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The Organization of Information Technology Activities in North American Research Libraries

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Title

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Abstract

This study presents the results of an online survey that benchmarked the organization of information technology (IT) functions in academic library members of the Association of Research Libraries. The survey investigated whether responsibility for 14 key areas resided in the libraries or in an institution-level information technology department, whether responsibilities have shifted over the past 20 years, satisfaction with services provided, assessment methods used to evaluate information technology services, and top challenges facing library IT. This paper considers the survey results addressing where the responsibility lies, satisfaction with the support, and whether and when the responsibility changed.

Introduction

The organization of information technology (IT) activities and staff in academic libraries has changed over the decades since IT became an integral part of how those libraries serve the needs of their faculty, staff, and students. What began as a focus on mainframe-based integrated library systems has evolved through many stages to a multitude of online platforms, applications, and resources that are accessed through a variety of devices and interfaces. The inspiration for this research came from a potential rethinking of how IT activities, services, and staff are managed at the authors' home institution. The authors initially conducted an informal survey of peer institutions about similar developments that they were experiencing, and it appeared that there was a trend to centralize some, or in several cases, all IT activities, services, and staff under the central campus IT unit, removing responsibility from the library deans and directors. The authors followed up with a formal survey of the academic member libraries of the Association of Research Libraries to determine whether there is, in fact, such a trend. Questions address 14 functional areas of IT, whether those functions are performed by library staff or campus IT staff, whether the responsibility for those functions changed in the last 20 years (and why), and the level of satisfaction with the services performed. The survey also included questions about how libraries assessed their IT services and their top three challenges. Assessment of IT activities and the top three challenges will be addressed in subsequent papers.

Literature Review

The authors examined the library science literature published between 1990 and 2021 to review current practices and trends in the management of information technology staff, equipment, and services in academic libraries. Although the literature on this topic is limited, the authors found four studies that directly address the organization of library information technology responsibilities in academic libraries. Two studies address Carnegie Classification R1 institutions, and two studies address a broader swath of college and research libraries.

Library Systems Office Organization: A SPEC Kit (SPEC Kit 211) (Muir, 1995) documented the changes in library information technology units from 1990 to 1994, addressing staffing and responsibilities, and the changes caused by technological developments. There were 75 surveys used for the report. Library systems heads reported to library leadership in all cases in both 1990 and 1994, and to the director of the computer center in no cases. The top five responsibilities in 1990 included the management of the library system, purchasing hardware and software directly from vendors, managing bibliographic utilities, managing stand-alone CD-ROM stations, and application development. In 1994, the top 5 responsibilities included the management of the integrated library system, purchasing hardware and software from vendors, managing local area networks, managing Gopher, Mosaic, etc., and managing networked CD-ROMs, demonstrating the continuing importance of the integrated library system but also the growing importance of the internet.

Following up on the 1994 study, *Library Systems Office Organization: A SPEC Kit* (SPEC Kit 271) (Muir and Lim, 2002), updated the earlier survey. While the 1995 SPEC Kit included seven questions, the 2002 survey was expanded to 16 questions. It was distributed to 124 ARL member

libraries, with 70 responding to the survey. All of the responding libraries have staff dedicated to information technology, most of them centralized in one unit, with the average number of staff devoted to IT increasing since the 1994 survey (p. 9). Major changes since the 1994 survey included an increase in the number of pieces of equipment, networked library services, and software products supported, and an increase in the number of systems office staff (p. 19). Muir and Lim pointed out that the increased demand placed on library systems units is partly a result of new interoperability standards; the growth of digital text, image, and audio collections; and the trend towards patron-initiated services and resources (p. 9). Certain responsibilities were often handled by the parent institution, such as wireless network management (28 institutions), computer lab maintenance (24 institutions), wide-area networks (36 institutions), and email administration (37 institutions) (p. 20).

The *Survey of Academic Library Leadership: Managing Conflicts Between Library & Information Technology Staffs* (Primary Research Group, Inc., 2020) investigated what it referred to as "turf battles" between the library and the college- or university-level IT unit, further asking for a description of the cause of the disputes. There were 80 surveys returned, including nine junior colleges, 24 BA-granting, 37 MA- or PhD-granting, and ten research universities. The results showed that turf battles were common at 30% of schools over 8,000 full-time equivalent (FTE) students (p. 12). Respondents "mentioned issues over website design or content three times, and other issues such as lack of responsiveness and poor customer service and distance learning (once each)" (p. 12). To the question "Does the library maintain its own information technology department or staff independent of the college/university information technology staffs?", the summary of findings noted that "Respondents from public schools reported significantly more independent information technology departments compared to those from private schools (47.37% compared to 21.43%)" (p. 13). Additionally, 50% of responding research universities and 60% of schools with FTE greater than 8,000 reported having their own IT department or staff (p. 13); however, there is no indication of what level of research university these institutions represent. For those that have their own staff, the number of staff employed ranged from one to six (p. 13).

Jasmine Hoover (2018) conducted a similar survey on information technology, library, and educational technology organizations in small universities in Canada in "Gaps in IT and Library Services at Small Academic Libraries in Canada" (*Information Technology and Libraries*). Her findings show that libraries support increasing amounts of technology, both by integrating tools and resources online as well as with increased systems and services in libraries' physical spaces, and they require appropriate staff to support the technology (p. 15). She notes that larger universities "have managed this influx of demand and usage of new technologies in libraries by having their own library IT services to manage software and technologies to support research, teaching, and learning. Many also offer student and user-facing technical support with IT help desks within the library" (p. 15). Additionally, Hoover described centralized, decentralized, and federated IT models and stated that IT within higher education has shifted over time between these organizational structures (p. 19). To the survey question "Is there anything you would like changed about the current organization when it comes to IT and the library?", all respondents

from libraries that did not have "in-library IT support" expressed a desire for an IT position in the library or better collaboration with IT, including a specific contact (p. 17).

