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BRIEF COMMUNICATIONS

Assessment of health sciences and science and technology librarian e-science educational needs to develop an e-science web portal for librarians*†

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In 2007, the Association of Research Libraries (ARL) Joint Task Force on Library Support for E-Science issued its report outlining five goals to guide research libraries' burgeoning endeavors in offering e-science services and initiatives [1]. Since 2007 and the ARL report, the library scholarly literature, including recent communications from ARL e-science task force member James Mullins and task force liaison Neil Rambo, has contained a number of discussions on roles for librarians and libraries pursuing e-science initiatives [2–6]. The ARL report included strategies and actions for libraries to take to prepare and position themselves to support this emerging process of scholarly communication. The report's third outcome states that librarians should seek to become "knowledgeable and skilled research library professionals with the capacity to contribute to e-science and to shape new roles and models of service."

Although the scholarly literature discussing e-science collaboration is growing [7–10], few articles exist that have actually addressed how and where current and future health sciences and science and technology librarians should turn to develop the specific e-science capacity prescribed in the ARL report. In the summer of 2009, the Lamar Soutter Library at the University of Massachusetts Medical School applied for and was awarded funding from the National Network of Libraries of Medicine, New England Region (NN/LM NER), to begin the construction of an e-science educational web portal specifically for librarians wanting to develop this capacity. The motivation for the portal came from feedback and conversations with librarians attending a regional e-science symposium and subsequent

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A supplemental appendix is available with the online version of this journal.

science boot camp, jointly sponsored by the Boston Library Consortium (BLC), the University of Massachusetts Libraries, and the NN/LM NER.

METHODS

The e-science web portal team's first task was to assess the region's health sciences and science and technology librarians and their e-science needs and learner preferences in order to help guide and inform the construction of the portal. The objectives of this assessment were threefold. The first was to establish that there was indeed a need for an e-science portal for librarians. The second was to examine what types of e-science and data services were being undertaken by these librarians and their libraries in New England. The third was to identify the background of the region's health sciences and science and technology librarians as well as their educational needs and Web 2.0 tool preferences in order to develop the scope and transmission mechanism of online educational materials concerning e-science.

To construct the assessment questions, the portal team conducted interviews with the health sciences and science and technology librarians who participated in the aforementioned e-science symposium and the science boot camp. With this feedback, the portal assessment team created an online assessment draft survey using SurveyMonkey [11]. A volunteer group of health sciences librarians at the University of Massachusetts Medical School tested and evaluated the survey. In August 2009, after making the necessary adjustments, the team sent the survey electronically to a selected group of regional health sciences and science and technology librarians who serve medical and biomedical researcher patrons (Appendix, online only). The sample consisted of the sixty-three medical and health sciences librarians at member institutions of the NN/LM NER and the sixty-six members of the New England e-science distribution list, which is a list of attendees of the e-science symposia and e-science boot camps hosted by the Lamar Soutter Library at the University of Massachusetts Medical School, NN/LM NER, and the University of Massachusetts Libraries.

In addition, the team asked 19 BLC directors and 16 directors of NN/LM NER Resource Libraries to distribute the survey to their institutions' health sciences and science and technology librarians. The survey was also sent to 11 members of the BLC's biology email discussion list and 13 members of its chemistry email discussion list (the remaining members of these two BLC email discussion lists were already included in the New England e-science distribution list). In all, the survey was sent to a total of 168 unique libraries and individual medical, health sciences, and science and technology librarians who served or whose institutions served medical or interdisciplinary biomedical researcher patrons.

The survey informed participants that the web portal would be designed to integrate e-science

resources, instructional tools, and collaborative networking tools for librarians. It listed the benefits of this portal for librarians, including a centralized location for content education, e-science related tools, and the exchange of information. As part of the development of this portal, participants were asked for their input and cooperation in filling out this online assessment tool to help align the portal with their e-science needs as librarians. The team encouraged participation in this assessment by highlighting that the feedback would be vital to the selection of comprehensive resources for the portal.

