



Research data management services in academic research libraries and perceptions of librarians



Carol Tenopir^a, Robert J. Sandusky^b, Suzie Allard^a, Ben Birch^{a,*}

^a School of Information Sciences, University of Tennessee, 451 Communications Bldg., 1345 Circle Park Drive, Knoxville, TN 37996-0341, USA

^b Richard J. Daley Library, MC-234, 801 S. Morgan St., Chicago, IL 60607, USA

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ABSTRACT

The emergence of data intensive science and the establishment of data management mandates have motivated academic libraries to develop research data services (RDS) for their faculty and students. Here the results of two studies are reported: librarians' RDS practices in U.S. and Canadian academic research libraries, and the RDS-related library policies in those or similar libraries. Results show that RDS are currently not frequently employed in libraries, but many services are in the planning stages. Technical RDS are less common than informational RDS, RDS are performed more often for faculty than for students, and more library directors believe they offer opportunities for staff to develop RDS-related skills than the percentage of librarians who perceive such opportunities to be available. Librarians need opportunities to learn more about these services either on campus or through attendance at workshops and professional conferences.

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1. Introduction

Science has entered a “fourth paradigm” that is more collaborative, more computational, and more data intensive (Hey, Tansley, & Tolle, 2009a) than the previous experimental, theoretical, and computational paradigms. This emerging scientific paradigm is often referred to as e-science or e-research (Hey, Tansley, & Tolle, 2009b). Increased reliance on technology in all parts of scientific endeavor, or cyberinfrastructure, and the establishment of data management and data sharing mandates by many research funding bodies¹ have motivated academic libraries to take action with regard to the shifting needs of their faculty and students and consider how best to engage in e-science through the development of library-based research data services (RDS). In the U.S. and Canada, individual large academic research libraries often lead these activities (Association of Research Libraries, 2010).

The results of investigations into (a) librarians' RDS practices in U.S. and Canadian academic research libraries and (b) the RDS-related library policies in the same type of libraries are reported here. These studies establish a baseline assessment of the RDS involvement of individual librarians as well as libraries as institutions. The results

inform and enable practitioners, administrators, and educators to make strategic RDS plans in academic research libraries and guide the evolution of curricula in LIS education.

2. Problem statement

The emerging need for research data management is prompting library directors to plan for additional RDS to be offered by their libraries, and at the same time many librarians are looking for opportunities to develop their RDS-related skills. But are library directors and librarians on the same page regarding RDS? In other words, do library policies in this regard align with librarians' perceptions? Misalignment can hinder effective start-up of RDS. This study focuses on the alignment issue by comparing data from library directors on RDS currently offered or planned, with data from librarians on RDS currently performed. Similarly, comparisons are made between library directors' perceptions on how their libraries are providing RDS development opportunities for staff and perceptions of librarians on the availability of such opportunities in their library. Insight on the part of the library community gained from this study could raise awareness of such misalignment, followed by corrective action leading to more efficient development of RDS.

This paper combines the findings from two surveys to answer several questions regarding North American academic research libraries and their involvement in RDS, including:

- How many academic libraries are actively engaged in RDS?
- How many academic libraries are planning to be involved in RDS in the near future?

* Corresponding author.

E-mail address: wbirch@utk.edu (B. Birch).

¹ In the U.S., data management and data sharing mandates have been established by the National Science Foundation, the National Endowment for the Humanities, the National Institutes of Health, and others (University of Minnesota Libraries, 2011). In Canada, similar mandates have been established by the Canadian Institutes of Health Research, the National Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council (Government of Canada, 2013).

- Are libraries offering opportunities for their librarians to gain RDS related skills?
- What specific types of RDS are being offered?
 - o Which are more common – *informational, consulting-type services* (for example, helping faculty and students find a place to deposit their research data or pointing to data management plan examples) or *technical, hands-on services* (for example, running an institution-housed data repository or helping researchers write data management plans)?
 - o Are libraries offering or thinking of offering a mix of services or concentrating on a single service?

Libraries may already be offering or planning to offer RDS and they may have developed plans to do so. However, it is the librarians who are on the front lines in terms of implementing these plans. Therefore, two separate studies were conducted; the first – the library study – surveyed directors of academic libraries in the U.S. and Canada and sought answers for the questions above. The second – the librarian study – surveyed a sample of librarians who work in academic research libraries. Librarians were surveyed in an attempt to answer such research questions as:

- How many academic librarians are currently involved with RDS in their libraries?
- Do librarians think they have the disciplinary background and training to offer RDS?
- Do librarians feel they have opportunities to learn what they need to know about RDS?