The library literature includes some examples of research addressing the mergers of libraries and campus-level information technology units or computer centers, such as *Books, Bytes and Bridges: Libraries and Computer Centers in Academic Institutions* (ed. Hardesty, 2000); however, this organizational development is not the focus of this research and was not explored further.

Methodology

The authors designed a survey to assess the organization of information technology staff, equipment, and services in academic libraries that are members of the Association of Research Libraries (ARL). The authors chose Qualtrics software to manage the survey and responses. Deployed in April 2021, the survey remained open beyond the original deadline of May 28, 2021, until June 4, 2021. Altogether, 72 libraries completed the survey, forming the basis of the analysis.

The survey was designed to gather information about the organization of information technology activities, whether those activities are managed within the libraries or by campus-wide information technology units, whether the organization of those activities changed during the 20 years under review, and the level of satisfaction with the activities and services provided if they are performed outside of the libraries themselves. The survey also collected additional information about perceived future challenges, the assessment of information technology activities, and gathered demographic data about the responding libraries. The full text of the survey can be found in Appendix A.

Demographic data collected included the name of institution, type of institution (public or private), and the organizational reporting line within the organization (the unit library reports to and the title of the person). The survey also asked for "any additional information regarding library technology services at your institution that may be relevant to this survey topic."

Survey Results

Institutional Information

Of the 72 responding libraries, 55 (76%) were public institutions, and 17 (24%) were private. Of the 70 libraries that answered the question "What organizational unit does the library report to?", responses indicated that the libraries reported almost exclusively to the Academic Affairs division of the University with a direct reporting line to the Provost.

Library Technology Services

The main portion of the survey was to gather information about the responsibility, satisfaction, and changes in responsibility for the primary technology services provided by research libraries. These services were grouped into 14 common areas of specialization within the field of information technology:

1. Web design and development
2. Server & systems administration
3. Email
4. Calendar
5. Integrated library system or library services platform
6. Library-specific applications
7. Desktop support of staff computers
8. Desktop support of public computers
9. Digital scholarship technology or equipment
10. Hardware or software purchasing
11. IR development and support
12. Other digital content management support
13. Audio visual or media technology or equipment
14. Disability services technology or equipment.

Service Responsibility, Satisfaction, and Changes

Table 1 includes the frequencies of responsibility responses for the 14 services evaluated in the survey.

[Insert Table 1]

Website design and development

Library IT units are responsible for website design and development in the great majority of responding libraries, with 88.9% reporting that it is done within the library and only 5.6% reporting that such work is performed at the institution level. Four libraries (5.6%) selected "other," and listed a mix of responsibility:

- Combination of vendor and two library units
- Centralized marketing department
- Design is outsourced; development is in house
- Development is local; CMS is university-wide

The majority of libraries (76.4%) reported that they were satisfied with the website design and development services provided, with 15.3% neither satisfied nor unsatisfied and 8.3% being unsatisfied. Explanations provided by respondents indicated that satisfaction has resulted from a tight integration between the web development team and a fast response time making updates; the dissatisfaction resulted from understaffing and resource constraints that made it difficult to keep up with the work. Of the 64 responses where responsibility lies within the library, only 4.7% indicated that they were very unsatisfied; whereas, three of the four responses where the responsibility lies with campus IT indicated dissatisfaction. Of those with shared responsibility, none indicated that they were unsatisfied. The satisfaction levels for website design and development and all other services can be found in Appendix B.

The responsibility for web design and development has not changed between 2000 and 2020 for 72.2% of the respondents. Of the libraries in which the responsibility did change, the average year of the change was 2015. One library noted that a vendor was engaged to support website design and development after a migration to Drupal; another noted that responsibilities have gone back and forth between the library and central IT. Reasons provided for removing the responsibility from the library were insufficient in-house staff and expertise, and part of a broader trend of centralizing IT.

Server and Systems Administration

As with website design and development, server and systems administration is a function that primarily resides in the library; 63.9% of libraries reported that library IT was responsible for it. Nearly 20% of libraries reported that the institution-level IT unit was responsible for server and system administration, and 16.7% selected "other." All of those selecting "other" reported a combination of library and institution-level IT, with one library indicating that they rely on a vendor and another relying on a consortium for some support.

A total of 83.3% of respondents indicated that they were either satisfied or very satisfied with the server and systems support services they receive; 11.11% were neutral, and 5.6% were dissatisfied. Whereas only 4.3% of the responses from libraries where responsibility for server and systems administration lies within the library indicated dissatisfaction, 7.1% (one out of 14) of responses from libraries where server and systems administration lies within campus IT indicated dissatisfaction. One of the twelve with shared responsibility were dissatisfied with the support they received for server and systems administration.

A total of 23 libraries (31.9%) reported that the responsibility for server and systems administration changed over the previous 20 years, with 2016 being the average date of the change. Forty-nine libraries indicated that responsibility had not changed. Most of the comments indicated that the responsibility for server and systems administration had moved from the library to campus IT; in some cases, this was predicated by the campus move to the use of virtual machine (VM) platforms. Only two libraries indicated in the comments that the responsibility for server and systems administration had moved from campus IT to the library; in one case the respondent attributed the move to the poor support offered by campus IT. One library noted "As we use more specialty vendors and also cloud services, we no longer rely on central campus IT servers."

