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Supporting Scholarly Research: Current and New Opportunities for Academic Libraries

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Supporting Scholarly Research: Current and New Opportunities for Academic Libraries

Ngoc-Yen Tran, San José State University
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A Choice White Paper

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Choice White Paper: Supporting Scholarly Research: Current and New Opportunities for Academic Libraries

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With this study, "Supporting Scholarly Research: Current and New Opportunities for Academic Libraries," Choice, a publishing unit at the Association of College and Research Libraries, presents the sixth in a series of research papers designed to provide actionable intelligence around topics of importance to the academic library community. Researched and written by industry experts and published with underwriting from academic publishers and other parties, these papers are part of a continuing effort by Choice to extend its services to a broad cross-section of library-related professions.

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CONTENTS

ABOUT THE AUTHORS i

EXECUTIVE SUMMARY 1

INTRODUCTION 2

RELATED LITERATURE 3

- Recent Changes to Research Workflows 3
- Library Responses to New Research Workflows 4
  - Identify, Track, and Manage Funding Opportunities 5
  - Research Data Management, Sharing, and Preservation 5
  - Publishing and Dissemination of Research 6
  - Research Impacts and Metrics 7

SURVEY AND INTERVIEW 8

- Methodology 8
  - Survey 8
  - Interviews 8
- Survey Results 9
  - Demographics 9
  - Plans for Supporting Research Funding, Data Services, Publishing, and Metrics 10
    - Identify, Track, and Organize Funding Support 10
    - Data Services and Data Management Support 11
    - Publishing and Dissemination Support 12
    - Research Impact, Metrics, or Discoverability Support 13
  - Collaborations to Support Research Workflows 14
  - Staffing to Support Research Workflows 15
  - Challenges to Supporting Research Workflows 18
  - Library Priorities to Supporting Faculty Research Workflows 18
- Interview Results 19
  - Demographics 19
  - Staffing to Support Research Workflows 20
  - Challenges to Supporting Research Workflows 21
  - Emerging & New Directions for Supporting Research Workflows 22

DISCUSSION OF SURVEY AND INTERVIEW RESULTS 23

CONCLUSION 25

WORKS CITED 26

APPENDIX 29

- Survey Questions 29
- Interview Questions 33

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Supporting Scholarly Research: Current and New Opportunities for Academic Libraries

EXECUTIVE SUMMARY

To explore current and emerging academic library support for changing research workflows, the researchers surveyed academic librarians and interviewed academic library administrators in the United States and Canada. The goal of the mixed-method study was to investigate how academic libraries are looking to deepen their support for research activities within the identification of funding opportunities, research data management and data services, publishing and scholarly work dissemination, and collection of research metrics and impacts.

It should be acknowledged that this report was researched and written during the COVID-19 pandemic, a time of continuing uncertainty. There is general agreement that after COVID-19, there will be a "new normal" for libraries and for higher education in general. The extent to which the COVID-19 pandemic will affect research workflows or practices, funding for faculty research, and the overall research and scholarship landscape in the near- or long-term is unknown.

Even so, this report can provide libraries with practical information and ideas for current and future strategies for supporting evolving research workflows and researcher needs. The survey was distributed on April 8, 2020, and closed on May 4, 2020; the interviews were conducted between April 23, 2020 and May 11, 2020.

Key findings:

- Academic libraries are providing support in all four new research workflow areas (funding identification, data services, publishing, and research metrics) with involvement in some activities to a lesser degree than others.
- The greatest areas of current research support are publishing and research metrics. Data services is still limited but will continue to grow, especially as open research garners more attention. Funding identification support by the library is limited.
- Research workflow priorities, in rank order, are publishing and scholarly work dissemination support; research impact, metrics, or discovery support; data management/data management plan support; and identifying or managing funding support.
- Library liaisons or subject liaisons continue to provide the bulk of support through one-on-one consultations after relationships and trust have been built.

- Libraries are not necessarily adding new staff to address current or emerging research activities; rather, existing employees are seeing increases in position responsibilities.
- Development of staff expertise involves multiple methods, including in-house, university-sponsored, and non-university-sponsored training, workshops, or courses.
- Limited budgets and staffing continue to be major challenges for academic libraries in providing expanded research support. Other challenges include faculty awareness of library resources and services, and campus structure or (mis)perceptions of a modern library.
- Libraries collaborate extensively with offices of research, colleges/schools, and most frequently with individual faculty. Collaborations ensure strong relationships in resource procurement, promotion, and use.
- Libraries are creatively meeting challenges through collaboration and consortial relationships. Consortia membership can provide access to content and relieve staffing shortages.
- An emerging area is to recast institutional repositories as avenues for supporting many aspects of research workflows.
- Due to COVID-19 pandemic shutdowns, the need to digitize local, unique collections is greater than ever. Deployment of library services and resources in a digital manner will become a growing area of focus.

INTRODUCTION

Until most recently, the activities involved in the creation and dissemination of new knowledge, often referred to as the research lifecycle or research workflow, have stayed relatively the same. Research generally begins with a scholar reading the literature or observing the world; seeing a need or a gap; then planning, designing, and conducting the research; and finally producing some form of research output such as a book, article, audio visual, painting, etc. for dissemination. Publishers, curators, and other gatekeepers evaluate the work against established criteria and if those are met, the work is then disseminated, and the cycle begins again for the scholar as they embark on a new project.

While the activities of a researcher's workflow may differ based on their discipline, situation, or preferences (Schonfeld, 2017; Glusker & Exner, 2018), factors such as academic culture, economics, and technology have undeniably altered the processes and activities of new knowledge creation, particularly within the last two decades. The last decade has brought forth further changes and developments of new practices for scholars as a result of external mandates or requirements (Glusker & Exner, 2018), alignment of faculty scholarship with institutional priorities or goals, and shifts in publishing and dissemination technologies or paradigms. Some of these new research practices (and the focus of this report) have been identifying, tracking, and managing funding opportunities (Vaughan et al., 2013; Polster, 2007); research data management, sharing, and preservation practices (Wolff-Eisenberg, Rod, & Schonfeld, 2016; Glusker & Exner, 2018); research publishing and scholarly work dissemination (Peters & Dryden, 2011; Rowlands et al., 2011; Kennan, Corrall, & Afzal, 2014); and gathering and documenting research impact (Vaughan et al., 2013).

In response to changes or new developments in scholarly practices and workflows, academic libraries have adapted, expanded, or developed new resources, services, and spaces in order to meet these new research and researcher needs (Favaro & Hoadley, 2014). Additionally, as colleges and universities have identified increased faculty research output as an institutional goal, libraries have aligned their activities with these institutional priorities to demonstrate value (Lougee, 2009). Furthermore, libraries and librarians have positioned themselves as essential players in supporting the changing faculty research workflows and, fundamentally, the campus research enterprise.

The goal of this report is to investigate how academic libraries are looking to deepen their support for research activities within the identification of funding opportunities, research data management and data services, publishing and scholarly work dissemination, and collection of research metrics and impacts. Using a mixed-methods approach that consists of a survey of academic librarians and interviews with library administrators, the study concentrates specifically on academic libraries' current responses to the changing nature of faculty research and their plans for providing additional support along those four topical areas. It should be acknowledged that this report was researched and written during the COVID-19 pandemic; in this time of continuing uncertainty, it is unknown how this pandemic will affect research workflows and the overall research and scholarship landscape.

RELATED LITERATURE

Recent Changes to Research Workflows

In the last decade, mandates from government agencies have dramatically altered scholars' research activities, particularly around the management and sharing of research data. Previously, researchers could store, organize, and manage their data in any way they wished. However, new governmental mandates require that researchers who receive government funds make their research data available to the general public to foster reuse and improve transparency and reproducibility. In 2003, the National Institute of Health (NIH) in the United States made it a requirement that all grant applications for $500,000 or more include a data sharing plan (NIH, 2003). Since then, more government agencies including those in the United States (Holden, 2013), Canada (Government of Canada, 2016), and Europe (European Commission, 2020) have developed requirements that all applications for government-funded research have a data management plan that describes how researchers will manage and share their data. Naturally, with the availability of more publicly accessible data, there are greater needs and opportunities for applying metadata for discoverability and reuse, as well as finding, mining, and visualizing data.

The same mandates that necessitate the management and sharing of research data also often require that the results of the research be made freely available to the public within a certain time frame. For example, in the United States, the release of a memorandum by the Obama administration in 2013 required that all federally funded research above a certain dollar amount make an original research report available free-of-charge within 12 months of publication (Holden, 2013). Bolstered by this practice where data and results are accessible to a wider audience, new ideologies spurred by technological innovations have impacted the scholarly research publishing and dissemination landscape, and therefore, faculty research workflows. In terms of publishing, it is not uncommon

to have discussions about open access and nontraditional publishing formats such as blogs or wikis (Rowlands et al., 2011), and for disseminating work, scholars have options for different types of repositories (institutional repositories, pre-print and post-print repositories, etc.), scholarly profiles and online presences (ORCID, institutional repository profiles, ResearchGate, etc.), and additional channels such as Twitter and LinkedIn to disseminate their work. This increased interest in open research where research and research data is accessible as a result of governmental mandates has indeed contributed to recent changes to faculty research workflows (Tammaro & Casarosa, 2014).

