

McMaster's Evolving Digital Research Support Landscape

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A report by the
Digital Research Commons Pilot (DRCP)



Digital Research
Commons Pilot
askresearch.mcmaster.ca

This report is shared with the McMaster research community for review and comment and will be updated periodically as additional feedback and new information is collected.

Please use this form: <https://u.mcmaster.ca/drcp-feedback> (survey opens November 8, 2023) to provide feedback. Information collection for this period ends December 31st, 2023.

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Executive Summary

This report presents findings from the Digital Research Commons Pilot's (DRCP) Context evaluation of digital research support (i.e., access to systems, services, software, and the necessary expertise to use them effectively) at McMaster, which comprised three activities: synthesizing past assessments, identifying stakeholders and service providers, and analyzing digital research needs, gaps, and opportunities. The findings highlight the complexity of the support environment where various service providers cater to diverse researcher needs, but also reveal a lack of coordination, resulting in challenges associated with service discovery, access, and alignment with researchers' expectations. The lack of coordination presents various challenges across McMaster's research community:

Researchers face difficulties navigating the digital research support ecosystem to discover and access relevant services and resources.

Service providers operate with varied and often incomplete understanding of researcher needs and the services and resources available elsewhere.

Administrators have difficulty assessing the efficacy and efficiency of the distributed and uncoordinated support environment.

Input from research stakeholders identified the following opportunities to tackle existing challenges and gaps in digital research support, along with broader prospects for enhancing support across the institution:

Opportunity #1: Ongoing engagement and information collection: Establish a process for continuous engagement with and feedback from researchers related to needs, gaps, and opportunities.

Opportunity #2: Enhancing communications within the research community: Establish multi-faceted and consistent mechanisms for communication with and between researchers and service providers.

Opportunity #3: Realigning service priorities and operations: Align service providers' focus, function, and service offerings with researcher expectations.

Opportunity #4: Coordinating service delivery: Integrate systems and workflows used by service providers to streamline the support experience for researchers.

Opportunity #5: Improving awareness of digital research supports: Establish a user-friendly "one-stop shop", a centralized platform that connects researchers to a variety of support services and resources from different service providers.

Opportunity #6: Engaging researchers at career milestones: Focus on providing resources and support to researchers at specific career or research stages (e.g., graduate students, new faculty members, grant and ethics applications).

Over the coming year, the DRCP will engage with the McMaster research community to validate the findings of this report and co-develop a vision for the DRCP's role in realizing the opportunities that have been identified to improve digital research support at the institution.

This report will be updated periodically as we gather new insights and continue to engage with members of McMaster's research community.

Introduction: Digital research support and the DRCP

McMaster researchers use a diverse and growing suite of digital tools, platforms, and resources to plan for, carry out, and disseminate their research. To fully leverage these technologies and methodologies, researchers require digital research support (i.e., access to systems, services, software, and the necessary expertise to use them effectively) capable of meeting their distinct and evolving needs. Currently, the needs of McMaster researchers are addressed through a myriad of internal support units and external research support organizations including the Digital Research Alliance of Canada and Compute Ontario.

While this distributed approach to digital research support has proven successful in some ways—as evidenced by McMaster’s collective grant, publication, and ranking successes—it presents several challenges, particularly in terms of equitable access to services and resources for researchers. Numerous reviews of McMaster’s research and information technology services highlight insufficient and inequitable access to digital research resources and support services across campus. Some highly desired services are not comprehensive enough to meet needs or are not offered at all, while others vary in terms of their accessibility or affordability for different researchers. Another issue that has been highlighted is that often, appropriate services and resources exist, but researchers are unaware of them or unclear about how they can be accessed. Furthermore, the current approach has led to uncoordinated efforts across the campus, which has resulted in a lack of clarity about who should be responsible for what and some duplication of services as different groups have worked independently to meet the changing needs of their core constituencies.

To help address these challenges, McMaster has embarked on the **Digital Research Commons Pilot** (DRCP)—a collaborative initiative to build a more connected, capable, and researcher-focused approach to digital research support, with the goal of improving access to systems, services, software, and training for researchers across the institution. The DRCP is funded through a [Strategic Alignment Fund](#) (Office of the Provost) and co-sponsored by the Office of the Vice-President, Research (OVPR), the McMaster University Library, and the Office of the Associate Vice-President (AVP) and Chief Technology Officer (CTO).