Reasons for shifting responsibility for server and systems administration included a shortage of staff in the library to do the work, an administrative edict to centralize IT services, the increased cost-effectiveness of centralization, and better services or security provided by campus IT.

Email

Email services in responding libraries are managed by campus IT in 83.3% of cases, and by a vendor in 16.7% of cases. No libraries indicated any responsibility for email administration. Libraries reported that they were satisfied or very satisfied in 91.5% of cases; neutral in 8.5% of cases; and no libraries reported that they were dissatisfied with email services. Comments noted

the efficiency of campus IT managing enterprise-wide applications and platforms, with many indicating their institutions use Microsoft or Google products.

Responsibility for email services has changed in 17 institutions (23.9%) over the past 20 years, with the average year of the change being 2012. In some cases, the responsibility shifted from the library to campus IT; in others, it shifted from the campus IT unit to a vendor. In no cases did the libraries assume this role in the past 20 years. Reasons for the change in responsibility included the elimination of duplicate services, better services, improved security, cost effectiveness, advantages of working at scale, and the desire to leverage enterprise systems managed at the campus level. One library indicated the change was due to an alignment with campus IT priorities.

Calendar

Because calendaring and email systems are often connected or part of the same package, we expected the responses to the question of which unit is responsible for calendar services to mirror that for email; however, responsibility for calendar services resides in the library IT unit at seven of the responding institutions. Calendar services are provided by campus IT in 48 (66.7%) institutions, and by a vendor in 13 (18.1%) institutions. Comments show that some respondents may have been thinking of calendaring systems for research appointments, library spaces, and event scheduling, with several mentioning the LibCal cloud-based software platform.

The majority of respondents were satisfied or very satisfied with the calendar services provided, with 88.9% selecting those options. Seven libraries (9.7%) indicated they were neutral on this question, and one library was dissatisfied with the calendaring services provided by a vendor. Most comments indicated a general satisfaction with the Microsoft and Google products used by their institutions.

Responsibility for calendar services has changed in the last 20 years for 19.4% of responding institutions, with 2013 being the average year the change happened. Responsibility did not change for 80.6% of responding institutions. Reasons for the change are similar to those for email: improved security, better reliability, advantages of scale, cost savings, stability of the system, better backup, and alignment with campus IT priorities.

Integrated library system or Library services platform

The integrated library system (ILS) or library services platform (LSP) are arguably the most important software, service, or platform that academic libraries offer and support, so it is not surprising that only 2.8% of responding institutions reported that the campus central IT unit managed it. Of the remaining options, 50% of responding libraries manage the ILS/LSP themselves, 23.6% report that it is managed by a vendor, and 15.3% report that it is managed by a consortium. Six libraries (8.3%) selected “other” and noted in the comments that it was a collaborative effort between the library, a vendor, and a consortium, and in one case, between the library and campus IT.

Levels of satisfaction with ILS/LSP support are quite high, with 81.9% indicating they are either very satisfied or satisfied. Ten libraries selected the neutral option; three selected unsatisfied, and

no libraries indicated that they were very unsatisfied. Of the libraries that selected unsatisfied, two were libraries where the ILS/LSP support was provided by a vendor and one had selected "other," in this case a mix of responsibility. Comments indicate that dissatisfaction arose from a lack of effective collaboration, a shortage of staff, poor migration experiences, ILS/LSP downtime, and poor support from a vendor. Many libraries responded with comments indicating that their satisfaction comes from good support from their consortium, vendor, or their own staff, and a good experience with migration. Several noted that they migrated recently, but that they experienced no problems so far; others indicated that they were on legacy ILSs and were hoping to migrate to a next generation LSP in the coming years.

Two-thirds of responding libraries indicated that responsibility for managing the ILS/LSP has not changed during the twenty years under review, and one-third indicated that it had changed, with the average year being 2016. Comments provided by respondents reflected the widespread adoption of cloud-based platforms such as Alma along with many who migrated to LSPs as part of a consortium. Only one library mentioned that some support had shifted to a central IT unit: "Centralization of IT required that some support of our ILS now needs to come from Central IT." Another comment, "Most of our systems are hosted now, though Libraries IT staff manage configuration and troubleshooting for those systems," likely reflects the situations at most libraries; in other words, although the LSP may be cloud-based with vendor support, there may still be significant library staff support in the area of configuration and troubleshooting. Similarly, another comment noted "We were hosting our ILS on premises with a consortial support component, but moved to vendor-hosted and are doing all not-consortia-related support in-house."

Rationale for changes included increased efficiency, shared access to resources, cost and economies of scale, staff shortages, redirecting staff away from server support and toward value-added services, integration of e-resource and print-resource management, and modernization of functionality.

Library-specific applications

Under the library service "library-specific applications," libraries were responsible 86.1% of the time (62 responses), campus IT 2.8% (2), and one library reported vendor responsibility (1.4%). Seven respondents selected "Other" and comments indicated a combined responsibility between the library and vendors, the library and a consortium, and the library and campus IT. Some commented that this service category was unclear, with some library applications, such as SpringShare, being hosted and therefore supported by a vendor.