Finally, by studying both the directors of academic libraries to get official library policy and the front-line librarians who work at academic research libraries to get their perceptions and personal perspectives, the alignment between library practices and librarians' perceptions of the development opportunities open to them regarding research data management services can be evaluated. Although results from each of these individual studies have been previously reported, this article compares the results for the first time in order to determine if the practices and opportunities for training in research data service provision in academic research libraries are in alignment with the perceptions of the librarians as to their preparation and opportunities.

3. Literature review

The literature related to this paper includes studies of *librarians, libraries*, and RDS; and papers that present case studies or recommendations for how librarians and libraries can develop RDS. In addition to surveys of the current status of RDS in libraries in several countries, current literature covers a range of recommended specific services. The literature shows that RDS or e-science services in libraries are discussed in the library literature, and are being offered by some research libraries, but are not yet being offered by most. Peters and Dryden (2011) found that the most important data services needed by researchers are mainly directional ones: grant proposal support including data management planning, locating data-related services, publication support, and specific data management assistance. Another study (Bach et al., 2012), however, found that, of the surveyed biodiversity data repositories, most only deliver low-level support for users.

Many librarians and researchers engaged with e-research have discussed the possible roles for both libraries and librarians in providing RDS (Association of Research Libraries, 2006; Council on Library and Information Resources, 2008; Gabridge, 2009; Gold, 2007; Hey & Hey, 2006; Jones, 2009). One third of participants in a UK survey (Brown & Swan, 2007) believed that within five years “manager of datasets from e-science/grid projects” (p. 47) will be a major obligation of a librarian, with another third assigning it a secondary responsibility. MacColl (2010) advises libraries take on a more comprehensive and strategic role: libraries should be involved throughout the research process and

need to be actively engaged in curating, advising, and preserving research outputs. Some additional suggested roles for libraries are to develop researchers' data-awareness, to adopt a data archiving and preservation role, and to train data librarians.

Libraries and librarians have a long way to go before realizing these roles. Potter, Cook, and Kyrillidou (2011) found that only 9 of 86 (or 10%) narrative profiles created by ARL members in the U.S. and Canada included references to “e-science/data curation and management” (p.7) as an important service supporting faculty success and scholarly communications. As part of a 2007 investigation into all of the types of support provided to researchers by 134 U.S. and Canadian academic health science libraries, Cheek and Bradigan (2010) found that just 12.2% of these libraries provided support for “data curation”. About half of the respondents to ARL's 2009 North American e-science survey (Association of Research Libraries, 2010) had on-campus support units for scientific research data; however, the Data Working Group at Cornell University Library discovered that few university librarians were actually involved in research data curation (Steinhart et al., 2008).

A major aspect of data curation is preservation work. A 2009 survey of European data managers, of which nearly three-quarters (73%) were employed in libraries, found that the top three reasons for research data preservation included accountability for publicly funded research, inspiration for scientific advancements, and reanalysis of previously generated data (Kuipers & Van der Hoeven, 2009, p. 37). A majority of data managers, including those not employed by libraries, reported that their institutions have a policy for preservation of research data. These data managers did not report on the percentage of the data that was shared with other researchers. One Australian study found that data sharing is not a priority for many researchers (Markauskaite, Kennan, Richardson, Aditomo, & Hellmers, 2012). In this study, 864 researchers at seven Australian Universities were surveyed; 50% of participants did not allow access to any of their data and only 9% provided access to all of their data.

Research institutions have a responsibility to offer researchers educational and support services relating to data management and to encourage data sharing, in addition to providing policies and structure for research data preservation (Tenopir, Birch, & Allard, 2012). There is a need for more tailored and streamlined data services, but the identification of researchers' needs is difficult due to the complex nature of research data. Carlson (2012) at Purdue University Libraries, found that among and within fields of study there are disparities in the way that data curation is conceptualized and communicated. These variations make it challenging for librarians to understand the needs of researchers.