Between late 2022 and early 2026, the DRCP will engage and collaborate broadly to identify opportunities to support, augment, better promote, and provide easy access to services and resources that address McMaster researchers’ digital research support needs. The initiative is built around four core objectives:

1. *Engage with research stakeholder groups to identify opportunities for meaningful collaboration and co-create a vision for coordinated digital research support at McMaster.*
2. *Pilot the coordination of shared resources, services, and communities of practice for digital research support, with an initial focus on research data management, research IT security, research impact, research software development, and online data collection.*
3. *Provide researchers with a single interface to find information about digital research support. Compile and share information about services available from local, provincial, or national service providers.*
4. *Continuously assess the ever-evolving needs of researchers and the success of the DRCP’s approaches to guide efforts that address these needs during and beyond the pilot.*

Characterizing McMaster's Research Support Landscape

To guide and assess efforts towards its stated objectives, the DRCP has implemented the Context, Input, Process, Product (CIPP) program evaluation framework¹, an iterative evaluation approach that comprises four successive phases:

- **Context** (*assessing the current state, including needs and opportunities for improvement*)
- **Input** (*examining the potential strategies, plan, and resources available to implement the intervention or service, updating the current state evaluation*)
- **Process** (*implementing the intervention or service, evaluating its cost effectiveness and the efficacy of its implementation*)
- **Product** (*identifying the intervention or service's positive and negative outcomes and informing a new current-state map so that the intervention can be continuously refined*)

Incorporating the CIPP model into the initiative ensures that McMaster's research stakeholder groups have full information of the institution's digital research support landscape and that DRCP activities are driven by and responsive to the needs of these groups. More information on the CIPP Program Evaluation Framework can be found in [Appendix A](#).

Report Objectives

As the culmination and key output of the CIPP Context evaluation phase, this document characterizes the current state of digital research support at McMaster by examining its historical context, describing the present-day support landscape, and detailing the associated gaps and opportunities identified by research stakeholder groups across the institution. **We view this report as a living document that will be updated periodically as new information is collected through continual engagement with members of McMaster's research community.**

Findings have been organized into the following sections, each of which provides more information on data sources and methodology:

[Section 1: Summary of past digital research support assessments.](#)

[Section 2: McMaster's digital research support landscape.](#)

[Section 3: Current needs, gaps, and opportunities for digital research support.](#)

[Section 4: Summary of findings](#)

[Section 5: Next Steps](#)

Section 1: Summary of past digital research support assessments

Context and methods

The past conditions of McMaster's digital research support environment provide valuable context for understanding its current state and informing actions to address existing and future

¹ Stufflebeam, D. L., & Shinkfield, A. J. (2007). Evaluation theory, models and applications. San Francisco, CA Jossey-Bass.

needs. To synthesize this information, we performed a thematic analysis²³ on reports pertaining to McMaster's digital research support needs—these included reports that reviewed the institution's IT and research IT services, as well as those collected as part of provincial and national level needs assessments. Our review included both services that were specifically identified as relevant to research IT as well as more general IT services that were described as relevant to research activities (See [Appendix B](#) for a full list of documents analyzed).

Many of the documents reviewed were focused on challenges related to digital research support services and associated concerns. As such, data were labelled with an overarching key issue and collated into four broad themes:

[Theme 1: Awareness of digital research support services](#)

[Theme 2: Funding for digital research services](#)

[Theme 3: Availability of specific services, supports, and infrastructure](#)

[Theme 4: Coordination of service delivery](#)

A note about scope and limitations

While the following summary contextualizes and sets a baseline for our current needs assessment, it is important to note its scope and limitations:

- **Reports focused on needs assessment:** *The reviewed documents are primarily needs assessments that focus on unmet needs and gaps, rather than highlighting the services and organizational functions that are working well and meeting researchers' needs. The effective aspects of McMaster's digital research support environment will be examined during the next phase of the DRCP's assessment work, as we consider how they might be leveraged to address the issues identified here.*
- **Challenges not specific to McMaster:** *Many of the challenges identified throughout the documents reviewed are not specific to McMaster but are broad issues that impact researchers across the province and beyond.*
- **Information collected between 2016-2022:** *The following summary reflects information collected between 2016 and June 2022 and is a description of the digital research support landscape at a point in the past. Though not reflected in this section's findings, efforts to address the recommendations of past campus reviews have undoubtedly led to improvements in some areas. Through its current and ongoing assessment activities—of which this report is a part—the DRCP aims to update and keep current knowledge of McMaster's digital research support landscape, as well as the evolving needs of McMaster researchers. Furthermore, future iterations of this report will include documents and other resources that have been published since June 2022.*

Theme 1: Awareness of digital research support services

A prominent theme throughout the analyzed documents was that members of the research community were unaware of what digital research support services exist both internally and

² Braun and Clark's reflexive thematic analysis was used to analyze the reports pertaining to McMaster's digital research support needs. Thematic analysis is a method that can be used to explore and interpret patterned meaning within a qualitative dataset and generate themes from such data.