Respondents' satisfaction with the management of library applications was very high for those with responsibility in the library: very satisfied and satisfied had 29 responses each (46.8%) for a combined total of 93.6%. Only four respondents (6.5%) chose a satisfaction level of neutral. Both respondents who indicated responsibility for library applications resided in campus IT units selected neutral, and those who selected the "Other" response indicated their satisfaction levels were distributed across very satisfied (2), satisfied (3), and neutral (2). Three of the neutral responses and four of the satisfied responses noted that, while some are happy with what they

have, they desire to improve applications, and many mentioned the need for more staff to support this area. Those with responsibility within the library that are very satisfied had a range of praise for their in-house teams, describing them as responsive, capable, and experts with deep understanding. One wrote that their IT staff are "skilled, passionate about libraries, and work hard to meet staff and user needs." One mentioned the high cost of being very satisfied: "Very satisfied, but the cost is high: we employ 6 IT operations staff, 10 software developers, 5 data technicians, and 2 project managers."

Nine institutions noted changes in responsibility for library-specific applications; the average year of the change noted was 2013, with three noting a period of time for a more gradual shift. Reasons for the change varied, with three institutions reporting centralization of library IT work within the libraries themselves. One reported "A combination of staff resignations, and a shift in strategic priorities leading to more integration with campus IT," two mentioned that the responsibility shifted to campus IT, and one noted that a merged library and IT organization was separated in 2007 because the Provost wanted more attention paid to the library; they were able to pull most technology services back to the library.

Desktop support of staff computers

Desktop support of staff computers is managed by library staff at 76.4% of responding institutions and by campus IT staff at 18.1%. Four institutions (5.6%) indicated that they shared responsibility between library and campus IT.

Most respondents were very satisfied (40.3%) or satisfied (44.4%) with the desktop support for staff computers provided to them. Nine indicated that they were neutral (12.5%) and two indicated that they were unsatisfied (2.8%). Respondents from libraries in which the responsibility lies within the library reported that they were either very satisfied (50.9%) or satisfied (36.4%), with only 12.7% selecting neutral, and none selecting unsatisfied. Only two libraries selected unsatisfied, one where support was provided by campus IT, and one where the support was provided by a mix of units. One of the characteristics noted by respondents who selected very satisfied was the level of responsiveness of library IT staff.

Only one respondent from an institution where responsibility for desktop support resided in campus IT indicated that they were very satisfied (7.7%); 69.2% (9) were satisfied. In these cases, comments indicated that they were provided with sufficient service and that basic needs were addressed. Two respondents indicated that library IT staff had been moved to campus IT but were still dedicated to supporting library needs. One wrote "Staff in central IT are dedicated to Library desktop support because they formerly were part of the Library's IT unit. This support is guaranteed by Library funding these salaries, and by Service Level Agreements." Another wrote "This unit used to be part of the libraries, and is doing everything they can to keep their service level high in the face of additional service responsibilities, vacant positions, and a hiring freeze." Two institutions with desktop support provided by campus IT selected neutral (15.4%) and one selected unsatisfied, noting that there was no strategy or planning. Three out of four respondents from libraries with shared responsibility between library and campus IT were

satisfied and one was unsatisfied. The unsatisfied institution noted duplication of services between the two units and expressed a desire to be more efficient.

Responsibility for desktop support of staff computers changed in 16 libraries, with the average year of the change being 2015. Campus IT has responsibility in nine cases, and most reasons mention themes around centralization, efficiency, and cost savings. In four cases, responsibility for desktop support of staff computers returned to the libraries. One library reported getting this responsibility back from campus IT in 2021 because campus IT "was not doing a good job of supporting our users" and another reported getting responsibility back sometime between 2000 and 2015 because campus IT was "not meeting the needs of the libraries at that time."

Desktop support of public computers

Desktop support of public computers is more likely to be the responsibility of campus IT than support for staff computers, with 30.6% of the respondents selecting that option. Library staff are responsible in 58.3% of cases, and 11.1% selected "Other," indicating in comments that the responsibility was shared between campus IT and library staff.

Overall satisfaction with desktop support of public computers is high, with 33.3% very satisfied, 59.7% satisfied, 6.9% neutral, and no respondents unsatisfied. Of the 42 respondents who indicated that responsibility for desktop support for public computers resides in the library, 20 were very satisfied (47.6%), 21 were satisfied (50%), and one was neutral (2.4%). The few responses that indicated they were very satisfied noted responsive teams and "high standards of customer service."

Satisfaction with campus IT desktop support of public computers was positive, although more lukewarm than satisfaction at institutions where library staff support public computers. Only two respondents indicated they were very satisfied (9.1%); 17 were satisfied (77.3%), and 3 were neutral (13.6%). The eight libraries reporting shared responsibility through the "other" selection included two that selected very satisfied (25%), five that selected satisfied (62.5%), and one that selected neutral (12.5%).

Responsibility for public computers changed for 23 institutions, with 2013 being the average year of the change. In some cases, the library took over support. For example, one library reported that campus IT "pulled out public labs," and the library filled the void. In other cases, the "Provost wanted more attention paid to the library," and "Central IT did not provide the consistent level or hours of service we require."

Eleven institutions reported changes from library responsibility to campus IT, and the reasons provided referred to staffing levels, tight budgets, centralization of IT, and efficiency. One of the shared responsibility responses about the change noted that a computer lab needed to be relocated, and the library took them in.

Digital scholarship technology or equipment

Responsibility for digital scholarship technology and equipment lies within the library in 60 cases (83.3%) and in campus IT in four cases (5.6%). No respondents indicated that

responsibility lies solely with a vendor or a consortium; however, eight libraries selected "Other," noting that responsibility was shared among a combination of library and campus IT, a consortium, and a vendor.