There are also many other challenges that librarians and libraries face in RDS development. Corral, Keenan, and Afzal (2013) found clear evidence that development of specialized RDS is often constrained by knowledge and skills gaps among library staff and a lack of confidence in their expected roles in RDS. In a small-scale survey of New Zealand academic and college library managers, Brown (2010) found that there was little direct involvement in providing RDS but that libraries were participating in local steering groups, performing institutional planning, and involved in policy development both within and between academic institutions. This survey found that funding, librarian training, marketing, and uncertain demand from researchers and students were barriers to successfully providing RDS (Brown, 2010). Similarly, Creamer, Morales, Crespo, Kafel, and Martin (2012) found that health and science librarians have a high level of interest in developing a range of RDS skills, but often lack the skills needed to effectively provide RDS. More than half of the libraries were creating a “library strategic plan or policy for data management” (p.21), although they faced “serious barriers” to engaging in e-science, including funding for personnel and equipment and lack of broader institutional support, as well as “territorial struggles” between various other departments within the institution (p.23).

Recently, there have been tools developed and recommendations made to help overcome the challenges faced by librarians and libraries. The result of Carlson's (2012) terminology variation study was the development of the DCP Toolkit (<http://datacurationprofiles.org>). This tool enhances the data reference interview and enables librarians to connect with and discover the data needs of researchers. The detailed profiles in the DCP Toolkit provide insight into the data management language utilized by researchers in different fields. A number of studies have also acknowledged the importance of educating library staff about data curation and management services. Many library staff members have collection experience related to traditional materials, but may require training in relation to selecting and compiling data for inclusion in repositories. Research libraries have campus-wide faculty relationships and are proficient at developing conventional collections, giving them a competitive advantage in establishing a university's scientific data collection; however, Newton, Miller, and Bracke (2010) found that additional training is needed to build up an institutional data repository. Libraries need to utilize their professional connections with campus faculty, as well as faculty and staff at other institutions to collaborate and develop more skills in identifying appropriate materials.

4. Methodology

In order to compare like-to-like (that is, librarians in research libraries with policies of research libraries), the library data reported here are a subset of a larger study that surveyed all types and sizes of academic libraries in the U.S. and Canada. The full study sought to answer, in addition to the research questions addressed here, what sizes and types of academic libraries are most involved in RDS and how involvement varies by type and size of academic library. The full results were reported in Tenopir et al., 2012.

In the full study, survey responses were received from 223 library directors. In order to investigate the effects of variances in sizes and types of libraries, four demographic characteristics of the parent institution were used: number of full-time equivalent (FTE) students (less than 5000 vs. 5000 or more), number of tenure-track and tenured faculty (less than 100 vs. 100 or more), number of National Science Foundation (NSF) grants typically awarded per year (none vs. some), and type of institution (research or doctoral vs. baccalaureate vs. associate's).

Not surprisingly, academic research libraries, larger schools, and those receiving more NSF grants were more likely to be offering or planning to offer research data management services than other types of academic libraries (Tenopir et al., 2012).

Comparing results by these demographics also uncovered differences in methods libraries were using to develop staff capacity for RDS. Libraries at institutions with high enrollments, those with a large faculty, and those at research institutions were all more likely to have already reassigned or to be planning to reassign existing staff than libraries at other institutions.

Finally, there were considerable differences in library engagement with RDS. Libraries at institutions with high enrollment, larger faculty size, and at research institutions were more likely than libraries at smaller schools to be involved in things such as managing RDS technology infrastructure, planning RDS skills development opportunities for staff, and collaborating with other units on campus (Tenopir et al., 2012).

Because of these differences, the authors decided to examine in more depth only the results from libraries in research or PhD-granting institutions and to compare the results with another survey of individual academic librarians who work in research universities.

As in the academic library study, the librarian data reported here also represent a subset of a larger study. In the larger study, librarians employed by ARL member libraries were surveyed if their area of responsibility seemed likely to currently, or in the future, include RDS. The full study sought to answer how librarians' opinions of their preparedness to provide RDS, their library's support for their professional

RDS development, the importance of RDS for libraries and their associated institutions, and the contributing or inhibiting factors for librarian involvement in RDS, varied with their current degree of engagement with RDS. The results of this part of the full study were reported in Tenopir, Sandusky, Allard, and Birch (2013).

The full results indicated consensus that the absence of RDS would adversely affect the institution's perception of the library in terms of relevance and prestige, that provision of RDS would augment the institution's research impact, and that the absence of RDS would put the institution at a disadvantage for grants. In addition, participants strongly rejected the idea that RDS would be a distraction and the idea that RDS are unnecessary and strongly affirmed that RDS fits the traditional role of librarians as stewards of scholarship (Tenopir et al., 2013).