³ Braun V, Clarke V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101.

externally to McMaster. Many have also reported struggling to gain access to necessary IT and digital research services. Some have resorted to seeking help wherever they can find it to gain access to services that meet their needs. This has included paying external providers for services (sometimes even when those services are offered at no cost to end users as core services by McMaster through UTS and other units) or requesting support from more specialized units at the University for services that are available elsewhere on campus. It is not necessarily problematic when researchers select their own service providers, but suboptimal decisions may be made when researchers are inadequately informed about the support landscape.

The Research Technology Services Review conducted in August of 2019 found that some researchers were unaware of the existence of Research and High-Performance Computing Support (RHPCS) or the resources available through provincial and national digital research support providers such as Compute Ontario and Compute Canada (now the Digital Research Alliance of Canada). The latter issue is not exclusive to McMaster. In fact, this was an issue highlighted across both provincial and national needs assessments, with researchers across Ontario (and Canada) being generally unaware of the specific digital research-related resources, training, and support available to them through national and provincial platforms. It was suggested in McMaster's Digital Research Infrastructure Needs Position Paper that enhanced integration between campus IT resources and provincial and national computing platforms would enable improved access for researchers, as well as more efficient and cost-effective delivery of key services. As identified in numerous documents, not only does this issue of awareness of research support services result in unused resources, but it also results in inefficiencies as researchers spend valuable time attempting to decipher what services are available across campus (and in the broader national platform) and which are most appropriate to meet their needs.

Theme 2: Funding for digital research services

Access to funding for digital research support resources was identified as highly limited for some researchers. This inevitably translates into limitations in service access and ineffective use of resources. A key challenge is that different research domains have very disparate needs. An idea often suggested (and reflected in the 2016 Campus IT Services Review) is that research technology services could be categorized as "core" and "enhanced" with core services being supported through a core funding allocation and "enhanced" services being funded through user fees. However, even within a single faculty, "core service needs" for one department might look very different from "core service needs" in another. As such, creating a list of core services that truly meet the needs of most researchers is a complex task, compounded by the fact that some domains associated with larger demands (e.g., digital humanities) often have access to smaller funding allocations.

Various IT units at McMaster have historically relied on a "partial cost recovery" model but over time, documents reported that this model often ends up discouraging researchers from using key resources. Instead, researchers turn to seemingly less expensive external alternatives, which increases research security risk.

The issue of funding was also highlighted in both provincial and national digital research needs assessments, wherein access to funding for digital research support services were described as a significant bottleneck that prevents researchers from completing their work. With the patchwork of digital research funding options available and limited dedicated grants for the

provision of digital research services in Canada, researchers struggle to find sustainable and adequate options to support their work. Those available, such as the Digital Research Alliance of Canada's Resource Allocation Competition, are of limited value due to the short-term project-based cycles through which these funding and resource competitions operate, limited resources that can be allocated, and the unpredictable nature of their allocation. Unpublished data from Compute Ontario's analysis of the outcomes of recent Resource Allocation Competitions reveals that in 2021, McMaster researchers received just 16% of the GPU resources that they requested through the RAC process.

Reports consistently identified that funding models hindered access to digital research services and sometimes increased overall costs from additional mark-ups and administrative service fees, thereby inhibiting access to services at a time when such services are increasingly central to the research enterprise.

Theme 3: Availability of specific services, supports, and infrastructure

There were several gaps identified in terms of access to specific research support services and infrastructure that McMaster researchers require. [Table 1](#) highlights the critical issues expressed by some researchers who contributed to review documents:

Table 1: Specific service, support, and infrastructure gaps for McMaster researchers, as identified from internal and external needs assessments.