The majority of libraries indicated that they were satisfied or very satisfied with the support they received for digital scholarship technology or equipment, with 33.8% selecting very satisfied and 42.3% selecting satisfied. Fifteen libraries (21.1%) selected neutral, and two libraries selected unsatisfied. Two of the four libraries where campus IT supported digital scholarship were unsatisfied, one was neutral, and one was satisfied. In comparison, 85% of those attributing responsibility to library staff were satisfied (27 at 45%) or very satisfied (24 at 40%) and nine reported neutral (15%). Of those who reported a shared responsibility for digital scholarship, two were satisfied (28.6%) and five were neutral (71.4%). One respondent who indicated dissatisfaction with campus IT support for digital scholarship stated that "generic" central IT support cannot meet digital scholarship needs; another noted that campus IT worked on select projects "for faculty they deem worthy," leaving digital scholarship service activities spread across a range of units. One respondent who was very satisfied with library staff support stated, "No one else on campus is in a position to provide the level of engagement, project management, support, and development that the University Libraries provide." Another wrote "We have a robust digital collections, digital repository, and digital publishing program."

Only five libraries noted a change in responsibility for digital scholarship since 2000. Of these, two changed between 2019 and 2020, one because responsibility shifted to campus IT and another to collaborate with campus IT for "efficiencies, cost savings, and standardization."

Hardware or software purchasing

Library staff are responsible for hardware and software purchasing in 81.9% of responding libraries. Campus IT is responsible in 6.9% of cases, and the responsibility is shared in 11.1% of responding libraries.

Respondents indicated a high level of satisfaction with services provided with 83.3% selecting either very satisfied or satisfied. Five libraries (6.9%) selected neutral, six (8.3%) selected unsatisfied, and one selected very unsatisfied. Of the respondents who indicated that responsibility for hardware and software purchasing lies within the library, three (5.1%) indicated that they were unsatisfied. Of those where responsibility lies with campus IT, one (20%) was very dissatisfied. Of those with a mixed responsibility, three (37.5%) were unsatisfied.

Responsibility for hardware or software purchasing has changed at 15.3% of responding libraries between 2000 and 2020, with most occurring since 2007 and four changes happening between 2020 and 2021, with an average of 2015. Comments show that in four cases, responsibility was centralized in campus IT, and in one case, responsibility returned to the library after an organizational change that separated a formerly merged library and campus IT unit. Moving responsibility to campus IT was intended to eliminate redundancies, achieve cost savings, and integrate more with campus IT. In the case where the responsibility returned to the library, it was due to library dissatisfaction with the support provided by campus IT.

Institutional repository development and support

The management of institutional repositories lies within the library at 79.2% of responding institutions. Only two libraries report that support is provided by campus IT; eight libraries (11.1%) indicated that a vendor supports the IR, and another two selected consortial support. Three libraries selected "Other," with two of them indicating a shared responsibility between library and campus IT support.

A strong majority of respondents were satisfied with the support they receive for the institutional repository, with 29.2% indicating very satisfied and 50% indicating satisfied. Eleven respondents are neutral on this question, three are unsatisfied (with library support), and one very unsatisfied (with vendor support). Many of the comments indicated a dissatisfaction with the staffing levels supporting the IR and several noting that there was room to grow in this area.

Only 19.4% of responding libraries indicated that responsibility for managing the IR had changed during the time period under review. Three libraries reported that responsibility moved from library-supported to vendor-supported and one noted that they dropped one vendor in favor of another. Two libraries indicated that responsibility was moved into the library, and one that responsibility moved to campus IT when staff were reassigned due to a reorganization. Most of the changes happened in the last ten years, with the average being 2015. Reasons centered around two themes: a need for better support and changing organizational needs or priorities.

Other digital content management support

Our assumptions are that some libraries maintain a separate digital content management system in addition to their institutional repository, and this system holds digitized collections that might come from their special or archival collections. A strong majority of the responding libraries indicated that their digital content management systems are supported by library staff (81.9%), with only three libraries (4.2%) indicating that they were supported by campus IT; five (6.9%) were supported by a vendor; and one by a consortium. Four libraries selected "Other," with three reporting a mix of library and campus IT staff, and one reporting a mix of library and vendor support.

Most respondents indicated that they were satisfied with the level of support they received, with 28.2% selecting very satisfied and 49.3% selecting satisfied. Fifteen libraries (21.1%) selected neutral, and only one library indicated that they were unsatisfied (in this case with vendor support). Four libraries commented on the lack of sufficient staff to effectively manage their digital content management systems.

Nine libraries (12.5%) reported that responsibility for managing digital content management systems had changed over the period from 2000-2020, and 87% indicated that responsibility had not changed. Two libraries indicated that responsibility was outsourced to a vendor, one to a consortium, one to campus IT, and another noted that a department had been formed within the library to manage them. The average date for the change was 2014. Reasons for making the change included a desire for better support, a result of a centralization effort, and leveraging services and collaborative efforts.

Audiovisual or media technology or equipment

Many libraries provide audiovisual and media technology to their faculty, staff, and students. Of the responding libraries, 49 (68.1%) indicated that support for audiovisual and media technology lies with the library staff and 13 (18.1%) indicated that support is provided by campus IT. In ten cases (13.9%), support is provided by a combination of library and campus IT staff, or by a combination of campus IT and a vendor.

The majority of respondents indicated that they were either very satisfied (25.4%) or satisfied (54.9%) with the support they receive for audiovisual or media technology. Twelve respondents were neutral (16.9%), and two were unsatisfied (2.8%). The latter were two of those that responded that they had a shared model of support. Comments from respondents reflected a wide range of practices, expectations, and desires regarding audiovisual or media technology. Several libraries indicated that they provided this support but felt that campus IT was a better fit for it. Others recognized that there is a need for campus-wide coordination on these activities, and that it is difficult to scale such support across campus.