The current analysis compares, for the first time, the frequency of RDS provision in academic research libraries with the services offered by the librarians.

The full library study was distributed to a stratified random sample of 351 library directors who are members of a panel organized by the Association of College and Research Libraries (ACRL). Each of these directors had agreed to participate in several ACRL surveys on assorted topics over the course of a year. A total of 221 of these ACRL directors responded, for a response rate of 63%. Surveys were initially distributed in November 2011, with a follow-up in January 2012 (Table 1).

A separate distribution to several libraries in the University of California (UC) system yielded two additional responses. The number of invitations sent in the UC system, and therefore the exact response rate is unknown, although there are ten campuses in the UC system. The final dataset contains responses from 223 academic libraries. This paper focuses on the 101 responses from research/doctorate granting institutions (the 99 from ACRL distribution and the two UC universities; see Tenopir et al. (2012) for a full analysis of all 223 library responses).

In order to compare official library policy with the perspective of the librarians who work in academic research libraries, a separate survey was sent to a sample of academic librarians in the U.S. and Canada. The survey was sent to librarians who work in the 115 academic libraries that belong to the ARL. Between April 2011 and August 2011, a total of 948 invitations were sent to a sample of ARL librarians who work as subject librarians, metadata librarians, e-science librarians, or data librarians. This survey had 222 responses: a response rate of 23%.

In November 2011 and February 2012 a separate invitation was sent to librarians working in two libraries in the UC system, and to librarians whose ACRL library director volunteered to distribute the survey to their staff. This yielded 80 additional responses. The exact number of invitations sent in this method, and therefore the response rate, is unknown. The final dataset includes responses from both the initial distribution and this second distribution for a total of 302 librarians.

All of the respondents to the librarian survey work in comprehensive research-extensive institutions, while libraries in the libraries survey included associate, baccalaureate, and doctorate degree-granting institutions. Therefore, in order to remove a confounding factor from comparisons between the two survey results, only libraries at doctorate degree-granting institutions are included in this analysis. That way, although it is not known whether librarian respondents come from the same institutions that responded to the libraries survey, the official policies of academic research libraries can be better compared with the perceptions of librarians who work in that type of institution.

Table 1
Distribution to ACRL panel members.

Classification	Panel members	Responses	Response rate
Associate-degree granting	116	68	59%
Baccalaureate-degree granting	93	54	58%
Doctorate-granting	142	99	70%
Totals	351	221	63%

Table 2

Informational or consulting RDS currently offered by the library or planned to be offered in the future [library study].

RDS	No plans	>24 months	13–24 months	<12 months	Has service
Discuss RDS (n = 99)	37.4%	11.1%	7.1%	16.2%	28.3%
Create guides (n = 99)	28.3%	13.1%	13.1%	20.2%	25.3%
Find datasets (n = 99)	17.2%	8.1%	14.1%	11.1%	49.5%
Outreach (n = 97)	53.6%	10.3%	8.2%	11.3%	16.5%
Consult meta (n = 98)	42.9%	10.2%	13.3%	10.2%	23.5%
Consult DMP (n = 99)	45.5%	11.1%	8.1%	9.1%	26.3%

Questions to both library directors and librarians covered specific RDS offered or planned to be offered in their institutions, as well as opportunities for professional development on RDS issues for the professional staff. Half of these questions concerned informational or consulting RDS and half were about a greater level of involvement with technical/hands-on RDS. Informational/consulting services cover a wide range of services, from consulting on data management plans through discussing RDS with others:

- Consulting with faculty, staff, or students on data management plans.
- Consulting with faculty, staff, or students on data and metadata standards.
- Outreach and collaboration with other RDS providers either on or off campus.
- Providing reference support for finding and citing data or datasets.
- Creating Web guides and finding aids for data, datasets, or data repositories.
- Discussing RDS with other librarians, or other people on campus, or RDS professionals.

The technical or hands-on services show another level of involvement with RDS:

- Providing technical support for RDS systems (e.g., a repository, access, and discovery systems).
- Deaccessioning or deselection of data or datasets for removal from a repository.
- Preparing data or datasets for deposit into a repository.
- Creating or transforming metadata for data or datasets.
- Identifying data or datasets that could be candidates for repositories on or off campus.
- Directly participating with researchers on a project (as a team member).