Besides government mandates or requirements for research, institutional alignment of faculty scholarship with campus priorities has also been a driver of change to faculty research workflows, especially in securing external research grants and awards. As institutions look to maintain or increase their reputation or status vis-à-vis faculty research productivity and outcomes, successful procurement of grants will become an area of growing importance (Polster, 2007). While institutions have goals to increase faculty research outputs, shrinking or flat budgets have limited their abilities to fully financially support research endeavors, resulting in the necessity for some researchers to apply for external grants and awards as a way to supplement base support and improve research infrastructure. Institutional budgets are assisted with facilities and administrative fees and can serve as a source of income for the institution (Polster, 2007). Even as these external sources of funding are available, global economic crises have constrained the ability of governments to fund research and education (Kennan, Corrall, & Afzal, 2014), even more so as they focus their limited funds on targeted research areas. With limited funds for all areas of research and the rising costs of conducting research due to privatization or commercialization, the process of procuring research grants and awards has become highly competitive (Polster, 2007). In this current state of scarce resources and high competition, it is even more prudent for faculty to be cognizant and aware of potential funding opportunities; to track, organize, and manage those options in order to identify and develop a successful grant proposal; or to look for other avenues of financial support.

With limited institutional and federal support for research, there are increasing demands for greater accountability and measurement of research performance, thereby expanding institutional and researcher interests in research impacts and metrics (Ball & Tunger, 2006; Hendrix, 2010; Astrom & Hansson, 2013). Instead of simply publishing their work and moving onto the next project, faculty are now asked to actively promote and disseminate their research and outputs using a variety of channels, collect evidence concerning their productivity and the impact of their research, and monitor the continuing effects of their work in perpetuity to highlight its enduring influence. This latter element is particularly noteworthy when applying for additional funds to continue and expand upon previous projects, and for the purposes of tenure or promotion.

These new research practices around funding, data management, publishing and dissemination, and research impact have influenced faculty processes and highlight potential areas for library support.

Library Responses to New Research Workflows

As funder, institution, and general public expectations of researchers increase, more support for all aspects of research workflows will be necessary (Ketchum, 2017), especially for processes related to identifying, tracking, and managing funding opportunities; data management and services; publishing

and dissemination; and tracking and demonstrating research impacts and metrics. Libraries and librarians have been traditionally known to offer resources and services toward the beginning and the end of research workflows; however, these new researcher activities are within the scope of library and librarian expertise and skills and are natural extensions of existing library work and knowledge (Vaughan et al. 2013; Ketchum, 2017; Cox & Tam, 2018). Indeed, academic libraries and librarians have strategically responded by enhancing, expanding, or developing online resources and technological tools; providing programs and services, including training or instruction; and physical spaces to demonstrate their value in meeting researcher needs and campus research priorities (Favaro & Hoadley, 2014).

Identify, track, and manage funding opportunities

Library and librarian skills and knowledge of searching and indexing can naturally be extended to helping faculty identify, track, and manage potential funding opportunities (Atkinson, 2016). Besides acquiring general and subject-specific databases, libraries are aware of and can become familiar with other types of database subscriptions, including funding databases such as Pivot or SPIN that make it easier for researchers to identify, track, and manage funding opportunities and to locate potential collaborators. In some cases, libraries have subscribed to and/or shared costs with campus units in order to license funding databases or research information management systems such as Elsevier's Pure, which is a database of researchers and can be used to match funding opportunities with their research agenda (Healy, 2010; Goodell & Murray, 2020). Additionally, as providers of information, librarians have also compiled grant identification information into one place, such as through a web guide via LibGuides (Deng and Dotson, 2015). For example, at New York University Library, the library's grants web guide included steps with internal and external resources for each of the steps, including identifying and writing research grants (New York University Library, 2019).

Beyond providing access to funding databases, academic librarians also deliver training and instruction, as well as other programs and services to help researchers identify, track, and manage grant opportunities. Suggested topics in the literature for instruction programs have included the following: how to track, manage, and organize potential grants and awards in databases like Pivot or SPIN (Healy, 2010), present current awareness tools and grant writing resources (Healy, 2010), identify specific grant opportunities (Vaughan et al., 2013), and identify alternative funding sources (Vaughan et al., 2013).

Research data management, sharing, and preservation

Library support of research data is still developing, with many academic libraries anticipating future involvement in this particular research workflow as open data policies become commonplace (Tenopir, 2019). This involvement, however, can vary because research data support is complex and can include a number of different services, such as finding datasets, data mining, and use of statistical software. While some libraries are supporting the more technical aspects of data services, most are providing information on data services at the campus level and/or helping researchers locate datasets (Tenopir, 2019).

In recent years, there has been a growing interest among libraries to support faculty with the management, sharing, and preservation of research data, specifically in fulfilling funder mandates with the creation of research data management plans (Tenopir, 2019; Sewell, 2020). The Data Management Plan Tool (DMPTool), created by eight ARL libraries in direct response to government mandates for open data practices, enables researchers to create a data management

plan using pre-loaded, funder-specific templates (University of California Curation Center, "About Us," n.d.). Further customization by libraries can include insertion of local information and uploading complete examples. Other tools for data management support include institutional repositories for open data storage (Corrall & Lester, 2013), and online toolkits that help researchers write data management plans and better understand the process of data management, find agency requirements for plans, and locate services available on campus for various aspects of data management. Many examples of library-created web guides can be found online, for example, the one from University of New Hampshire (University of New Hampshire Library, 2020), and from University of California Los Angeles Library as a source for humanities faculty (University of California Los Angeles Library, 2020).

The provision of new resources and tools often requires training and instruction in their use. Librarians at University of North Carolina at Chapel Hill provide faculty with instruction in the preparation of data management plans, preparing data, navigating repository options, and tracking compliance through a research data toolkit (Vaughan et al., 2013). At University of Central Florida, metadata services were created by librarians to support faculty through activities that included consultations to researchers on topics such as data set documentation, information and advice on metadata standards and descriptions, and helping researchers to prepare metadata for deposit and preservation (Deng and Dotson, 2015). Other suggested topics for support in this area from the literature have included providing advice and training and setting up data repositories to support research data management (Cox & Pinfield, 2014), locating internal and external data services (Peters & Dryden, 2011), and organizing or managing data, media, or images for research both in the present and for the future (Wolff-Eisenberg, Rod, & Schonfeld, 2016).

Publishing and dissemination of research

With advances in technology and other changes to the research publishing and dissemination landscape, libraries and librarians have had to consider additional strategies to help faculty publish and disseminate their research (Sewell, 2020). It should be noted that the publishing and dissemination landscape is complex, and there are many ways to provide support in this area to researchers. Those described below are only a sample of potential options for support.

One example of publishing and dissemination support has been through library-initiated development and management of institutional repositories (IRs) as part of a campus-wide infrastructure strategy for open access publishing and to provide greater visibility of faculty research (Corrall & Lester, 2013). A quick online search reveals that many libraries offer this tool to help researchers meet funding requirements with data management, expand their open access publishing options, and to increase the reach of their research outputs. One feature of IRs is the ability to develop faculty research profiles. With technological advances, disseminating research has become more digitally mediated, and online scholarly presences have become more important for demonstrating researcher validity and reputation. While the IR is one option for researcher profiles, recently there have been more complex systems and databases that can track and promote researcher activities (among other functions), like Elsevier's Pure and Ex Libris' Esploro. Librarians at Wayne State University and Oklahoma State University Center for Health Sciences have collaborated with their research office to provide research profile databases as well as training sessions to promote their use (Healy, 2010; Goodell & Murray, 2020).

While some research dissemination can be done passively through researcher profiles or distributing lists of faculty research achievements, active dissemination and promotion of research is required in order to reach a wider set of audiences. Faculty recognize this and have adjusted by being open and/or actively distributing their research using technological channels such as social media (Rowlands, et al., 2011). Libraries have also helped faculty in promoting and disseminating their work through the development of web guides and events that discuss online strategies for maintaining a digital identity, sharing and promoting one's research, registering for ORCID numbers, making pre-prints available, and using social media to disseminate research (Konkiel, 2015). Other avenues of research publishing support include selecting appropriate journals and understanding author's rights and copyright (Vaughan et al., 2013).

Lastly, some libraries have pooled their tools and resources, programs and services, and staffing together to create new spaces that support faculty research publishing and dissemination. Areas such as digital scholarship centers, digital humanities centers, and research commons have become spaces for the creation of new knowledge for faculty to share and disseminate their research through presentations, workshops, and symposia.

Research impacts and metrics

Libraries have been providing research metrics to scholars and institutions, but increasing demands for greater institutional and researcher accountability have highlighted the need for comprehensive research analytics (Ball & Tunger, 2006; Hendrix, 2010; Astrom & Hansson, 2013). A well-known method for measuring research impact is through the use of bibliometrics - the quantitative method of citation and content analysis of scholarly journals, books, and researchers by counting citations and determining h-indexes. Despite some controversies with bibliometrics, it remains a prominent and frequently used method for determining research performance. Therefore, libraries and librarians continue to provide and support researchers and institutions with access to, and instruction on, tools such as Web of Science, Scopus, Google Scholar, and others to help faculty identify citation counts and other research impact metrics (Astrom & Hansson, 2013). For faculty, measurements of impact are used for the tenure process (Kear & Colbert-Lewis, 2011), and for institutions, they can be used in determining the allocation of institutional research funding. Specific services and topics include: citation reports and impact calculations (Corrall, Kennan, & Afzal, 2013); verification of outputs and the location of DOIs (Bradbury & Weightman, 2010); and helping faculty deposit work into digital repositories (Vaughan et al., 2013).

Besides providing the tools and instruction on citation and researcher metrics, librarians have also been supporting faculty with identifying alternative metrics (Roemer and Borchadt, 2012). Libraries have provided access to tools such as Altmetrics or PlumX, in which researchers can quantify the reach of their research on blogs, social media, *Wikipedia*, and citation managers. Additionally, librarians have provided training and instruction on how researchers and scholars can demonstrate the impact of their research on the societal or cultural spectrum, using nontraditional metrics such as how their research has affected patient care or changed public policies. In helping faculty increase their research impact metrics, libraries and librarians have also provided tools and instruction on strategies for enhancing research impact and metrics, such as populating online profiles with links to faculty research outputs and registering for ORCID, a unique researcher identifier.

