participants agreed that librarians have applicable basic skills, they were concerned about additional knowledge and skills that are necessary to effectively work in an eScience environment. As librarians assume new responsibilities, training will be essential to apply their traditional knowledge and abilities in new ways to competently work with researchers. The group agreed that librarians must assess their knowledge gaps and fill them through continuing education, professional readings, internships, etc.

While librarians routinely learn how to use new technologies to access information, they will need to be comfortable with cloud computing, electronic lab notebooks, social media, and other collaborative technologies to identify the best tool for a specific research purpose. Zotero and Mendeley are examples of bibliographic management tools that could prove useful in the collaborative research environment because they store information on a remote server and make the data available from any internet enabled workstation.

Librarians also realize that they need to bring themselves up to speed on tools and projects under development by leaders in eScience. Some of these projects would welcome the contributions of MCR librarians. Purdue University's Data Curation Profile (http://datacurationprofiles.org/), was promoted during the Priscilla M. Mayden Lecture and brought up again in the discussion. Librarians can review completed profiles to inform themselves about subject areas already described. They can use the Data Curation Profile interview questions to work with their own researchers and develop and deposit a profile for subject areas not already in the database. The Open Researcher and Contributor ID (ORCID) (http://orcid.org) was designed to establish author and researcher unique IDs which will be especially useful when distinguishing between researchers with a common name (e.g., Jane Smith) or when variations of a name are used. Each librarian could work with authors and researchers within their home in-

stitution and contribute to this national database.

Librarians and scientists can share with each other the type of work and collaboration taking place in their individual locations. There is a growing eScience library community on Twitter (https://twitter.com/search/%23eScience) and the e-Science Portal (http://eSciencelibrary.umassmed.edu) that can serve as a mentoring resource as well as a source of new ideas or new ways to look at existing problems.

The Future

Reference, teaching, and cataloging are the basic areas of librarianship that will serve librarians well as they develop new services and resources to support eScience efforts. Knowledge of copyright management as it pertains to creating and sharing data will encourage discussions about the role of the librarian in promoting not only open access but open data as well. If librarians are to manage the data and tie it to publication information, they will need to understand how digital repositories, that have primarily held published and pre-publication documents, can be expanded to include data.

Working successfully with researchers will require librarians and library staff to reevaluate their activities and responsibilities. This may happen gradually as the demands of eScience projects increase and the more traditional tasks and responsibilities wane. It may require scrutinizing the roles played by library staff and prioritizing activities according to the values of the institution in a changing information environment. The exact configuration of the integration of librarians into eScience projects and its impact on the structure and focus of the library will be unique in each institution according to the needs of the researchers and projects involved.

A closing question in the discussion referred back to the title of the Priscilla M. Mayden Lecture, "*eScience and the Evolution of Library Services*": Are librarians adapting or evolving in their eScience role? As explained by one of the participants, adaptation is short term, evolution is long term. The participants in this discussion strongly agree that librarians are adapting to the eScience environment now, but will ultimately evolve in our roles in support of eScience.

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