As identified by McMaster researchers

- Access to software licenses and packages for research
- Access to short- and longer-term storage for research data
- Access to graphics processing unit (GPU) for researchers not affiliated with the Vector Institute
- Computing infrastructure for "moderate" advanced research computing users
- Appropriate network access
- Access to training on specialized techniques, tools and methods
- Support with software development for research
- Support with data analysis and data visualization
- Support with data management

As identified across national and provincial needs assessments

- Training for highly qualified personnel (HQP)
 - Repository storage for data sharing
-

Similar issues were reported by researchers across Canada through national and provincial needs assessments. In fact, according to the Pan-Canadian Needs Assessment Pan-Canadian Needs Assessment (2021), four of the top five digital research priorities highlighted by researchers in Canada involved services, resources, and infrastructure:

- *Repository storage for data sharing*
- *Training for HQP*
- *Cloud computing*
- *Computing systems with high-speed internal networking*

It should be noted that while costs for some of these areas can be included in major grant proposals, many don't allow for some of these types of expenses. In addition, while these areas were characterized as issues of “access” or “existence” in the documents under review, some of these gaps may be due to issues of “awareness” and “dissemination” ([Theme 1](#)). For example, there are resources available free of cost both within McMaster and through provincial or national service providers that could effectively address some of these requirements.

Theme 4: Coordination of service delivery

McMaster's research and IT services have developed and adapted over decades to maintain competitiveness in the evolving research ecosystem and meet the needs of its community. However, past reviews have characterized McMaster's operations as highly decentralized, contributing to inequitable access to resources across campus, with many users struggling to receive appropriate guidance and support for their digital research support needs. Those providing such services were also restricted in their ability to meet researcher needs in the current organizational context due to limited budgets and staff availability. At the same time, there was little coordination of services across units, which limits opportunities for more efficient delivery of some services. For example, multiple units were identified as providing services related to server hosting and maintenance, web/content management systems, and software license management, among others (FHS IT Review, [Campus IT Review](#)). Similarly, IT staff within faculties and departments have reported a lack of awareness of the operations and services of other IT groups, due to the siloed nature of these units.

Section 2: McMaster's digital research support landscape

To help characterise McMaster's current digital research support environment and provide data to inform future service mapping and discovery activities, we conducted an environmental scan by collecting information from websites within the mcmaster.ca domain, as well as provincial and national service providers. The purpose of this scan was to create an up-to-date inventory of current digital research support providers and their services. The scan was scoped to include services that are available to researchers at the departmental level or broader; as such, the numerous research labs offering internal digital research-related training and resources to their members were not included unless they met this threshold.

After completing the initial environmental scan, we distributed a survey to the research support and Faculty IT units. Within the survey, each unit was provided with the information that had been gathered on their services from institutional websites and documentation. They were asked to correct the information provided and were asked additional questions regarding how their services are funded, which services are core provisions, and who can access their services. Open-ended questions were also provided to capture perceptions of support gaps and opportunities for coordination between the unit and the DRCP ([discussed further and used in Section 3](#)). An outline of the survey is available in [Appendix C](#). We received 29 survey responses from 25 unique McMaster service providers. In the time between the initial environmental scan and preparing this report, additional service providers were identified through their web

presence or referral during engagement activities. These providers were added to our inventory and flagged for surveying at a later time.

Noting the variability associated with classification granularity, approximately 50 internal and external digital research support service-providing units were identified during the scan and subsequent information collection ([Appendix D](#)). These units are administered by entities including all six faculties, the libraries, central IT and research support units, numerous research centers and institutes, as well as Compute Ontario and the Digital Research Alliance of Canada. A summary of these entities and their high-level missions can be found in [Appendix E](#).

As illustrated, there is a plethora of digital research support that exists at the University, with some units servicing broad constituencies and others providing support to smaller groups of researchers. Some of these units are managed and available within a single department or faculty, while others maintain multi-faculty or university-wide mandates. The nature of support provided, as well as governance and funding models also vary significantly. Many of these units have evolved within distinct operational contexts and continue to operate independently from one another.

Section 3: Current needs, gaps, and opportunities for digital research support

Context and methods

Following the environmental scan and analysis of relevant documents, we utilized focus groups and open-ended survey questions to validate our findings and explore potential gaps that exist within the landscape and to start conversations about how these gaps could be bridged to help meet the digital research support needs of McMaster researchers.