SURVEY AND INTERVIEW

As academic libraries of all types look to support research activities at their institutions, this study investigates how academic libraries are attempting to do so and their plans for the future, especially as it relates to the identification of research funding, research data management, publishing and dissemination, and research metrics and impacts. To do so, the research questions of the study are:

- What have been academic libraries' responses to the changing nature of faculty research, especially as it relates to research funding, data management, publishing and dissemination, and impacts and metrics?
- What are emerging supports and new directions for libraries as they look to support research funding, data management, publishing and dissemination, and impacts and metrics?

Methodology

A mixed-methods design approach, comprising a widely distributed survey and interviews, was used in order to gather information on this complex topic. Approval from the San José State University Institutional Review Board was sought and granted (Tracking Number: F20099).

Survey

The authors developed a survey questionnaire to better understand library and campus support of faculty research workflows, and library operational approaches for providing support and their corresponding challenges and priorities. The questions centered on nascent library research services, specifically: research funding, research data, research publishing and dissemination, and research impact, metrics, and discoverability support. Demographic questions were limited to understanding the institutional and positional context of the responses (see Appendix for questionnaire).

Choice personnel distributed the survey to 1,600 contacts via ACRL lists and then to an additional 11,350 individuals via the Choice house list for a total of 12,950 contacts. The survey was distributed on April 8, 2020, and closed on May 4, 2020. Reminders were sent periodically within the open time period. Thirty-one hundred contacts opened the email, 211 individuals clicked to the survey, and 196 viable responses were collected. The response rate was 1.5%.

Interviews

The authors developed an interview instrument with the goal of understanding the challenges, opportunities, and experiences of library administrators from all types of institutions in providing faculty research workflows support (see Appendix for interview questions). Library administrator (deans, directors, associate deans, associate directors, et al.) participation was solicited via library listservs, social media, the corresponding survey, and by direct invitation. Interview participants were screened based on their institution's Carnegie classification to ensure representation from all library types.

Bewtween April 23, 2020 and May 11, 2020, 11 library administrator interviews were scheduled, conducted, and recorded via Zoom, an online conferencing software platform. Consent to participate in the interviews was obtained using DocuSign. Each interview lasted approximately an hour. Zoom's transcript feature was used, but all transcripts were anonymized and reviewed for accuracy. Each interviewee was assigned a pseudonym by institution type (e.g., research library 1, master's library 2, etc.). The transcripts were reviewed and analyzed using an open coding method where words or sentences were highlighted that pertained to predetermined themes and codes (those related to research funding, data management, publication and dissemination, and metrics and impacts). Additionally, depending on the code, they could also be assigned a subcode for more nuanced analysis. All the codes and themes were placed into a spreadsheet for further analysis. While the coding was conducted separately, the researchers reviewed each other's coding in order to develop a consensus.

Survey Results

Demographics

A total of 196 respondents consented to participate in the survey and provided viable data. Due to the open nature of the survey and the absence of mandatory questions, respondent numbers for each question may vary and will not reflect the total number of respondents. Percentages are calculated from the number of viable responses for that particular question.

Table 1: Survey Participant Counts and Relative Percentages by Institution Type in Comparison to 2018 Carnegie Classification Population

Carnegie Classification	Number of Survey Respondents (% of column total)	Number of Institutions from the 2018 Carnegie Classification Data (% of column total)
Doctoral Universities	41 (36.0%)	418 (14.2%)
Master's Colleges & Universities	31 (27.2%)	685 (23.3%)
Baccalaureate Colleges	28 (24.6%)	837 (28.5%)
Associate's Colleges	14 (12.3%)	1,000 (34.0%)
Total	114 (100%)	2,940 (100%)

Table 1 shows the institutional categories for the survey participants. The majority of the survey respondents were affiliated with doctoral universities (n=41, 36%), followed by master's colleges and universities (n=31, 27.2%), baccalaureate colleges (n=28, 24.6%), and associate's colleges (n=14, 12.3%).

Table 2: Faculty Research Workflows Directly Supported by Survey Respondents

	Research awareness / info-seeking	Research planning	Research analysis	Research writing	Research publication	Research assessment or metrics	Research preservation
Doctoral (n=40)	33	18	9	11	17	11	14
Master's (n=30)	25	8	8	7	8	7	12
Baccalaureate (n=28)	26	9	8	8	10	4	8
Associate's (n=12)	11	3	2	2	1	2	4

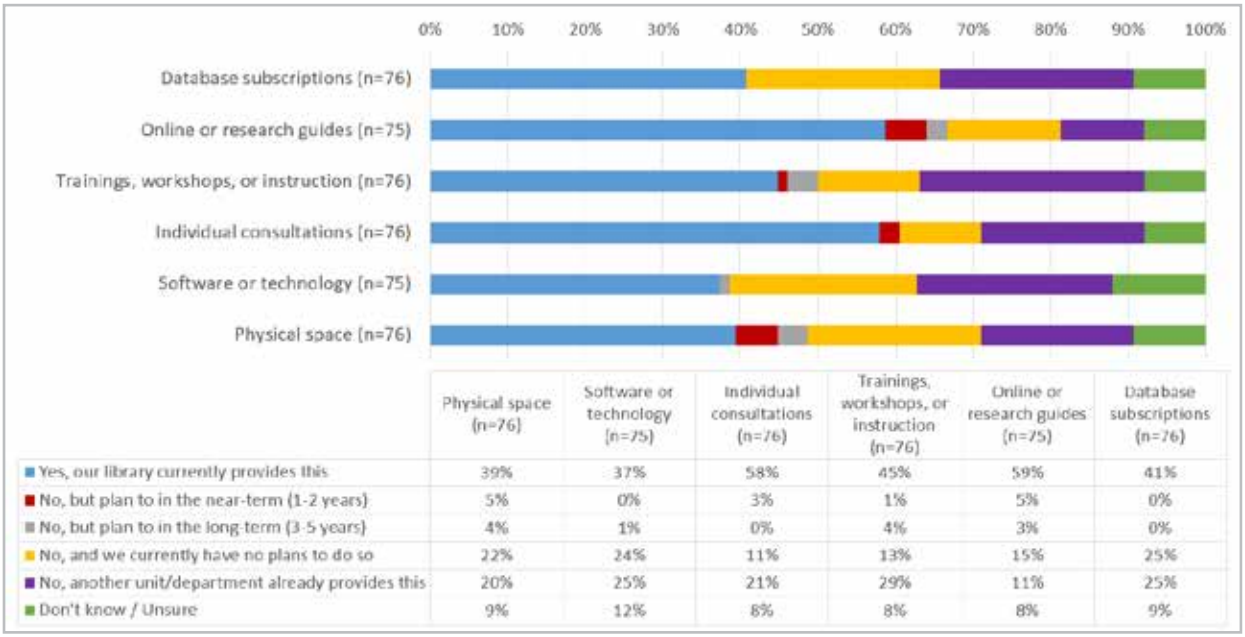
Table 2 displays the faculty research workflows that survey respondents directly support. Respondents were allowed to select as many that would apply. Results indicate that individuals may support multiple areas with the highest frequency in "research awareness/info-seeking" across all institution categories.

Plans for Supporting Research Funding, Data Services, Publishing, and Metrics

Identify, Track, and Organize Funding Support

Survey respondents reported upon their libraries' or campus's support of research funding (Figure 1). Among the options of providing access to database subscriptions; online or

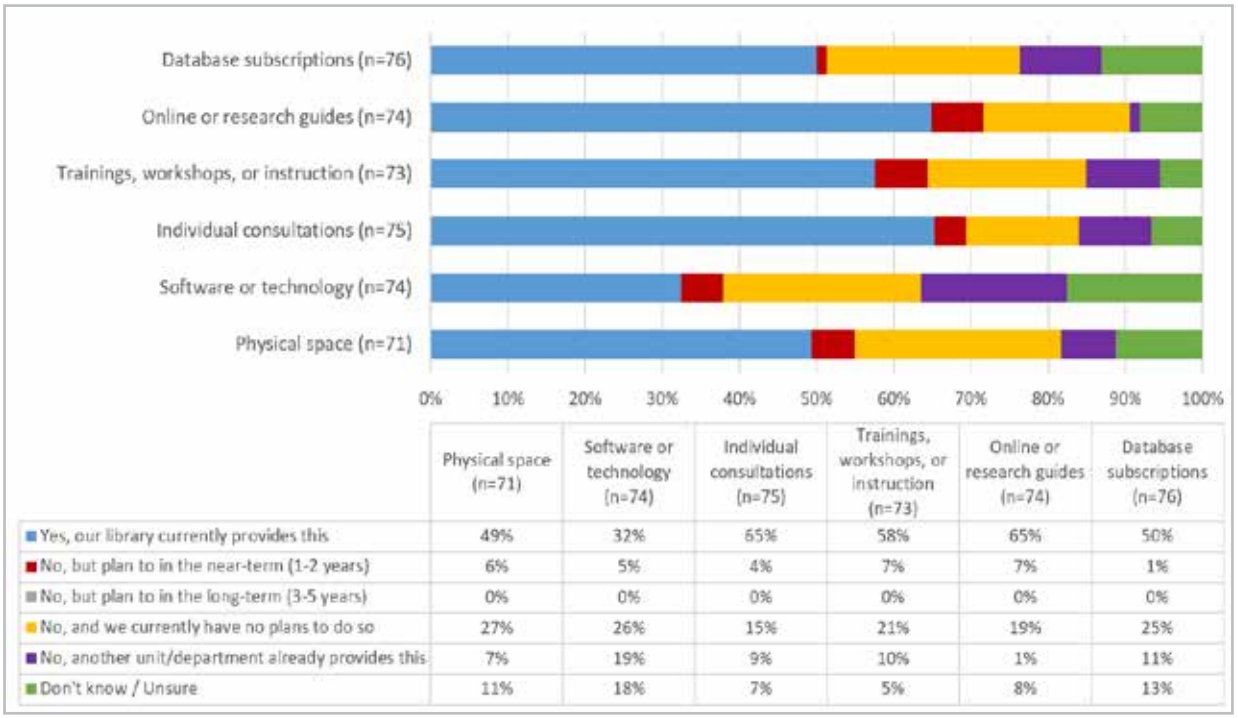
Figure 1: Research Funding Support Among Survey Respondents' Libraries