Library directors were asked whether each of the RDS were currently offered or planned to be offered in the future through the library. The answer choices were:

1. Not available, and we currently have no plans to offer it.
2. Not available, but we plan to offer it in more than 24 months.
3. Not available, but we plan to offer it within 13–24 months.
4. Not available, but we plan to offer it within 12 months.
5. Our library currently offers this service.

Librarians were asked how frequently they performed each of the RDS. Their answer choices were:

1. Never performed.
2. Performed a few times a year.
3. Performed about once a month.
4. Performed about once a week.
5. Performed daily.

In cases where the respondent indicated that service was provided to both faculty and students, separate details were given for faculty and students.

5. Results

Providing reference support for finding and citing data or datasets is the most common of currently-offered or planned-to-be-offered informational RDS in academic research libraries, with nearly half currently offering this service and another third planning to within the next two years (Table 2). That means that almost 83% of these libraries will offer this service within the next two years. No other data informational service is currently offered by a majority of libraries, but consulting on data management plans, consulting on metadata creation, creating guides, and discussing RDS with patrons are planned in a majority.

Outreach and collaboration with other RDS providers either on or off campus is the least commonly offered information service now and least likely to be in the planning stages, although this may merely mean that the library doesn't need to collaborate in order to offer RDS.

The following two tables (Tables 3A and 3B) show how often informational RDS are performed by librarians in academic research libraries for faculty (Table 3A) or for students (Table 3B). On average, informational RDS are currently performed by these librarians never or only a few times a year, with helping faculty find relevant data or datasets the most frequently offered service. Helping students find data or datasets is the most frequently offered RDS for students, followed closely by creating library guides to data services. Tables 3A and 3B also show that in each case in which a service is performed for faculty or students, it is performed more often for faculty than for students.

Although over half of all research libraries in the libraries survey do not officially consult with others on campus or beyond the campus for

Table 3A

Informational or consulting RDS currently performed by librarians for faculty [librarian study].

RDS	Never	Few times/year	Once/month	Once/week	Daily
Create guides (n = 262)	44.0%	38.0%	10.0%	6.0%	2.0%
Find data (n = 255)	32.0%	41.0%	16.0%	6.0%	5.0%
Consult meta (n = 261)	52.0%	35.0%	7.0%	5.0%	1.0%
Consult DMP (n = 265)	55.0%	29.0%	12.0%	3.0%	0.0%

Table 3B

Informational/consulting RDS currently performed by librarians for students [librarian study].

RDS	Never	Few times/year	Once/month	Once/week	Daily
Create guides (n = 239)	53.0%	33.0%	8.0%	4.0%	2.0%
Find data (n = 233)	36.0%	39.0%	11.0%	9.0%	5.0%
Consult meta (n = 240)	74.0%	20.0%	3.0%	2.0%	1.0%
Consult DMP (n = 239)	81.0%	13.0%	5.0%	0.0%	1.0%

Table 4

Informational or consulting RDS currently performed by librarians with others [librarian study].

RDS	Never	Few times/year	Once/month	Once/week	Daily
Outreach (n = 218)	53.0%	34.0%	8.0%	5.0%	1.0%
Groups (n = 218)	40.0%	35.0%	15.0%	8.0%	2.0%

Table 5
Technical RDS currently offered by the library or planned to be offered in the future [library study].

RDS	No plans	>24 months	13–24 months	<12 months	Has service
Team member (n = 100)	49.0%	11.0%	5.0%	8.0%	27.0%
Identify data (n = 98)	44.9%	10.2%	12.2%	15.3%	17.3%
Create meta (n = 97)	50.5%	10.3%	16.5%	6.2%	16.5%
Prepare data (n = 100)	52.0%	9.0%	13.0%	11.0%	15.0%
Deaccession (n = 100)	73.0%	8.0%	10.0%	6.0%	3.0%
Tech support (n = 100)	43.0%	12.0%	16.0%	11.0%	18.0%

RDS, individual librarians are slightly more likely to report that they collaborate on RDS (Table 4). Almost half of librarians engage in outreach, that is, collaborating with other RDS providers on campus. Working beyond their campus is more common, and 60% of the librarians report they participate in working groups or other professional groups about RDS. This participation may lead to a growth in RDS in libraries in the future.