With both information collection approaches, McMaster researchers and research support staff were asked to identify potential support gaps and opportunities for better service coordination across the institution. Surveys to research support units to validate information collected from their websites ([Section 2](#)) included open-ended questions asking for feedback in these areas ([Appendix C](#)). Focus groups were conducted with Faculty IT support unit staff, faculty deans and associate deans, and graduate students to identify opportunities to support, augment, and better promote existing digital services and resources that facilitate research at McMaster. Specifically, participants were asked questions regarding gaps in their current workflows, challenges accessing relevant supports, and potential solutions to these issues. Overall, 7 participants represented faculty deans and associate deans, 8 participants represented Faculty IT support units, and 6 participants represented graduate students, for a total of 21 focus group participants across 6 focus groups.

Thematic analysis was also used to analyze the qualitative responses from the open-ended survey questions and focus groups^{4,5}. The following subsections outline the primary issues and potential solutions provided by participants across the focus group and survey responses:

⁴ Braun and Clark's reflexive thematic analysis was used to analyze the qualitative responses from the open-ended survey questions and focus groups. Thematic analysis is a method that can be used to explore and interpret patterned meaning within a qualitative dataset and generate themes from such data.

⁵ Braun V, Clarke V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101.

[Theme 1: Organization and coordination of services](#)

[Theme 2: Alignment of research support provision with researcher practices](#)

[Theme 3: Discovery of digital research support services](#)

[Theme 4: Access to digital research support services](#)

[Theme 5: Availability of resources and training](#)

Theme 1: Organization and coordination of services

While the current structure of digital research support at McMaster has its advantages, such as units being able to drive their own priorities based on the observed needs of the communities they serve, participants raised concerns related to the organization, strategic management, and governance of digital research support services and digital research more broadly at McMaster. Most notably, participants indicated that the decentralized and uncoordinated nature of digital research support at McMaster results in inefficient and ineffective service delivery and inhibits reliable identification and prioritization of support gaps and scaling.

Participants reported that the independent development and operation of support units at McMaster has created a landscape where senior leaders, researchers, and support staff are uncertain of the service offerings, mandates, and primary targeted users of many service providers. Consequently, researchers may be unsure where to begin when seeking digital research support, and support unit staff may be unaware of additional resources that researchers can access to fulfill their needs. This general fragmentation of services can cause support delays and increase the administrative burden placed on researchers attempting to seek support ([Theme 2](#)). The lack of coordination concerning service unit mandates can also result in duplication of services, which some participants identified as wasteful and inefficient given the limited resources available for research support. It should be noted that distinguishing between genuine service duplication and specialized service offerings is crucial; for instance, two entities providing "desktop support" or "lab computing support" might deliver disparate services despite sharing similar labels. Context is essential to discerning whether such variation is detrimental or beneficial.

Similarly, it was suggested that operational inefficiencies in a decentralized and uncoordinated service environment could result in research support at McMaster that is comparatively more expensive than support offered by other institutions or commercial alternatives (note: the authors know of no formal analyses carried out on this topic). McMaster researchers may be more inclined to seek support outside of the University when cost-recovery services are delivered in a more accessible and cost-efficient manner elsewhere. Though individual support units at McMaster may assess service use or needs within their purview, there are no mechanisms to coordinate or facilitate the exchange or centralization of such information across the institution. As a result, service units are often only partially aware of support gaps or scaling needs of the broader research communities they serve, and this may result in the ineffectual allocation of research support resources and lost opportunities for collaboration amongst service providers.

Participants also emphasized that there is a need for a clear institutional strategy around the funding, provision, delivery, assessment, and coordination of digital research-related resources. This strategy ought to include a plan for addressing inequities in resource access and use ([Theme 4](#)). Greater operational coordination between support units could reduce costs by

minimizing unnecessary duplication and expand service offerings and utilization by allowing staff to target additional researcher needs. Research support and IT units emphasized that a mechanism to continuously evaluate researcher needs is required to maximize the efficacy of available resources and proactively address researcher needs.

Participants raised the possibility that governance and advisory structures—whether newly-developed with a specific digital research support focus or accommodated within existing ones—could be a first step toward coordinating digital research support at McMaster. The DRCP was identified as a possible platform to facilitate coordination and communication between support units. As part of this functionality, the DRCP could coordinate with support units and researchers to define and differentiate responsibilities, thereby minimizing duplication of services, expanding support offerings, and clarifying the support environment. Participants also suggested that service units should have a better grasp of the services that are offered elsewhere (at McMaster and beyond), which could enable units to better coordinate with one another and develop valuable services that meet anticipated needs of researchers.