research guides; trainings, workshops, or instruction; individual consultations; software or technology; or physical space, over half of the respondents indicated that their libraries currently offered online or research guides (n=44, 59%) and individual consultations (n=44, 58%) to support research funding activity. Very few respondents reported any plans to provide research funding support over the next several years, while a notable group of respondents indicated that their libraries had no plans to provide database subscriptions (n=19, 25%), software (n=18, 24%), or physical space (n=17, 22%) to this element. Except for the category of maintaining online or research guides, which was a majority library-provided activity, a sizable portion of survey participants reported that another campus unit or department was already providing database subscriptions; trainings, workshops, or instruction; software or technology; and physical spaces to support research funding.

Data Services and Data Management Support

Figure 2: Research Data Support Among Survey Respondents' Libraries

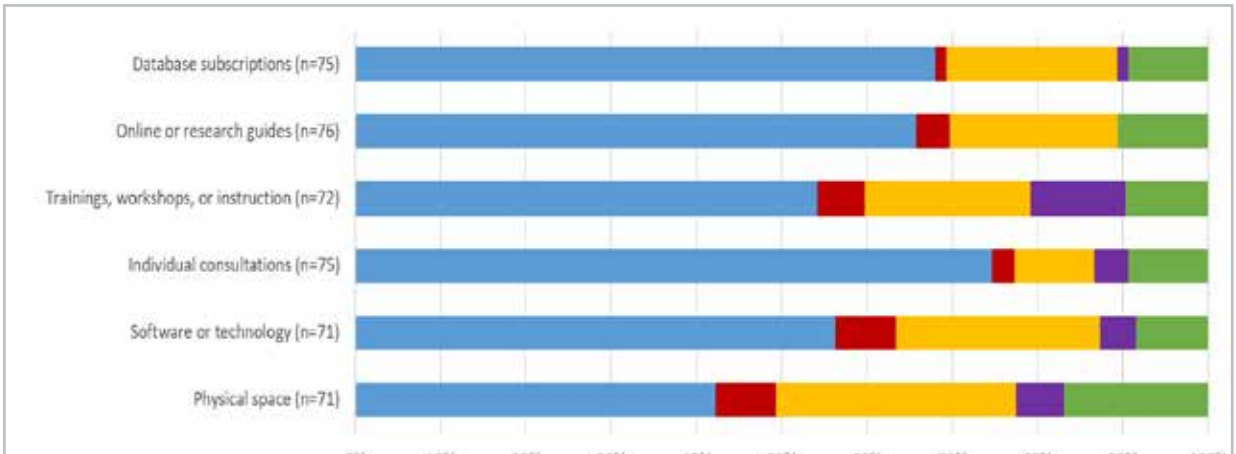


	Physical space (n=71)	Software or technology (n=74)	Individual consultations (n=75)	Trainings, workshops, or instruction (n=73)	Online or research guides (n=74)	Database subscriptions (n=76)
Yes, our library currently provides this	49%	32%	65%	58%	65%	50%
No, but plan to in the near-term (1-2 years)	6%	5%	4%	7%	7%	1%
No, but plan to in the long-term (3-5 years)	0%	0%	0%	0%	0%	0%
No, and we currently have no plans to do so	27%	26%	15%	21%	19%	25%
No, another unit/department already provides this	7%	19%	9%	10%	1%	11%
Don't know / Unsure	11%	18%	7%	5%	8%	13%

In the area of research data support, online or research guides (n=48, 65%), individual consultations (n=49, 65%), and trainings, workshops, or instruction (n=42, 58%) were among the highest reported library-provided activities among survey respondents (Figure 2). Additionally, almost half of the survey respondents indicated that the library provides physical space for research data support (n=35, 49%). Conversely, physical space (n=19, 27%), software or technology (n=19, 26%), and database subscriptions (n=19, 25%) were identified as resources for which the respondents' libraries did not have plans to support. Software or technology was most frequently provided by another unit/department (n=14, 19%).

Publishing and Dissemination Support

Figure 3: Research Publishing and Dissemination Support Among Survey Respondents' Libraries

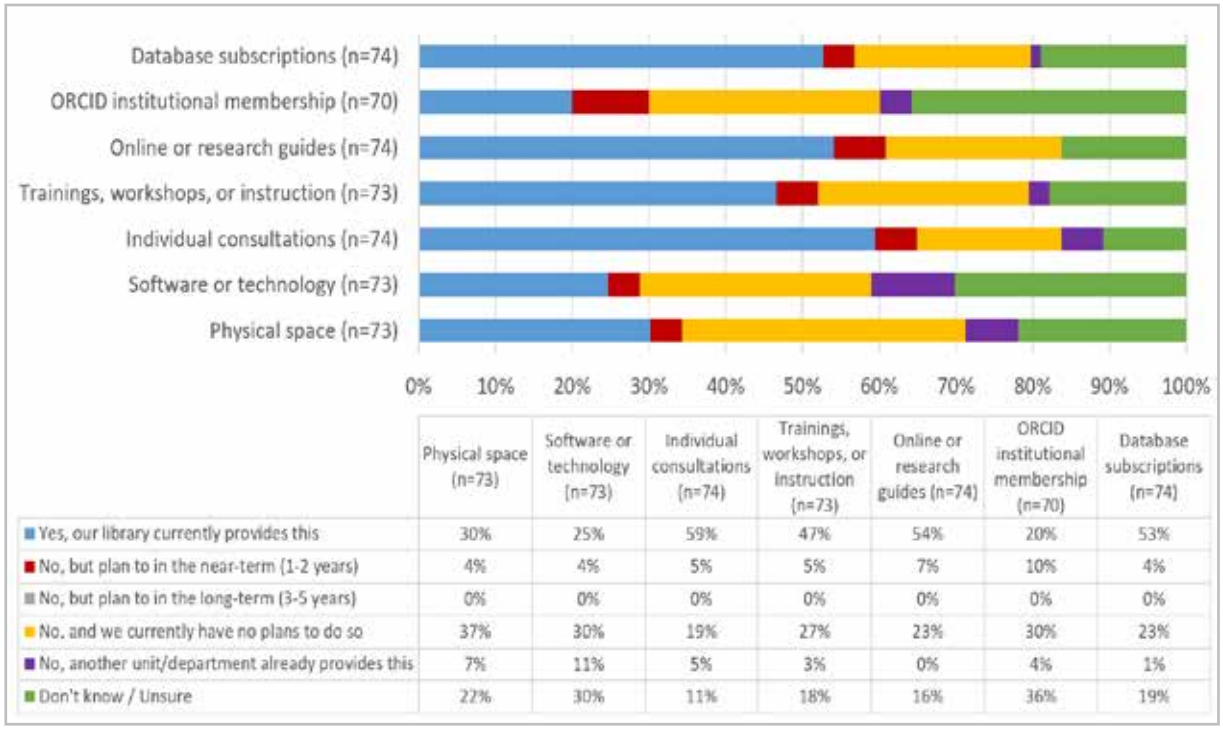


	Physical space (n=71)	Software or technology (n=71)	Individual consultations (n=75)	Trainings, workshops, or instruction (n=72)	Online or research guides (n=76)	Database subscriptions (n=75)
Yes, our library currently provides this	42%	56%	75%	54%	66%	68%
No, but plan to in the near-term (1-2 years)	7%	7%	3%	6%	4%	1%
No, but plan to in the long-term (3-5 years)	0%	0%	0%	0%	0%	0%
No, and we currently have no plans to do so	28%	24%	9%	19%	20%	20%
No, another unit/department already provides this	6%	4%	4%	11%	0%	1%
Don't know / Unsure	17%	8%	9%	10%	11%	9%

Individual consultations were the most frequently library-offered activity for research publishing support (n=56, 75%), followed by database subscriptions (n=51, 68%); online or research guides (n=50, 66%); software or technology (n=40, 56%); trainings, workshops, or instruction (n=39, 54%); and physical space (n=30, 42%) (Figure 3). Survey respondents indicated that their libraries did not have plans to offer research publishing support in the areas of physical space (n=20, 28%), or software or technology (n=17, 24%). Eight (11%) respondents reported that trainings, workshops, or instruction on research publishing could also be offered by another unit/department.