RESULTS

The team sent out 168 surveys, and 78 librarians responded. Within this group, 36 out of the 58 respondents (62.0%) who identified their patrons stated that they serve the health sciences. Among those who chose to identify their institutional affiliation, 56 (72.7%) were librarians at an academic library, 9 (11.7%) were at hospitals, and 4 (5.2%) were at biomedical research institutes. The remaining 8 (10.4%) worked for a variety of governmental and public and private research special libraries. These librarians reported a wide range of scientific strengths and listed a similarly wide and interdisciplinary range of patrons. Forty-three (68.3%) reported only a bachelor's degree in addition to their master's of library science (MLS), and 29 (46%) reported a master's degree in addition to their MLS. Roughly half of the respondents held degrees that were not in the sciences.

To establish whether survey participants were providing e-science services, the team included a definition for e-science: "E-science describes the collaboration among computationally intensive science disciplines that creates immense data sets" that are "captured, transported, stored, organized, accessed, mined, visualized, and interpreted in order to extract knowledge....The e-science role for librarians is characterized by interdisciplinary research collaboration and the collection, organization, and management of these data." The respondents were asked, according to this and other currently established definitions for e-science, whether they provided or their library provided e-science-related library services. Forty-three out of 64 respondents (67.2%) answered no, 13 out of those 64 (20.3%) answered yes, and 8 (12.5%) did not know. To ascertain the specific type of e-science services being acknowledged, the survey asked respondents if they managed e-science-related datasets. Eight of 62 (12.9%) said they did so, and 13 of 62 (21.0%) stated that their libraries had created or provided online e-science-related tutorials for their research communities. Although only 8 were providing e-science and data services, 28 of 62 (45.2%) replied in the affirmative when asked if potential opportunities for future e-science and data information services collaboration existed in their institutions.

The remaining questions on the survey allowed respondents to choose more than 1 option. When

Table 1
Preferred learning options for e-science

Desired educational opportunities (n=53)	Responses	(%)*
Online tutorials for specific e-science-related tools	47	(88.7%)
Online tutorials for specific e-science-related background or content knowledge	45	(84.9%)
Continuing education	36	(67.9%)
Support from the library community	26	(49.1%)
Other	7	(13.2%)

* Respondents could select more than one option.

asked what features they would be most likely to use in learning about e-science, 49 of 53 respondents (92.5%) stated that they would be most likely to use tutorials for specific e-science tools. Forty-one (77.4%) replied that they would be likely to use tutorials to develop background and content. Thirty-nine (73.6%) would use features to locate continuing education purposes, and 33 (62.3%) would use features to collaborate with other librarians at other institutions. When asked about what educational materials would support e-science in their institutions, 47 of 53 (88.7%) selected online tutorials for specific e-science-related tools, 45 (84.9%) selected online tutorials for specific e-science-related background or content knowledge, 36 (67.9%) selected continuing education, and 26 (49.1%) chose support from the library community (Table 1).

Answering the questions about preferred learning environment and preferred Web 2.0 tools for transmitting educational materials, 32 of 54 respondents (59.3%) stated that they learn best in a structured classroom environment. Thirty-one librarians (57.4%) replied that they prefer informal small groups, and 28 (51.9%) responded that they prefer self-guided learning. Forty-seven (87.0%) stated that the Web 2.0 tool that they use best to learn is an email discussion list. However, 42 (77.8%) also declared that they feel comfortable using blogs and wikis, and 31 (57.4%) felt comfortable using social networking applications (Table 2).

When asked which scientific disciplines or areas respondents would like to learn more about, 33 of 39 (84.6%) respondents stated that they would like background and content knowledge and 8 of these respondents (20.5%) listed basic and advanced sciences involved in e-science. Forty-one of 53 respondents (77.4%) preferred using online tutorials to

Table 2
Preferred learning options for e-science

Preferred collaborative tools (n=54)	Responses	(%)*
Web blog (blog)	42	(77.8%)
Wiki	42	(77.8%)
Email discussion list	47	(87.0%)
Social networking applications	31	(57.4%)
Other	6	(11.1%)

* Respondents could select more than one option.

improve this knowledge. When asked if they were interested in attending e-science-related continuing education courses, 39 survey participants (73.6%) responded, "Yes." Eight of these participants (20.5%) specified topics for continuing education courses, including instruction on basic sciences, database training, and data management skills.

DISCUSSION

As stated above, the objectives of this assessment were threefold. The first was to establish that there was indeed a need for an e-science portal for librarians. The second was to examine what types of e-science and data services were being undertaken by these librarians and their libraries in New England, and the third was to identify the background of the region's health sciences and science and technology librarians, their learning needs, and their Web 2.0 tool preferences in order to support the scope and transmission of online educational materials concerning e-science.