Theme 2: Alignment of research support provision with researcher practices

Researchers typically develop workflows that iteratively adapt and extend over time. These are often influenced by a variety of factors, including the conceptual, social, financial, and physical environments in which a researcher or project develops. Furthermore, researchers often work within environments that demand constant research productivity while simultaneously balancing alternative institutional obligations. As a result, researchers often prioritize their tasks within strict timelines and funding constraints. Participants indicated that this working context shapes researchers' expectations for digital research support and the general approach they take to accessing services and conducting research. Furthermore, these expectations and practices sometimes contrast with the provision of research support. This contrast manifests in the following ways:

- Researchers often seek digital research support only when an imminent need arises in their workflow. However, researchers are often expected to navigate the digital research support landscape on their own. In a fragmented support environment, solo navigation can be time consuming and challenging, especially when researchers are unfamiliar with the research support landscape ([Theme 3](#)).
- Researchers desire rapid and convenient solutions to contextual, time-sensitive needs; however, accessing the available digital research support may include fees, require completion of administrative tasks, or otherwise disrupt workflows and cause delays.
- Digital research supports are often channeled toward particular fields or types of research. Additionally, available support may be best suited to researchers with certain knowledge or technical skills. It may be more difficult for researchers outside of fields familiar with this language and skill set to easily access or utilize these digital research supports ([Theme 4](#)), and this additional burden may dissuade use.
- Researchers favour resources that are minimally disruptive and most easily integrated into existing research practices and workflows. However, resources may be developed or delivered without knowledge or consideration of the disruption they may cause to research practices and workflows.
- Support units may produce guidelines, best practices, or instructional materials for a general research audience. Translating general information into actionable instructions

within the scope of their disciplines requires additional effort on the part of researchers, which may also dissuade use.

This contrast between researcher workflows and priorities and the delivery models for digital research support may result in several notable consequences. Available digital research support may not be utilized or valued by researchers, and gaps in research support may thereby go unidentified. Participants also highlighted that researchers may forgo valuable resources if they learn about them at an inopportune time or if they are delivered in a manner that is deemed to be disruptive. Some research practices and workflows may be so deeply entrenched that they limit uptake of digital research support, regardless of potential value. Collectively, this may compromise research productivity, lead researchers to seek support elsewhere, and impede the improvement of McMaster's digital research support landscape. Security and liability vulnerabilities may also arise due to support units providing researchers with general instructions that require additional investigation and interpretation from the researcher. Neither support units nor researchers may be aware of the full extent of these vulnerabilities.

Some researchers may be able to adjust their workflows in minimally disruptive ways to limit the potential severity of these consequences. Well-funded or well-staffed researcher groups often have additional support options (ranging from dedicated data management staff to additional graduate students), that may not be available to smaller research groups. Naturally, well-funded researchers have a broader range of support options from which they can choose. Also, well-funded or staffed research groups may designate responsibilities associated with digital research support to specific individuals. Regardless of the inherent inequity in this landscape (explored further in [Theme 4](#)), these types of ad hoc solutions to research support needs may not be ideal. Designating research support responsibilities within a research group may result in significant workflow disruptions in the event of personnel change, such as graduate student turnover. Utilization of commercial support services may involve security and compliance issues, or uncertainties related to long-term planning. In general, the long-term health of digital research support at McMaster depends upon the sustained use of McMaster's digital research services.

Many actions may be taken to address this contrast between researcher needs and available digital research support. One general approach is to improve communication between researchers and support units, as this may facilitate better alignment of attitudes and priorities. Additionally, the priorities or operations of digital research support units could be modified to better align with researcher expectations. Support units could prioritize services that are minimally disruptive to research processes and goals. This could include greater effort toward limiting the administrative burden on researchers when accessing services. Services could also be better tailored to alternative research needs across disciplines and skill levels. Service delivery could be coordinated with researchers to limit points of access and streamline delivery around individual researchers or projects. Additionally, participants suggested that support units could employ multimodal communication methods to spread awareness of their services, ideally targeting researchers at suitable times within their workflow. For instance, promoting awareness of services upon onboarding at the institution or targeted information during ethics submissions. Similarly, a user-friendly "one-stop shop" for researcher self-service and navigation of available research support would allow researchers to locate support at their own pace and when their workflow allows. This "one-stop shop" should also direct researchers toward instructional materials, guidelines, and best practices that can be delivered as actionable items that can be implemented immediately.