Research Impact, Metrics, or Discoverability Support

Figure 4: Research Impact, Metrics, or Discoverability Support Among Survey Respondents' Libraries



	Physical space (n=73)	Software or technology (n=73)	Individual consultations (n=74)	Trainings, workshops, or instruction (n=73)	Online or research guides (n=74)	ORCID institutional membership (n=70)	Database subscriptions (n=74)
Yes, our library currently provides this	30%	25%	59%	47%	54%	20%	53%
No, but plan to in the near-term (1-2 years)	4%	4%	5%	5%	7%	10%	4%
No, but plan to in the long-term (3-5 years)	0%	0%	0%	0%	0%	0%	0%
No, and we currently have no plans to do so	37%	30%	19%	27%	23%	30%	23%
No, another unit/department already provides this	7%	11%	5%	3%	0%	4%	1%
Don't know / Unsure	22%	30%	11%	18%	16%	36%	19%

Individual consultations for research impact, metrics, or discoverability support was most frequently offered by respondent libraries (n=44, 59%), followed by online or research guides (n=40, 54%) and database subscriptions (n=39, 53%) (Figure 4). ORCID institutional membership appeared less frequently than any other option (n=14, 20%). All categories of support, except for individual consultations, were frequently identified as areas for which the libraries had no plans to develop; most notable were physical space (n=27, 37%), software or technology (n=22, 30%), ORCID institutional membership (n=21, 30%), and trainings, workshops, or instruction (n=20, 27%).

Collaborations to Support Research Workflows

Table 3: Collaborators for Supporting Faculty Research Workflows

	Office of research	College or school	Individual faculty	Center for faculty excellence/ support	Information technology (IT)	Other	Library only	Not offered
Identifying, tracking, or managing funding opportunities or venues (n=64)	29 (45%)	14 (22%)	27 (42%)	10 (16%)	5 (8%)	5 (8%)	3 (5%)	13 (20%)
Research data services (including managing data, data visualization, etc.) (n=64)	18 (28%)	16 (25%)	25 (39%)	6 (9%)	15 (23%)	6 (9%)	4 (6%)	22 (34%)
Publishing and disseminating scholarly work (n=65)	13 (20%)	16 (25%)	37 (57%)	10 (15%)	3 (5%)	3 (5%)	11 (17%)	11 (17%)
Identifying and quantifying impact or metrics, and discoverability of scholarly work (n=64)	13 (20%)	12 (19%)	23 (36%)	4 (6%)	2 (3%)	6 (9%)	14 (22%)	17 (27%)

Table 3 displays the various collaborators for faculty research workflows across the four topical areas: funding, data services, publishing, and impact. Survey respondents were able to mark all that applied.

In the area of funding support, the Office of Research was the library's most frequently identified collaborator (n=29, 45%), followed by individual faculty (n=27, 42%). Over 20% of the affiliated libraries (n=13) did not offer research funding support.

For research data support, library collaboration took place with individual faculty (n=25, 39%), the Office of Research (n=18, 28%), colleges or schools (n=16, 25%), and information technology (IT) (n=15, 23%). Over 30% of the respondents indicated that their libraries were not currently offering research data services support (n=22).

In the area of research publishing support, individual faculty are their library's most frequent collaborators (n=37, 57%), followed by colleges or schools (n=16, 25%), and the Office of Research (n=13, 20%). Eleven (17%) respondents indicated that the library is the only unit providing services and programming in publishing support, while another eleven (17%) respondents reported that their libraries were not currently offering support in publishing.

In the area of research impact support, libraries frequently collaborated with individual faculty (n=23, 36%), followed by the Office of Research (n=13, 20%), and colleges or schools (n=12, 19%).

Fourteen libraries were not collaborating with any other entities when offering research impact support (22%), and seventeen (27%) libraries were not offering services in this area.

Staffing to Support Research Workflows

Table 4: Staffing Support for Faculty Research Workflows (check all that apply)

	Individual liaison or subject librarian(s) or staff	Dedicated librarian(s) or specialist(s)	A group, committee, or team	A department or unit	Other	Not offered
Identifying, tracking, or managing funding opportunities or venues (n=64)	28 (44%)	11 (17%)	4 (6%)	5 (8%)	6 (9%)	23 (36%)
Research data services (including managing data, data visualization, etc.) (n=65)	22 (34%)	16 (25%)	5 (8%)	9 (14%)	6 (9%)	20 (31%)
Publishing and disseminating scholarly work (n=65)	28 (43%)	19 (29%)	12 (18%)	7 (11%)	5 (8%)	10 (15%)
Identifying and quantifying impact or metrics, and discoverability of scholarly work (n=64)	28 (44%)	17 (27%)	7 (11%)	6 (9%)	5 (8%)	17 (27%)

In Table 4, survey respondents selected the various library employees and structures that staff the four aforementioned areas of research support. Multiple staffing options could be selected for each topic.

Survey respondents indicated that in the area of funding support, liaison librarians provided the greatest amount of support (n=28, 44%), followed by dedicated librarian(s) or specialist(s) (n=11, 17%).

For research data services, liaison librarians (n=22) and dedicated staff (n=16) provided the highest support at 34% and 25%, respectively. Support from a dedicated department or unit was notable (n=9, 14%).

Staffing for publishing support was primarily composed of liaison librarians (n=28, 43%) and dedicated staff (n=19, 29%), though larger structures were also involved. The group, committee, or team option was selected 12 (18%) times, while the department or unit option was selected 7 (11%) times.

Among survey respondents, impact support is derived from liaison librarians (n=28, 44%); dedicated staff (n=17, 27%); a group, committee, or team (n=7, 11%); a department or unit (n=6, 9%); and other (n=5, 8%). Seventeen (27%) respondents indicated that research impact support was not currently offered by their respective libraries.

Table 5: Staffing Capacity to Support Research Workflows, n=59

Approach to Developing Staff Capacity	Number of Survey Respondents (% of column total)
Not applicable (please describe)	20 (34%)
Reassigned existing staff	19 (32%)
Other (please describe)	12 (20%)
Hired staff specifically to support faculty research workflows	10 (17%)
Reclassify positions as vacancies arise	9 (15%)
Planning to reassign existing staff	7 (12%)
Planning to hire staff	1 (2%)

In Table 5, respondents reported on their approaches to developing staff capacity for supporting new or expanded faculty research workflows. Respondents could select multiple options.

The most frequently selected option was not applicable (n=20, 34%). These respondents indicated that work just happens and that everyone helps as they can, while others cited a lack of need on their campus to support expanded research workflows. Survey respondents indicated that they reassigned existing staff (n=59, 32%), used other methods (20%), hired staff for specific roles (17%), and reclassified positions as vacancies arise (15%). Respondents who selected the other option (n=12, 20%) reported that the activities associated with supporting new or expanded research workflows were added to existing job descriptions.

Table 6: Library Approaches for Providing Professional Development Opportunities to Develop Knowledge and Skills for Supporting Faculty Research Workflows

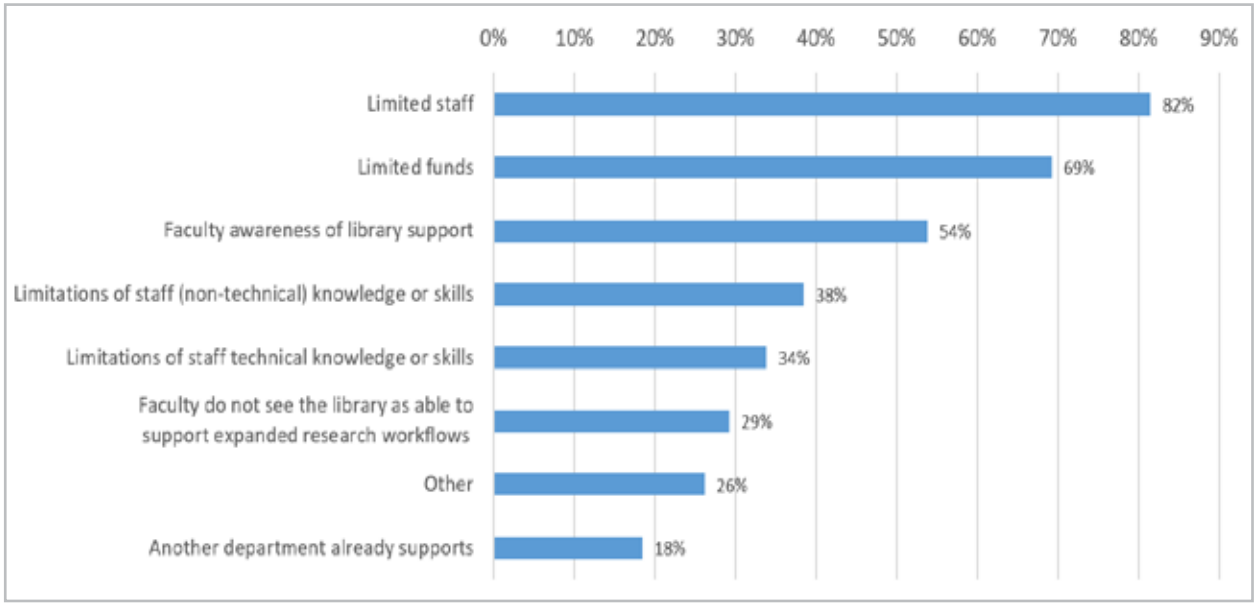
	Yes, currently provides	No, does not provide	No, plan on providing
In-house/library workshops or presentations (n=64)	34 (53%)	25 (39%)	5 (8%)
Provided financial or leave support to attend "university sponsored" conferences, workshops, or courses (n=64)	35 (55%)	25 (39%)	4 (6%)
Provided financial or leave support to attend "non-university sponsored" conferences, workshops, or courses (n=63)	41 (65%)	18 (29%)	4 (6%)
Collaborated with campus partners to develop conferences, workshops, programs, or courses (n= 62)	27 (44%)	25 (40%)	10 (16%)
Collaborated with non-campus partners to develop conferences, workshops, programs, or courses (n=61)	23 (38%)	30 (49%)	8 (13%)
Other (n=5)	0 (0%)	4 (80%)	1 (20%)

In Table 6, survey respondents reported on their library's approaches to providing professional development opportunities to develop knowledge or skills related to supporting the four aforementioned faculty research workflows.