A significant number of respondents indicated that they would use a variety of methods and tools to learn about e-science: 34 respondents of 53 (64.2%) indicated they would seek collaborative learning, 49 (92.5%) indicated they would use tutorials for specific tools, and 41 (77.4%) indicated they would use tutorials to develop content or background knowledge. These responses point to an online resource that would facilitate the delivery of tutorials, guides, and collaboration via a virtual community. An e-science portal could be this online resource and would provide web-based tutorials, information on continuing educational opportunities, and a forum for collaboration to facilitate library e-science initiatives.

The portal team is currently engaged in collecting links and resources as well as creating and encouraging the creation of tools and tutorials. Such tools could range from online modules or tutorials to links to others' initiatives, like Witt and Carlson's data interview, a modernization of the traditional reference interview that seeks to guide librarians who may be new to providing data management services. The value of these tools is that they are created by librarians for librarians [12].

Although only a small percentage of these New England institutions reported being actively engaged in e-science, it is important to note the high number of respondents who stated that they felt there are e-science opportunities for collaboration in their institutions or with others. These reported data supported those in the health sciences library literature calling out for defining and establishing roles for health sciences librarians and biomedical libraries in e-science [3].

The assessment also sheds light on the need for the portal to focus on content resources for health sciences and science and technology librarians, especially for those who do not have extensive science backgrounds. A significant number of respondents

wanted this portal to offer content in the sciences as well as information technology-based scientific fields, which could include such disciplines as bioinformatics and geographic information services (GIS).

Many respondents felt that continuing education focusing on e-science and related content would be beneficial. These results echo research in the librarian recruitment literature that debates the necessary educational backgrounds for successful health sciences and science and technology librarians. The consensus in the literature is that having a strong interest in science and a motivation to develop oneself professionally are better determinants of success than educational background and that the best predictor of success is the librarians' personal efforts prioritizing their own professional development [13–17]. Indeed, the e-science web portal has the potential to play a major role in this professional development for those respondents who did not have a medical or other related science background.

Examination of the responses concerning the respondents' preferred Web 2.0 tools for educational uses shows the majority of respondents preferred the email discussion list. Librarianship, similar to some other disciplines [18], still has its members who are firmly dedicated to the email discussion list. However, survey data show that librarians, such as the health sciences and science and technology librarians in this survey, are also quite comfortable utilizing blogs, wikis, and other social-networking applications. Thus, the portal will not solely depend on an email discussion list and will offer other venues for creating and transmitting educational content.

The results of the survey clearly show that a small, but significant number of New England libraries serving the health sciences are currently engaged in e-science activities within their institutions or with other institutions and that a larger group of health sciences and science and technology librarians see potential for e-science collaborations in the future. These results, from a sizeable representative sample of respondents, clearly establish that an e-science web portal specifically for librarians is both wanted and needed by New England's library community. These results also show a regional demand for a portal centralizing e-science and data services tools and scientific content tutorials to serve patrons in basic as well as emerging information technology and data-intensive scientific disciplines. Moreover, the results present a community that is comfortable utilizing a variety of educational Web 2.0 tools for its self-guided learning and that is interested in future continuing education and professional development opportunities focusing on e-science.

These data support the work of the NN/LM NER in its current mission to strengthen its regional health sciences libraries and partners' e-science initiatives by establishing an interactive e-science web portal designed by and for librarians that integrates e-science educational resources and scientific content development. As of the summer of 2010, the portal

team has been expanded to include a web developer and an advisory board as well as content editorial teams populated with selected members of the New England library community.

To begin populating the portal with content and to encourage future contributions (user-generated content) from librarian users, the team created an initial content wiki and tutorial focusing on life science disciplines. This early effort, termed the Biotechnology Interactive Dictionary (BID), links user-generated tutorials and definitions with the National Library of Medicine's Medical Subject Headings (MeSH) controlled vocabulary. The team also engaged an educational design consultant to build a flash tutorial narrating the librarian's role in researcher workflows, authored by a librarian with experience as a biomedical researcher. Areas for future research include identifying and examining the specific types of e-science collaborations and endeavors among the region's health sciences, biomedical, and scientific institutions, their libraries, and librarians utilizing the web portal, and studying the future effectiveness and impact of the web portal, its resources, and Web 2.0 tools on these efforts.

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