Nine (12.5%) respondents indicated that responsibility for audiovisual or media technology has changed in the period of 2000 to 2020. Several commented that the responsibility shifted from library staff to campus IT or another unit on campus or moved to a shared model. One respondent noted that the responsibility was moved to the library pre-pandemic. The average year for the change in responsibility was 2016. If we remove the one outlier (2007), the average change was made or initiated in 2018. Reasons given for the change were to improve service quality, to provide a more seamless customer experience, to increase efficiencies and cost savings, and as a result of strategic changes such as a centralization effort.

Disability services technology or equipment

Disability services technology or equipment was the most likely service to be managed at the campus IT level, with 38.6% of responses; library staff are responsible in 42.9% of cases. Thirteen libraries (18.6%) selected "Other," with three indicating the responsibility lies with a campus disability services office, three selecting a combination of library staff and a campus disability office, and two selecting a combination of library staff, campus IT, and a campus disability office.

Most respondents were satisfied with the support they receive for disability services technology or equipment, with 15.9% selecting very satisfied and 60.9% selecting satisfied. Thirteen respondents (18.8%) selected neutral, three (4.4%) selected unsatisfied, and none selected very unsatisfied. The three that selected unsatisfied represent one each from libraries that are supported by library staff (3.3%), campus IT (3.7%), and a shared model of support (7.7%). Comments indicated that there is more cross-campus collaboration regarding disability services technology and equipment than there is with other service categories. Some libraries have staff dedicated to disability services; others rely on a university-level disability services office.

Nine libraries indicated that responsibility for disability services technology or equipment has changed from 2000 to 2020, with three indicating that these services did not exist in 2000, and

two others indicating that services were centralized in a new unit. The average year of the change in responsibility was 2016. Several libraries noted the need to provide a seamless or better user experience.

Discussion

The services that were most likely to be provided by library staff were web design and development, library-specific applications, digital scholarship, hardware or software purchasing, and digital content management. It is not surprising that email and calendar support were the least likely to be supported within the library, given that they are now considered to be enterprise-level services. The 9.7% of libraries that responded that they supported calendar services were (based on comments) referring primarily to scheduling services such as reference desk hours or room reservations, rather than basic calendar (e.g., Outlook), which is what we meant by our question; otherwise, we believe the percentage of libraries that manage their own calendar services would be zero percent, as it is for email services. We expected to see that campus IT was taking over server and system administration along with support for both public and staff computers; however, server and system administration is still being managed by library staff in 63.9% of libraries, support for staff computers is still being managed internally by 76.4% of libraries, and support for public computers is managed internally by 58.3%. It was surprising to see that only 50% of responding libraries reported that they managed their ILS/LSP; however, 23.6% reported that the ILS/LSP is managed by a vendor and 15.3% that it is managed by a consortium. In these cases, we expect that library staff are managing the relationships with the vendors and consortia, in which case the ILS/LSP is still under the libraries' control, rather than campus IT's. Audiovisual technology support is still concentrated in the library, with 68.1% of libraries reporting that they managed it, 18.1% being managed by campus IT, and 13.9% being shared. This is an area where several respondents indicated that they felt the responsibility could or should be moved to campus IT, so we may see a trend in that direction in future years.

Only calendar and mail services were more likely to be supported by campus IT than library staff, which is unsurprising for the reasons noted above. The services that campus IT are more likely to support otherwise are server and system administration (19.4%), support for staff computers (18.1%), support for public computers (30.6%), audiovisual technology or equipment (18.1%), and disability services technology or equipment (38.6%). Notably, only two of these services, support for public computers and disability services technology or equipment, rise above 20% in the responding libraries.

The service most likely to be outsourced to a vendor is management of the ILS/LSP. Many of those responding to this question indicated that they had recently migrated to a hosted LSP (Alma) and that the vendor was providing most of the support. As noted above, we expect that library staff are the ones on campus most likely to be engaging with and managing the vendor in these activities. Other services supported by vendors included email (16.7%), calendar (18.1%), institutional repository (11.1%), digital content management (6.9%), and library applications (1.4%). Comments about email and calendar indicated the library's use of Microsoft hosted solutions. Two comments regarding vendor support of the institutional repository mentioned the

use of Digital Commons, with one indicating they wanted to move away from that platform now that it is owned by Elsevier.

Only three services were supported by consortia, with the ILS/LSP being the most likely at 15.3%. Consortia support was also provided for institutional repositories in 2.8% of cases, and in 1.4% of digital content management.

The most likely services to be shared among one or more entities were disability services technology and equipment at 18.6%, server and system administration (16.7%), audiovisual technology and equipment (13.9%), support for public computers (11.1%), support for digital scholarship (11.1%), and hardware and software purchasing (11.1%). None of the other services rose above 10% of respondents.

A review of the levels of satisfaction depending on who is providing the service shows that in six categories, the level of satisfaction is lower when the service is provided by campus IT; these include web design and development, server and system administration, desktop support of staff computers, digital scholarship technology and equipment, hardware and software purchasing, and disability services technology and equipment. In one category, support for the institutional repository, two out of 57 respondents indicated dissatisfaction with library support for the institutional repository, whereas, no respondents (out of two) indicated dissatisfaction with campus IT support for the IR. There were three categories where no respondents indicated dissatisfaction: email services, library-specific applications, and desktop support for public computers.

In four of the six categories where a vendor was used to support services, respondents were more likely to report dissatisfaction with the vendor services than to report dissatisfaction with library services: calendar services, ILS/LSP, IR support, and digital content management. In two categories (email and library-specific applications) there was no dissatisfaction expressed for either library or vendor support. In some cases, the move to vendor-supported solutions really means a move to the use of cloud-based services; this leaves much of the management still in the hands of library staff, which may be preferable to centralizing those services under a campus IT unit that may not have the same customer-service mindset as is entrenched within library staff.