Most respondents reported that their library provides financial leave or leave support to attend non-university (n=41, 65%) or university sponsored conferences, workshops, or courses (n=35, 55%), followed by in-house or library workshops or presentations (n=34, 53%). Collaboration with campus partners (n=27, 44%) and non-campus partners (n=23, 38%) to develop conferences, programs, or courses were indicated as other notable options for library staff professional development.

Challenges to Supporting Research Workflows

Figure 5: Reported Challenges to Supporting Faculty Research Workflows (Select All that Apply, n=65)

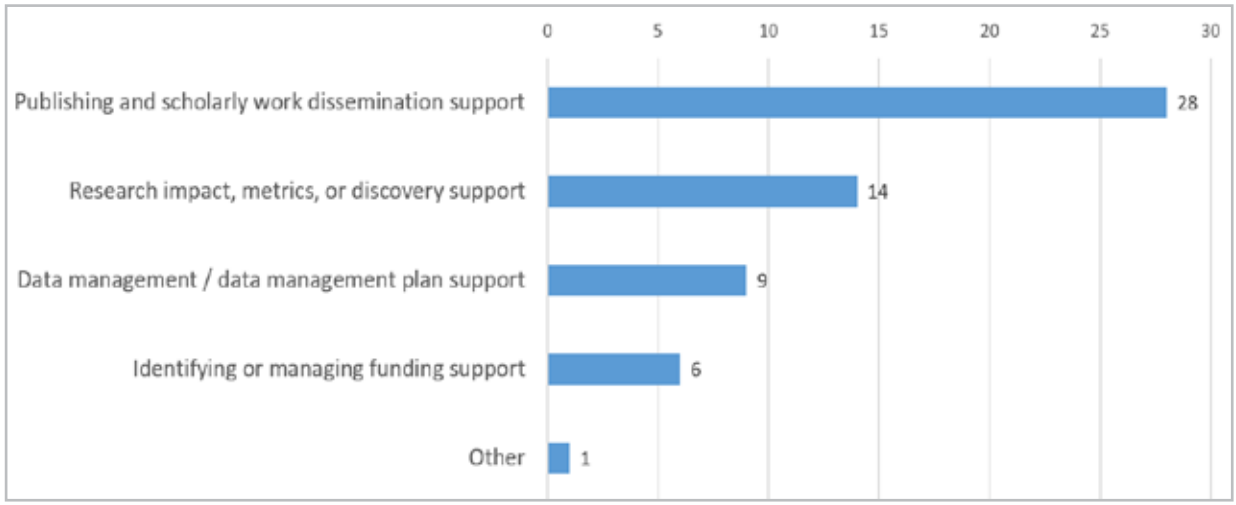


Survey respondents reported upon the most pressing challenges their libraries have in supporting faculty research workflows (Figure 5). Respondents could select all of the challenges that could apply.

The most pressing challenge was limited staff (n=53, 82%), followed by limited funds (n=45, 69%), and a lack of faculty awareness of library support (n=35, 54%).

Library Priorities to Supporting Faculty Research Workflows

Figure 6: Library's Highest Priority in Supporting Faculty Research Workflows (n=58)



Survey respondents ranked their library's priorities by the four topical areas of this white paper: research funding support, research data support, research publishing support, and research impact, metrics, and discoverability support (Figure 6).

Support in publishing ranked first with 28 (48%) respondents reporting it as their highest priority, followed by research impact (n=14, 24%), data (n=9, 16%), and funding (n=6, 10%).

Interview Results

Data was analyzed for the pre-determined themes focused on funding, data management, publishing and dissemination, and research impacts and metrics. Initial analysis of the interviews found that the specific codes of staffing, challenges, and emerging support would add to the quantitative survey questionnaire analysis. Pseudonyms are used to protect the identities of the research participants.

Demographics

A total of 11 library administrators were interviewed for the study, 8 female library administrators and 3 male administrators.

Table 7: Interviewed Library Administrators

Pseudonym	University Type	Location	Position
Special Focus 1 (SF1)	Public, 4-year or above Special Focus Four-Year: Other Health Professions Schools	United States	Director
Special Focus 2 (SF2)	4-year, Public Special Focus Four-Year: Law Schools	United States	Director
Master's Library 1 (ML1)	Private not-for-profit, 4-year or above Master's Colleges & Universities: Larger Programs	United States	Director
Master's Library 2 (ML2)	Private not-for-profit, 4-year or above Master's Colleges & Universities: Medium Programs	United States	Director
Master's Library 3 (ML3)	Private not-for-profit, 4-year or above Master's Colleges & Universities: Larger Programs	United States	Associate Director
Master's Library 4 (ML4)	Private not-for-profit, 4-year or above Master's Colleges & Universities: Larger Programs	United States	Director
Research Library 1 (RL1)	Public, 4-year or above Doctoral Universities: Very High Research Activity	Canada	Associate University Librarian
Research Library 2 (RL2)	Public, 4-year or above Doctoral Universities: Very High Research Activity	United States	Director
Research Library 3 (RL3)	Public, 4-year or above Doctoral Universities: Very High Research Activity	Canada	Associate University Librarian
Research Library 4 (RL4)	Public, 4-year or above Doctoral Universities: High Research Activity	United States	Research Administrator and IR Coordinator
Research Library 5 (RL5)	Public, 4-year or above Doctoral Universities: High Research Activity	United States	University Librarian

Of the 11 library administrators (Table 7), 9 were employed at institutions in the United States and 2 in Canada. All of the institutions granted four-year or above degrees. The interviews consisted of 7 public institutions and 4 private not-for-profit institutions; one of the institutions is listed among Historically Black Colleges and Universities and 1 is faith-based. Two are special-focus institutions with 4 master's colleges and universities with larger or medium programs and 5 doctoral universities with either high or very high research activity. It should be noted that Canada does not employ Carnegie Classification for their institutions, but research into the 2 Canadian institutions indicated they were doctoral universities with high research activity.

Staffing to Support Research Workflows

A large number of interview participants communicated that, with flat or shrinking budgets, they would not be able to grow their staff. In order to support broader faculty research workflows or activities, library staff duties have changed or evolved in order to meet research and researcher needs. It was common to hear that as library staff retired or left the institution, their responsibilities or positions were altered in order to align with the current needs of the library, meet new researcher or campus requests, or plan for the future. For instance, ML3 said that it was necessary to repurpose positions as an "investment in our program."

In the absence of employee turnover, staffing responsibilities naturally evolved and more people had to wear multiple hats or take on multiple responsibilities. Essentially, library staff continued providing their traditional supports while also taking on additional aspects of research workflows that were aligned with their skills, knowledge, or interests. As an example, SF2 said:

"The position [focuses on faculty services support] has become more involved in sort of moving...beyond like sort of the traditional role of just, you know, supporting faculty research and ensuring that faculty have the resources they need... He has sort of moved more into sort of promotion, like promoting our faculty, promoting scholarship, and sort of calculating through the metrics associated with that... Certainly [he] is more involved with that aspect of it now than he was in the past."

Another staffing/organizational structure theme expressed by the interview participants involved library reorganizations at both the library and campus levels. At the library level, some administrators said that their librarians' responsibilities had moved away from the traditional liaison or subject-based roles to functional roles that are more serviced based. Specifically, ML3 said:

"We probably had a "subject based" library liaison program for 20 or more years. But as time evolved, those liaisons, even though they were still referred to as "subjects liaisons," they function[ed] much less as true subject liaisons. … there are some basic IR [institutional repository] and scholarly communications embedded in those positions. So they're working closely with faculty to learn more about their research, helping them with their research profiles, they are helping them with collection development, assisting with accreditation, those types of things. And so we basically just took something we already had and repurposed it to support a new model."

At the campus level, changing library administrative roles has facilitated the integration of the library into broader campus discussions about research, its infrastructure, and associated initiatives. At RL1, the position for an Associate University Librarian for Research Services was created in order to foster greater research synergies between the library and campus:

"By creating a role that the University's research establishment recognizes as a research-specific role, that person, in this case me, is able to sit at the table and be a part of these [campus research] committees, where as I think previously the library …wasn't at the table in the same way. The librarians didn't attend [campus research] meetings. They might have been asked from time to time to come and give a presentation, but they weren't at the table, and that is something that I think has made a tremendous difference in the way we're viewed on campus, and the way we're able to get ourselves at the table in an initiative."

Greater involvement in campus-wide research discussions was reiterated by RL3 who stated:

"Making an Associate University Librarian with the research portfolio … positioned us in the university hierarchy. Whereas, it wasn't really clear who should go to meetings that, like, if the Associate Deans of Research for Social Sciences or Arts and Humanities were going somewhere, does the library get to send somebody? Or should they send somebody? But now, like, because I am an Associate Dean equivalent, I get to go to those things and I have access to that discussion, and I get to both listen and learn a tremendous amount, but also say, well you know we can do that for you."

When new positions were available, library administrators looked to hire people with different skills. RL3 mentioned, "It's been really part of my hiring strategy to not hire for subject area expertise at all, but rather for technical competencies and skill competencies." Multiple library administrators mentioned their scholarly communications librarians and digital initiatives librarians as key to supporting faculty research workflows.

Challenges to Supporting Research Workflows

Interview respondents unanimously indicated that limited funding and limited staffing were big challenges for libraries in supporting new faculty research workflows. With limited funding, libraries cannot provide the content, resources, technology, or the staffing that researchers need in order to explore or complete their research projects. And with limited staffing, the library lacks the personnel to provide new services, instruction, and education on available resources and tools.