It may also be possible for researcher attitudes toward digital research support to be adjusted. It may be beneficial to recommend or require digital research training for some researchers. It may also be possible to target researchers at suitable career or research stages, when practices and workflows are not as deeply entrenched, to nurture more fruitful attitudes. For example, targeting outreach and training to graduate students or new researchers may facilitate a broader uptake and acceptance of digital research support.

Theme 3: Discovery of digital research support services

One underlying theme identified throughout participant interviews is that decentralized and uncoordinated service delivery at McMaster University ([Theme 1](#)) results in a support landscape that is difficult to navigate.

Support units may be unaware of the services offered elsewhere ([Theme 1](#)) and may promote their services independently and in alternative ways. For example, McMaster's research support web presence consists of various webpages for assorted service units, research centers, institutes, and groups, each of which outline service offerings with varying degrees of accuracy and completeness. According to participants, researchers are often unaware of what supports are available to them and unsure which support units offer which services, if and how those services can be accessed, and which support units to use when similar services are offered by multiple units.

A related, recurring concern was that support units often have different intake processes, which contributes to confusion and inefficiency when navigating digital research support at McMaster. Researchers are often confused as to where to go first for their research support needs due to multiple entry points. Additionally, researchers may have to navigate this support landscape many times over the course of a single research project.

Participants also reported that researchers have varying degrees of digital research knowledge and skills and may thereby be differentially equipped to navigate the support landscape on their own. It can also be difficult for researchers to find reliable assistance when navigating the digital research landscape. While some units have clear messaging on their web page, such as a "Contact Us" page or a chat button, others do not, and it is up to researchers to find out who the primary contact is on their own. Furthermore, while support staff may be able to assist researchers on topics relevant to their home unit, they may not be able to help them navigate support elsewhere.

Due to these issues, participants reported that researchers often experience delays in receiving support. It was noted that researchers often direct their inquiries to incorrect support units and then are either forced to begin their search again or abandon their search altogether. Additionally, interviewees highlighted that researchers would rather spend their time performing research as opposed to searching for research support and they will typically only seek support when there is an imminent need ([Theme 2](#)). As noted by participants, it takes a significant amount of time to find and access support at McMaster University, which is valuable time wasted that could have been spent performing research. This speaks to the primary consequence of trying to navigate this confusing system, which is the increased administrative burden that falls on individual researchers. This burden may potentially lead researchers to accept the most convenient—but not the most appropriate—solution. Additionally, participants noted that navigation challenges are related to researchers opting for commercial support

entities, such as Amazon Web Services for cloud computing, as they tend to be easier to access and more well-known.

When prompted to comment on potential roles for the DRCP in this area, a solution provided by participants involved the DRCP (or an initiative like it) operating as a central coordination hub for digital research support by providing an up-to-date service catalogue to assist researchers in navigating the digital research support landscape. Additionally, the DRCP could disseminate relevant information on digital research support to researchers and support units. Similarly, it could operate as a single intake point, coordinating the referral of researchers to appropriate services.

Participants also suggested that the DRCP could serve as a neutral party to facilitate communication and coordination between support units. This could help units identify unmet needs and unnecessary duplication of services, delineate and complement service offerings, and coordinate service promotion or delivery. Ideally, support units could anticipate researcher needs and thereby coordinate service delivery around common touchpoints that are already integrated into research workflows, such as onboarding, grant support, or ethics approval.

To assist with navigation, the DRCP could help researchers become better navigators of digital research support. Specifically, participants emphasized that the onboarding process for new researchers could be improved. By equipping researchers with the tools to succeed at the onboarding stage, the likelihood of finding and accessing appropriate support services will increase, resulting in researchers feeling that their research support needs are being met. Similarly, by simply communicating more effectively with researchers and better promoting existing services, the DRCP could help create a better-informed base of researchers, equipped to identify, and pursue digital research support that exists within the University.

Theme 4: Access to digital research support services

As indicated in [Theme 1](#), digital research support units at McMaster have developed independently, within unique funding, administrative, and research contexts. Different groups of researchers may experience this support landscape differently. Though all researchers may confront barriers in the digital research support landscape, these barriers may tend to be more significant for some groups of researchers.