In two of the three categories where a consortium was relied upon to support services in some libraries, respondents indicated that they were satisfied or very satisfied with the services provided by both the consortia and library staff. In one category (support for the IR) more dissatisfaction was expressed for library support (5.3%) than for consortial support (0%).

“Other” responsibility was selected by respondents in 13 of the 14 categories, with most indicating a mix of responsibility for particular services between the library staff, campus IT, a vendor, or a consortium. In five of those categories (calendar, library-specific applications, desktop support of public computers, digital scholarship, and digital content management), no respondents were dissatisfied with services provided by the library staff or those with the “Other” designation. In five other categories (ILS/LSP, desktop support for staff computers, hardware and software purchasing, audiovisual technology and equipment, and disability services technology and equipment), dissatisfaction was higher for those with the “Other”

designation than for library staff. In two categories (web design and development and IR), dissatisfaction for library staff support was higher than for those with the "Other" designation.

Dissatisfaction with support for the 14 categories under review centered on several themes. First, many libraries reported that they did not have enough resources or staff to maintain information technology services at the level desired. For example, 11 libraries reported that they did not have enough staff to manage web design and development well. Other complaints centered on what respondents perceived as poor customer service provided by campus IT staff and the lack of control when a particular function is managed by campus IT or another institutional-level unit, such as the marketing or communications department in the case of web design and development. On the other hand, many respondents who indicated that they were satisfied with services provided noted that their satisfaction resulted from their ability to manage the service internally to the library and the appropriate level of staffing and other resources to meet the needs of their constituents. Services that have been managed by campus IT, such as email, calendar, and to a lesser degree, server and systems management and desktop support of staff computers, are less problematic from the library's viewpoint. Support for AV or disability services technology and equipment are still centered in the library, but many respondents acknowledge that these are services that could logically fit in multiple responsibility centers of the university and do not necessarily have to reside within the library's suite of services.

Overall, responsibility for the fourteen technology services we looked at was relatively stable, with only three services reflecting over 30% change and three between 20%-30%. Changes in responsibility for the management of the ILS/LSP was most likely to change, with respondents indicating that they moved to a hosted vendor solution that presumably would not require campus IT or library staff to manage servers. The other two most likely services for which responsibility changed was server and systems administration and desktop support of public computers. In the case of server and systems administration, respondents noted an increasing reliance on virtual machine software, which is more easily managed by a central campus IT staff member. Other reasons noted for changing responsibility for managing these and other services were cost savings, increases in efficiency, and less staff time required.

Conclusion and areas for future research

This study expands on the past studies that considered what information technology services were performed within the library by addressing the wider IT environment in which libraries now operate, with most activities remaining under the purview of the library staff, but others performed by campus IT, vendors, consortia, or a mix of some or all of those. Using the findings in this study, library and university administrators will be more informed as they consider how to organize the management of information technology activities in their own institutions. Findings about satisfaction with services may predict the quality of services provided to the students, faculty, staff, and other constituents of university libraries, depending on how those services are provided.

While this study reveals a snapshot of the status of information technology responsibility in large, academic libraries in North American universities, including where those responsibilities

lie and the level of satisfaction with the services provided, it would be useful to repeat this study in five or ten years to see whether there is a trend toward further centralization or outsourcing to a vendor or consortium. It would be valuable to take a deeper dive into one or more of the service categories and analyze the factors that go into a successful centralization of the service responsibility or to identify the factors that call for the service to remain in control of library staff. The move toward greater use of cloud-based services bears watching, as we are seeing this grow in libraries, particularly in library applications and library service platforms. It would also be useful to conduct a similar study with smaller universities and colleges, or with a focus on liberal arts colleges to learn how their organizations are structured to support IT activities within libraries.

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Appendix A. Survey instrument

IT Organization

The survey asks the same set of questions for a variety of library systems and services to get more information about responsibility and satisfaction. The time frame for consideration is from 2000 to early 2020, prior to the pandemic.

The library systems and services being asked about are:

- Web design and development
- Server and systems administration
- Email
- Calendar
- Integrated library system or library services platform
- Library specific applications
- Desktop support of staff computers
- Desktop support of public computers
- Digital scholarship technology or equipment
- Hardware or software purchasing
- Institutional repository development and support
- Other digital content management systems
- Audiovisual or media technology or equipment
- Disability services technology or equipment

The same set of questions being asked about those systems and services are:

Please indicate who is primarily responsible for **[service from list]** for your library:

- ○ Library systems office or other units or personnel within the library
- ○ Institution-level information technology unit
- ○ Vendor
- ○ Consortium
- ○ Other _____

How satisfied are you with the **[services from list]** services provided?

- Very satisfied
- Satisfied
- Neutral
- Unsatisfied
- Very unsatisfied

Please explain

_____

Has this responsibility for **[services from list]** changed since 2000 (prior to the pandemic)?

_____

If No, skip to the set of questions for the next service
If Yes, these additional questions will be asked:

Please explain

_____

What year did this responsibility change?

_____

Why was the decision made?

_____

The final survey questions are:

Please list the top three challenges the library systems operation in your institution will face in the next two years

- ☐ 1 _____
- ☐ 2 _____
- ☐ 3 _____

What techniques does the library use to evaluate the effectiveness of information technology services? **Please select all that apply**

- ☐ Track usage of web pages, ILS, etc.
- ☐ Track the number of helpdesk tickets
- ☐ Track the number of hardware or software installations
- ☐ LibQUAL+ survey
- ☐ Interview internal users
- ☐ Conduct user surveys
- ☐ Interview external users
- ☐ Conduct focus groups
- ☐ Other (text required) _____

Name of institution:_____

Is your institution public or private?