Campus structure was also mentioned as a significant challenge among the interview respondents. Due to the independence of the library as a standalone unit, the library may lack information on activities and developments in the departments, schools, or colleges, making it potentially difficult for the library to provide the resources or services that are needed. The same structural division may create a bureaucratic culture that discourages collaboration among different campus units. ML3 described it as such:

"Sometimes the bureaucracy does not encourage getting into some of these new areas. You know, so like an office that you might want to collaborate might not be on to your vice president, and so, you know, strategically, how do you do that. There's also a lot of competition for resources and so how do you position yourself as less of a competitor and more of a supporter or a collaborator for what another unit might be doing. And what we are offering is certainly supportive, but in terms of resource allocation, it may appear as us receiving funding or support for our initiative is keeping another unit from getting the resources that they need."

Another challenge brought up during the interviews was acceptance or awareness of a modern academic library's role in supporting faculty research and scholarship, as campus stakeholders held

onto stereotypes, misconceptions, or preconceived notions of library and librarian roles. ML3 said, "I think they're [faculty are] surprised, often, that we offer these services. I think a lot of our faculty members have this idea of libraries as passive repositories of information…that they come to when they need to find something out."

Limited ability to keep library staff current with technical skills was also a challenge communicated by the interview participants. RL4 and RL1 both indicated that as more technology and software become available and as library work becomes more technical, it becomes more difficult to keep library staff up to date on the technology and resources available to researchers. And while there are opportunities to learn new technologies, staff time is limited and thereby they do not have the time to be able to keep up with all new technologies.

Emerging & New Directions for Supporting Research Workflows

Many of the interview participants spoke at length about institutional repositories (IRs) as an emerging area of library support for new research workflows. At an institution where their IR is currently in the beginning stages of development, SF1 stated that they believe the IR is a "key piece in the whole mix of the stuff we're going to be offering the faculty going forward." At an institution where their IR is well-established, RL5 said that they "fully and firmly believe that their [institutional repository's] potential has not been realized."

Some of the library administrators mentioned how they would seek to leverage their IR platforms in transformative ways to further open access, open data, open science, open publishing, and open educational resources. One of the ideas mentioned was to expand the IR to not only acquire research outputs but also to collect and archive research data. Another avenue mentioned was to use the IR platform as a new support mechanism for open publishing, such as through open access publishing and the creation of open educational materials. IRs were also described by the interview respondents as places for preserving and making available rich local and original content, especially as libraries provide more digital content or engage in digitization projects.

Beyond IRs, library administrators interviewed also saw the library as having a role in capturing the impact of faculty research. RL5 states that while library staff discuss scholarly identity and impact with faculty during consultations, there is more that can be done, and that by providing this type of support, the library is not only helping faculty but also supporting the institution with the "marketing, promotion, and advancement of institutional identity."

Continuing to provide traditional library research support within new, collaborative, or consortial constructs was also another theme brought up by library administrators as a potential way of meeting faculty research needs. For example, ML1 emphasized consortial relationships as a way to provide content and address staffing supports:

"We're actually part of two…consorti[a]…Because of that…membership…we don't even need a systems librarian…They run our book catalog. We have a shared catalog with 25 other colleges…But that's just one thing I don't have to worry about, you know…Without [the consortium]…we would be, you know, a shadow of where we are."

Other areas that the interviewees cited as emerging areas that are congruent with traditional library responsibilities included open educational resources (OER), copyright advice, systematic reviews, and showcasing faculty research through bibliographies, events, or exhibit spaces.

DISCUSSION OF SURVEY AND INTERVIEW RESULTS

It is acknowledged that the survey's response rate was low and the resulting survey sample size is small. This may have been due to the fact that the response period overlapped within weeks of COVID-19 pandemic-related nationwide and university shutdowns. The extent to which the pandemic skewed survey or interview data is unknown, but the response rate was likely impacted negatively. Every effort was made to obtain a representative sample of library administrators whose interview responses would be reflective of their institution type, but it should be noted that interviewees emphasized their hyper-local context, including the politics, personalities, and sustained efforts to deepen campus relationships for formalized library collaborations. Taken together, all of these factors influence the generalizability of the report's results. Nonetheless, the survey data collected and the library administrator interviews, can provide libraries with practical information and ideas for current and future strategies for supporting evolving research workflows and researcher needs.

Information gathered from the survey and interviews indicate that academic libraries are currently providing research support across the four focus areas of this report (funding, data services, publishing, and metrics), though at varying degrees of involvement and priorities. Survey respondents indicated that publishing and scholarly work dissemination support was of the highest priority, followed by research impact, metrics, or discovery support; data management/data management plan support; and funding identification support. This is reflected in survey and interview responses that indicate that research publishing support is a well-supported area. Database or content expansion addressed funding identification, dataset collections, publishing metrics, and bibliometric impact and altmetrics. These resource investments naturally complemented the library's educational role in how to effectively search and utilize the database features; across all four areas, libraries consistently provided online or research guides; individual consultations; and to a somewhat lesser degree trainings, workshops, or instruction.

Library liaisons or subject librarians have become even more important as they provide the bulk of staffing support to these four areas, and, notably, most collaborations are with individual faculty members. This could indicate that growth and development in the four topical areas is being done on a one-on-one basis and possibly after having previously demonstrated value and outcomes from other projects. Relational contexts were emphasized during interviews with library administrators as key to gaining faculty trust.

Although liaisons or subject librarians provide this type of one-on-one support, the way that their job duties are organized may change as organizational structures are reviewed. Survey respondents indicated that staffing has not increased in response to supporting new research workflows; rather, activities that support new and emerging areas are performed in addition to existing responsibilities. Another common staffing approach reported was to reassign individuals or positions after employees have left the institution. Interviewees mentioned the

benefits of organizational change at university and library levels as a way to formalize these new responsibilities. These methods enable libraries to meet current needs and facilitate the natural evolution of position responsibilities.

Library approaches for providing professional development involved providing financial and leave support to in-house, university- and non-university-sponsored events, workshops, and courses. Keeping current on best practices and technologies is paramount to providing services in a vastly digital environment. The extent to which some of these educational and developmental opportunities are available for both library employees and campus stakeholders is important to further solidifying agreement and support on interrelated research processes that traverse multiple campus units. These mark potential opportunities for libraries to informally discuss and dialogue on how to approach complex research processes from multiple vantage points, particularly as institutions are concentrating on increasing their systematic support and oversight of the overall research lifecycle.

Survey respondents cited limited staff, limited funds, and lack of faculty awareness of library support as the greatest challenges to overall support of faculty research workflows. Coupled with reports that libraries are not adding new staff to take on these responsibilities, each employee likely has a larger portfolio of responsibilities than ever. This is emphasized by the demographic data collected of survey respondents and is reiterated by interviewees who stated that librarians were expected to be knowledgeable in scholarly communications, open educational resources, and their subject/discipline areas. Libraries are doing more than ever, as they juggle both meeting new and evolving research paradigms with the continuation of traditional library services.

Academic libraries are evolving and creatively finding new ways to ensure that materials, staffing, and instruction are available to faculty researchers despite shrinking or stagnant budgets, especially through the development of collaborations. The survey indicated that libraries are working extensively with offices of research, colleges/schools, and most frequently with individual faculty. During the interviews, library administrators also emphasized the importance of collaboration. Collaborations with other units allow for the pooling of resources, including staff and finances. Libraries are utilizing consortial or campus relationships to purchase databases or new technologies that faculty may need for their research, or are relying on consortia for strategic staffing, discovery, and publishing support with shared catalogs or IR platforms. Libraries will continue to seek multi-institutional agreements to bolster their services and resources. Additionally, libraries will work with campus units to secure databases; the library will manage the resources, while the unit pays the subscription/access fees. To ensure that faculty are provided instruction or made aware of new services, academic libraries are reassigning, reorganizing, or reimagining library staff positions to fill gaps and to think about future research needs.

Though libraries have been managing or administering institutional repositories (IRs) for at least the last decade, during interviews, library administrators stated that IRs are not ubiquitous or fully realized. As library administrators seek to add IRs to their current complement of library-offered programs, services, and initiatives, IRs are being recast as a potential comprehensive solution to supporting the four topic areas. Most notably, library staff are reimagining IRs to assist with satisfying governmental data and publishing mandates and requirements. Furthermore, IRs can demonstrate alignment with campus priorities for increased faculty research productivity and performance. For example, IRs can include faculty research datasets, disseminate and showcase faculty research and scholarship, provide download counts of open access materials, and assist in identifying potential research collaborators.

One area the survey and interviews indicated that libraries and librarians are not highly involved or do not plan to be highly involved in is with funding identification, tracking, and management. Data services was also not ranked highly in the survey results, but library administrators consistently referred to data management as an emerging opportunity for libraries. Libraries' lack of involvement or plans to offer services in these two areas may be due to existing support by another department or unit on campus (e.g., a research foundation, office of research, or IT). With limited financial and personnel resources, libraries do not have capacity to use their finite resources for redundant areas of support. Nevertheless, as libraries strategically expand their collaborations with other research-supporting units on campus, they may become more involved in highly specialized research systems that would allow for involvement in providing greater research funding identification, tracking, and matching support, as well as research data services.