In general, technical RDS are currently less frequently offered in libraries than are informational or consulting RDS, but only slightly so (Table 5). Roughly half of these academic research libraries offer or plan to offer most of the other technical services within two years, including (in order of frequency) within two years: providing technical support for a data repository, identifying datasets to incorporate into an institutional repository, providing librarians to serve as team members on e-science projects, creating metadata for datasets, and preparing data for deposit. Only deaccessioning datasets is not offered or planned by a majority of academic research libraries.

Librarians also report that they perform technical RDS less frequently than informational or consulting RDS, although the questions were slightly different in the librarian survey. Neither identifying datasets for inclusion in a repository nor serving as an e-science team member for faculty (Table 6A) or for students (Table 6B) is offered by a majority of these librarians. For those who do offer the services, a “few times per year” is the mostly likely frequency.

Table 6C shows the technical services offered by librarians regardless of for whom. Very few librarians offer these services, although they may be covered by a single data services librarian in those institutions that support the service. Creating metadata for data is the most commonly offered service, but most frequently only a few times per year. There is

Table 6A
Technical RDS currently performed by the librarian with faculty or staff [librarian study].

RDS	Never	Few times/ year	Once/ month	Once/ week	Daily
Identify data (n = 256)	52.0%	31.0%	12.0%	4.0%	1.0%
Team member (n = 256)	65.0%	26.0%	5.0%	3.0%	1.0%

Table 6B
Technical RDS currently performed by the librarian with students [librarian study].

RDS	Never	Few times/ year	Once/ month	Once/ week	Daily
Identify data (n = 233)	71.0%	21.0%	4.0%	3.0%	1.0%
Team member (n = 231)	82.0%	13.0%	3.0%	1.0%	1.0%

Table 6C
Technical RDS currently performed by the librarian on data or datasets [librarian study].

RDS	Never	Few times/ year	Once/ month	Once/ week	Daily
Tech support (n = 224)	76.0%	15.0%	4.0%	2.0%	4.0%
Deaccession (n = 226)	92.0%	7.0%	1.0%	0.0%	0.0%
Prepare data (n = 228)	71.0%	21.0%	6.0%	1.0%	2.0%
Create meta (n = 229)	67.0%	20.0%	6.0%	3.0%	4.0%

wide variation: 207 of 226 respondents reported never performing deaccession or deselection of data or datasets from repository, although one respondent reported performing this service daily.

The library study also explored whether libraries provided opportunities for staff to develop skills related to RDS. Just under one-third (31 of 99) replied that they provide some opportunities. Those that replied yes also reported which of the following opportunities were provided:

1. In-house staff workshops or presentations.
2. Taking courses related to RDS.
3. Attending conferences or workshops elsewhere related to RDS.

Library directors could select all that applied to their organizations. Providing conference opportunities was the clear favorite, with 94% of libraries offering attendance at conferences to their librarians (Table 7). Slightly more than half of libraries reported supporting attendance at courses related to improving RDS skills.

Among libraries that currently offer any training opportunities, Table 7 shows the percentages of libraries offering each opportunity. However, when all libraries are considered together, including those that do not offer services, the percentages are much lower: 29% for conferences, 18% for courses, and 14% for in-house training.

Some librarians feel they have opportunities for learning. Just under half (47%) of the 219 librarians who answered this question felt they had the opportunity for at least one type of RDS skills development (Table 8). The most common opportunity was support for attendance at conferences (65%), followed by courses elsewhere (53%), and, less often, training at their library (32%).

6. Discussion

The most commonly offered or planned informational RDS, finding and citing datasets, (Table 2) is a service that simply extends a familiar library reference service into the realm of data. At the other extreme, the least commonly offered information service is outreach and collaboration with other RDS providers. With the extensive hardware, software, and educational components needed for effective RDS, it is somewhat disheartening that so few research libraries are collaborating with others.

According to librarians who work in academic research libraries, RDS are being performed never or only a few times a year (Tables 3A and 3B). Keeping in mind that Table 2 takes into account planned availability as well as current availability, this result is not surprising. Growth in current performance of RDS by librarians can be expected to follow growth in current availability of RDS by libraries.

Considering technical RDS, this type of service is less available in libraries than are informational RDS (Table 4). The picture is also likely to change significantly in the near future, as only one service

Table 7
Percentage of libraries providing specific opportunities for staff to develop RDS skills. Library directors were allowed to select all that applied [library study].