- ○ Public
- ○ Private

What organizational unit does the library report to?

- ○ An academic unit, such as Academic Affairs
- ○ An administrative unit, such as Finance and Administration
- ○ Other (text required) _____

What is the title of the person that the library head reports to?

_____

Please submit any additional information regarding library technology services at your institution that may be relevant to this survey topic.

_____

Appendix B. Satisfaction levels based on which unit is providing a specific service

[Insert Table 2]

Table 1. Service responsibility breakdown by unit

Service Responsibility	Library	ITS	Vendor	Consortium	Other
Web design and development	88.9%	5.6%			5.6%
Sever, system administration	63.9%	19.4%			16.7%
Email		83.3%	16.7%		
Calendar	9.7%	66.7%	18.1%		5.6%
ILS LSP	50.0%	2.8%	23.6%	15.3%	8.3%
Library-specific applications	86.1%	2.8%	1.4%		9.7%
Staff computers	76.4%	18.1%			5.6%
Public computers	58.3%	30.6%			11.1%
Digital Scholarship	83.3%	5.6%			11.1%
HW SW Purchasing	81.9%	6.9%			11.1%
Institutional Repository	79.2%	2.8%	11.1%	2.8%	4.2%
Digital Content Management	81.9%	4.2%	6.9%	1.4%	5.6%
Audio Visual Media	68.1%	18.1%			13.9%
Disability equipment	42.9%	38.6%			18.6%
Averages	**62.2%**	**21.8%**	**13.0%**	**6.5%**	**9.8%**

Table 2. Satisfaction levels based on which unit is providing a specific service

Service	Responsibility	Very Satisfied	Satisfied	Neutral	Unsatisfied	Very Unsatisfied	Totals
Web design and development	Library	54.7%	26.6%	14.1%		4.7%	88.9%
	ITS		25.0%		75.0%		5.6%
	Vendor						
	Consortium						
	Other	25.0%	25.0%	50.0%			5.6%
Sever and systems administration	Library	50.0%	43.5%	2.2%	4.3%		63.9%
	ITS	21.4%	50.0%	21.4%	7.1%		19.4%
	Vendor						
	Consortium						
	Other	8.3%	50.0%	33.3%	8.3%		16.7%
Email	Library						
(71 responses)	ITS	33.9%	57.6%	8.5%			83.1%
	Vendor	41.7%	58.3%				16.9%
	Consortium						
	Other						
Calendar	Library	42.9%	57.1%				9.7%
	ITS	31.3%	54.2%	14.6%			66.7%
	Vendor	38.5%	53.8%		7.7%		18.1%
	Consortium						
	Other	25.0%	75.0%				5.6%
ILS LSP	Library	44.4%	44.4%	11.1%			50.0%
	ITS	50.0%		50.0%			2.8%
	Vendor	17.6%	58.8%	11.8%	11.8%		23.6%
	Consortium	27.3%	63.6%	9.1%			15.3%
	Other	16.7%	33.3%	33.3%	16.7%		8.3%
Library-specific applications	Library	46.8%	46.8%	6.5%			86.1%
	ITS			100.0%			2.8%
	Vendor		100.0%				1.4%
	Consortium						
	Other	28.6%	42.9%	28.6%			9.7%
Desktop support of staff computers	Library	50.9%	36.4%	12.7%			76.4%
	ITS	7.7%	69.2%	15.4%	7.7%		18.1%
	Vendor						
	Consortium						
	Other		75.0%			25.0%	5.6%
Desktop support of public	Library	47.6%	50.0%	2.4%			58.3%
	ITS	9.1%	77.3%	13.6%			30.6%
	Vendor						

computers	Consortium					
	Other	25.0%	62.5%	12.5%		11.1%
Digital Scholarship technology or equipment (71 responses)	Library	40.0%	45.0%	15.0%		84.5%
	ITS		25.0%	25.0%	50.0%	5.6%
	Vendor					
	Consortium					
	Other		28.6%	71.4%		9.9%
HW SW Purchasing	Library	47.5%	42.4%	5.1%	5.1%	81.9%
	ITS		80.0%		20.0%	6.9%
	Vendor					
	Consortium					
	Other		37.5%	25.0%	37.5%	11.1%
Institutional Repository development and support	Library	35.1%	49.1%	10.5%	5.3%	79.2%
	ITS		100.0%			2.8%
	Vendor		62.5%	25.0%	12.5%	11.1%
	Consortium	50.0%	50.0%			2.8%
	Other			100.0%		4.2%
Other Digital Content Management (71 responses)	Library	32.8%	48.3%	19.0%		81.7%
	ITS		100.0%			4.2%
	Vendor		80.0%		20.0%	7.0%
	Consortium	100.0%				1.4%
	Other			100.0%		5.6%
Audio visual or media technology or equipment (71 responses)	Library	34.7%	49.0%	16.3%		69.0%
	ITS	7.7%	76.9%	15.4%		18.3%
	Vendor					
	Consortium					
	Other		55.6%	22.2%	22.2%	12.7%
Disability equipment (69 responses)	Library	16.7%	66.7%	13.3%	3.3%	43.5%
	ITS	14.8%	51.9%	29.6%	3.7%	39.1%
	Vendor					
	Consortium					
	Other	16.7%	66.7%	8.3%	8.3%	17.4%