CONCLUSION

There are notable limitations to this study that bear mentioning. Collecting survey data and conducting interviews during the onset of the COVID-19 pandemic in the United States yielded a small number of responses; the ability to make generalizations is impacted. It should be further noted that this report was produced during a time of continuing uncertainty. There is general agreement that after COVID-19, there will be a "new normal" for libraries and for higher education in general. The extent to which the COVID-19 pandemic will affect research workflows, funding for faculty research, and the overall research and scholarship landscape in the near- or long-term is unknown. An area of future inquiry could be to see how COVID-19 impacts will affect libraries' content and their ability to deploy staffing in support of the research enterprise.

Future research in this area could also address the interplay between institution type and research support priorities. Arguably, any library's offerings can reflect the library's and institution's financial, technical, and relational infrastructures; existing collaborations with other units; and the campus administrative perception of the library's form and function. Further investigation of these elements, as well as their alignment with research priorities, would provide greater context on framing the new roles for libraries in support of research workflows.

This report sought to better understand academic libraries' current and emerging responses to supporting new research practices or workflows, specifically in these four areas: the identification of funding, research data management and data services, publishing and scholarly work dissemination, and research metrics and impacts. Data gathered from a survey questionnaire of academic librarians and interviews of academic library administrators revealed that academic libraries are responding to new scholarly practices, and doing so in alignment with traditional library outputs: information (via online or research guides); education (via one-on-one consultations and, less prominently, trainings, workshops, or instruction); and space.

Though this was not a particular focus of this study, it bears mentioning that COVID-19 has prompted a reevaluation of library collections, services, and space. One of the consequences of the nationwide shutdown and closure of libraries was the inability to access the library's physical collections, prompting the recognition that more physical materials, particularly within special

collections and archives, need to be digitized. Overnight, libraries had to adopt a completely virtual existence and service model; the library as a meeting, collaboration, and study space was gone, as was the library's unique ability to collocate resources, services, experts, and hardware. As libraries begin to reopen over the next few months and research activities resume, it will be important to assess how existing collaborations and planned outreach and activities focusing on research support transfer to a remote environment, and how the library and its value will be affected by these changes.

Despite these concerns, if the past is any indication of the future, academic libraries have demonstrated their ability to evolve in order to provide researchers with the help and support that they need. Therefore, even as new research workflows and working paradigms emerge, libraries and librarians will continue to find ways to support researchers and scholars with whatever they need in order to be successful creators and contributors to new knowledge.

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SURVEY QUESTIONS

Consent

- Would you like to continue?
    - Yes
    - No

Demographics

- Name of your institution or your institution's IPEDS UnitID (look up here: https://nces.ed.gov/ipeds/datacenter/InstitutionByName.aspx)
- Your status (select one)
    - Librarian
    - Staff
    - Administrator
    - Other____
- Which aspects of the faculty research workflows (research activities from topic development and funding identification to publication and measurement of research impact) do you directly support in your position? (select all that apply)
    - Research awareness/info-seeking
    - Research planning
    - Research analysis
    - Research writing
    - Research publication
    - Research assessment or metrics
    - Research preservation

The following questions ask about your library's support of faculty research workflows activities not traditionally available at libraries, including: research funding, research data, research publishing and dissemination, and research impact, metrics, and discoverability support.
{Matrix question response options for the following questions: Yes, our library currently provides this; No, but plan to in the near-term (1-2 years); No, but plan to in the long-term (3-5 years); No, and we currently have no plans to do so; No, another unit/department already provides this; Don't know/Unsure}

- Research funding support: Is your library currently providing or planning on providing resources or services to help faculty identify, manage, or track funding opportunities?
    - Database subscription(s) (e.g. Pivot, Foundation Directory, etc.)
    - Online or research guides

    - Trainings, workshops, or instruction
    - Individual consultations
    - Software or technology
    - Physical space
    - Other (please describe)_____

- Please comment on any of the above research funding support your library currently offers (topics covered; specific database subscriptions; software or technology; library spaces; etc.).
- Research data support: Is your library currently providing or planning on providing research data services (finding data, data management, data preservation, data ethics, data visualization, etc.)?
    - Database subscription(s) (e.g. ICPSR, etc.)
    - Online or research guides
      Trainings, workshops, or instruction
    - Individual consultations
      Software or technology (e.g. DMP Tool, DOI registration, Tableau, etc.)
    - Physical space
    - Other (please describe)

- Please comment on any of the above research data support your library currently offers (topics covered; specific database subscriptions; software or technology; library spaces; etc.).
- Research publishing and dissemination support: Is your library currently providing or planning on providing resources or services on to help faculty identify or evaluate publication or dissemination venues/opportunities?
    - Database subscription(s) (e.g. Cabell's, Ulrich's, Scopus, Web of Science, etc.)
    - Online or research guides
      Trainings, workshops, or instruction
    - Individual consultations
    - Software or technology (e.g., institutional repository, preprint repositories, etc.)
    - Physical space
    - Other (please describe)

- Please comment on any of the above research publishing and dissemination support your library currently offers (topics covered; specific database subscriptions; software or technology; library spaces; etc.).
- Research impact, metrics, or discoverability support: Is your library currently providing or planning on providing resources or services related to research impact, metrics, or discoverability?

    - Database subscription(s) (e.g. Scopus, etc.)
    - ORCID institutional membership
    - Online or research guides
    - Trainings, workshops, or instruction
    - Individual consultations
    - Software or technology
    - Physical space
    - Other (please describe)

- Please comment on any of the above research impact, metrics, or discoverability support your library currently offers (topics covered; specific database subscriptions; software or technology; library spaces; etc.).

The following questions ask you about the operational aspects of providing faculty research workflows support at your library.

- Who has your library collaborated with in providing support of faculty research workflows?

  {Matrix question response options: Office of research; College or school; Individual faculty; Center for faculty excellence/support; Information technology (IT); Other; Library only; Not offered}

    - Office of research
    - College or school
    - Individual faculty
    - Center for faculty excellence/support
    - Information technology (IT)
    - Other_____
    - Library only
    - Not offered

- Who in your library provides support for different aspects of faculty research workflows? (check all that apply)

  {Matrix question response options: Individual liaison or subject librarian(s) or staff; Dedicated librarian(s) or specialist(s); A group, committee, or team; A department or unit; Other; Not offered}

    - Individual liaison or subject librarian(s) or staff
    - Dedicated librarian(s) or specialist(s)
    - A group, committee, or team
    - A department or unit

    - Other_____
    - Not offered

- How has your library developed staff capacity for supporting new or expanded faculty research workflows? (Check all that apply)
    - Hired staff specifically to support faculty research workflows
    - Reassigned existing staff
    - Reclassify positions as vacancies arise
    - Planning to hire staff
    - Planning to reassign existing staff
    - Other (please describe)
    - Not applicable (please describe)

- How has your library provided professional development opportunities or support for library workers to develop knowledge or skills related to supporting faculty research workflows?

  {Matrix question response options: Yes, currently provides; No, does not provide; No, plan on providing}

    - In-house/library workshops or presentations
    - Provided financial or leave support to attend university sponsored conferences, workshops, programs, or courses
    - Provided financial or leave support to attend non-university sponsored conferences, workshops, programs, or courses
    - Collaborated with campus partners to develop conferences, workshops, programs, or courses
    - Collaborated with non-campus partners to develop conferences, workshops, programs, or courses
    - Other

The following questions ask about your library's challenges and priorities in supporting faculty research workflows.

- What are the most pressing challenges to your library in supporting faculty research workflows? (select all that apply)
    - Limited funds
    - Limited staff
    - Limitations of staff (non-technical) knowledge or skills
    - Limitations of staff technical knowledge or skills
    - Faculty awareness of library support

    - Faculty does not see the library as able to support expanded research workflows
    - Another department already supports
    - Other

- Please rank your library's priorities in supporting faculty research workflows activities not traditionally available at libraries (1 as being the highest priority)
    - Identifying or managing funding support
    - Data management/data management plan support
    - Publishing and scholarly work dissemination support
    - Research impact, metrics, or discovery support
    - Other

- Provide any additional comments or information on how your library plans on supporting faculty research workflows.

As an administrator for your library, we would like to interview you about your library's support of faculty research workflows. If you are willing to provide further information, please include your name and email. Thank you for considering.

INTERVIEW QUESTIONS

Demographics

- Please identify the primary duties of your position and how your role intersects with the campus research ecosystem.

Changing nature of faculty research

- How do you think faculty research workflows have changed over the past few years?
- What developments have you noticed in higher education, on your campus, and in your library?

Library's response to changing nature of faculty research

- How has your library evolved to meet these new changes...
    - in the area of Technology?
    - in the area of Staffing?
    - in the area of Programs and services?
    - Are there any Other ways in which your library has met these new faculty research workflows?

- What have been faculty's responses to these changes?

Challenges in providing those services

- What have been some of the library's challenges with providing these types of support to faculty workflows?
- [Library-level challenges probe if necessary: library employee resistance, training, staffing, finances]
- [Campus-level challenges probe if necessary: Awareness, Identifying the library as a suitable partner, or Timeliness and ability to meet the expectations of the faculty]

Current campus (outside of the library) support of faculty research

- What resources or services does your institution currently offer in support of faculty research workflows?
- Collaborations among library and non-library entities in support of faculty research
- Does your library actively collaborate with other campus units in support of faculty research workflows?

Emerging support and new directions

- What do you see as emerging opportunities for libraries in their support of faculty research workflows?
- Does your library have plans to expand faculty research workflow support? If yes, what are those plans? In what areas? Pre- and post-COVID-19
- What steps are you taking as an organization to meet those needs now, in the short term, and in the future? Pre- and post-COVID-19
- If your library has plans, how will resources (financial, personnel, etc.) be allocated for supporting these offerings?

Conclusion

- Are there any other things that you'd like to share with us?

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CHOICE
Start with better options