Opportunities for RDS skills (n = 99)	Percentage
Training	45%
Courses	58%
Conferences	94%

Table 8

Percentage of librarians agreeing that their library provides specific opportunities to develop RDS skills [librarian study].

Agreement with opportunities for RDS skills	Percentage
Training (n = 218)	32%
Courses (n = 216)	53%
Conferences (n = 217)	65%

(deaccessioning or deselection of data or datasets for removal from a repository) is neither in the plans nor currently being offered by most libraries. Perhaps the preservation aspect of repositories is considered inconsistent with deselecting data that is put into a repository.

There appears to be somewhat of a mismatch between what academic research library directors believe they offer to their librarians and what the librarians themselves perceive to be available to them in the way of RDS training opportunities (Table 8). Nonetheless, these results portend well for the future of RDS, as there are clearly some opportunities for training of librarians in RDS skills.

Library directors and librarians who are aware of research data management issues or are currently involved in RDS are more likely to respond to the survey, so results may show an inflated picture of research library involvement in RDS. Also, this is a dynamic topic and plans may change at some of the responding institutions. Responses to the libraries survey concern library policy, with the unit of analysis at the library institutional level. Responses to the librarian survey concern individual perceptions and opinions, with the unit of analysis at the individual librarian level. It is not possible to know how many of the librarian-respondents work at the institutions that responded to the libraries survey. It is also not possible to know how many individuals from the same institution responded. In addition, since this paper focused on libraries and librarians at research or doctorate-granting institutions, the results are not generalizable to academic libraries and librarians at other types of schools such as baccalaureate and associate degree-granting institutions. And, finally, as with any survey, responses are self-reported and are assumed to be accurate and truthful, although this cannot be verified.

7. Conclusion

It is clear that some academic research libraries are offering a variety of research data management services and more plan to do so within the next two years. Most commonly these services are extensions of traditional informational or consultative services, such as helping faculty and students locate datasets or repositories. A small, but growing, number of libraries are becoming more involved with research data, from helping with data management plans to preparing and preserving research data for deposit in data repositories.

Many of the librarians who work in academic research libraries feel they have the subject knowledge necessary to help their constituents with research data services, but need the opportunity to take advantage of continuing education. Whether consultative or hands-on services, librarians need opportunities to learn more about these services either on their own campus or through attendance at workshops and professional conferences.

Working with others on campus, as both teachers and joint learners of research data service specifics, will help the library play a shared role in building the future of research data at their universities.

The comparisons drawn here between library policy on RDS and the perceptions of front-line librarians as they implement this policy, indicates some misalignment. However, that is to be expected, as most libraries are in the early stages of making RDS available. Increased awareness of this issue within the academic library community is likely to result in more effective development of RDS.

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Carol Tenopir is a chancellor's professor in information sciences, director of research, and director of the Center for Information and Communication Studies at the University of Tennessee College of Communication and Information. She is a fellow of the American Association for the Advancement of Science and holds the Award of Merit from the American Society of Information Science & Technology. She holds a PhD in library and information sciences from the University of Illinois. Her research has practical implications for libraries, publishers, and scholarly communication.

Robert J. Sandusky is an associate professor and assistant university librarian for information technology at the University of Illinois at Chicago. His research addresses issues in scholarly communications; data management and curation; and distributed information practices — the confluence of information, systems, individuals, groups, organizations, standards, and processes. He is a member of the Association for Computing Machinery, the American Library Association, and the American Society of Information Science and Technology.

Suzie Allard is an associate professor and the associate director of the School of Information Sciences at the University of Tennessee. Her research focuses on how scientists and engineers use and communicate information. Her research has been published in journals including *PLoS ONE*, the *Journal of the American Society of Information Science and Technology*, and the *Journal of eScience Librarianship* and she has presented at conferences in the U.S., Europe, and Asia.

Ben Birch is a doctoral student and graduate research associate on the National Science Foundation-sponsored DataONE project in the School of Information Sciences at the University of Tennessee. Originally from Georgia, he earned a bachelor's degree in mechanical engineering from Georgia Tech. Following graduation, he worked as an engineer in the aerospace, shipbuilding, and nuclear power industries. Mr. Birch earned a master's degree in computer science at UT, where he worked as a research assistant in the field of robotic software.