Different researchers across Faculties, roles, research disciplines, and affiliations may have access to alternative sets of funded services. For example, each Faculty at McMaster has an IT support unit that serves faculty members and staff, but these units provide different sets of services from one another. Different groups of researchers also have varying amounts of funding available for digital research support, which contributes to disparity in access to paid services. This is especially impactful on disciplines without substantial funding available for digital research, such as those who seek funding from SSHRC-based competitions.

Some researchers suggested that support units sometimes make presumptions about their technical competencies, methodologies, field of study, or research goals and values. These tacit presumptions correspond with some groups of researchers but leave others with the impression that digital research support units aren't speaking their language. Participants noted that when support units assume researchers possess a high technical skill level that they do not possess, or when services are tailored to the language, values, or research goals of an alternative discipline or research type, this increases burden on the individual researchers. This compels some researchers to avoid certain support units, seek support elsewhere, or forgo

certain kinds of support entirely. Additionally, these researchers may not recognize the necessity or benefit of some services to their work.

Inequitable access to digital research support may become more entrenched over time as support units tailor their services to certain kinds of users ([Theme 1](#)) and dissuaded researchers avoid certain services or support units. Additionally, when encountering barriers in the digital support landscape, participants claimed that researchers try to obtain the support they need from “trusted” units that are readily accessible, even if the unit is not suited for the task. This may be a general phenomenon among researchers navigating digital research support and may thereby exacerbate challenges associated with navigation ([Theme 3](#)) and uncertainties in support unit mandates ([Theme 1](#)). However, when barriers tend to be more significant for some groups of researchers, the support units that cater to these groups may receive a disproportionate volume of requests that would be best directed elsewhere. Consequently, alternative support units may bear the burden of systemic research support challenges in different ways and to varying degrees.

Participants identified several possible remedies to inequitable access to digital research support. Increased funding for digital research support could improve speed and reliability of services, while core funding for all digital research services could simplify and expand researcher access. Funding models for digital research support at McMaster could be adjusted to prioritize equitable access; some researchers suggested that they were unable to access fundamental digital research support due to associated costs.

Additionally, the DRCP should consult with groups that are under-represented in digital research support to ensure that their needs and challenges are understood. Similarly, the DRCP was identified as a possible means to improve digital research support governance and strategy at McMaster ([Theme 1](#)) while involving researchers from a variety of disciplines, including those that have not been traditionally prioritized in digital research support.

Participants also suggested that support units could be more receptive to the possible range of researchers who could benefit from their services. Service promotion, communications, consultations, instructional materials, and training should be tailored to researchers of varying technical skill levels and to the languages, goals, and values that might vary across research types or disciplines.

Theme 5: Availability of resources and training

While most of the issues identified in McMaster’s digital research support landscape were related to governance and its downstream impacts on navigation, access, and equity, there were also tangible resources and services suggested that could improve researcher productivity and workflows. Participants suggested an array of services and resources that would benefit researchers across disciplines ([Table 2](#)). The need for training programs covering various digital research-related topics was highlighted, stressing the importance of customizing these programs to accommodate different audiences based on their skill levels, disciplinary backgrounds, and familiarity with technical subjects. It was suggested that the service, resource, and training gaps that currently exist are often a result of a dearth of information regarding researcher needs, and the lack of a centralized mechanism to obtain information related to gaps ([Theme 1](#)). Participants also expressed a strong desire for training initiatives tailored specifically to graduate students and research staff, acknowledging their significant contributions to research.

Table 2: List of specific services to which the DRCP could facilitate access.

Digital Research Support Area	Examples Identified
Information security for research	General guidance on best practices, information regarding Tri-agency requirements, handling, and protection of sensitive data
Research data management	General guidance on best practices, ethics compliance related to sensitive data, information regarding Tri-agency requirements, archiving sensitive datasets, general archival processes, platform for sensitive data sharing
Advanced research computing	Training on the use of R, Python, GitHub, artificial intelligence, and cloud computing
Software offerings / online data collection	Access to Qualtrics, electronic lab notebooks, user-friendly survey tools, the use of REDCap, web-hosting solutions, better software support, software licensing documentation, access to virtual machine research platforms, suitability of online data collection options
Research software development	General information and guidance, support for research software deposit for reproducibility, coding and script support, information on licensing and IP on software development
Research impact & Knowledge mobilization	General information and guidance, information on how to measure impact beyond traditional bibliometrics, ORCID set-up, knowledge mobilization support, researcher website options and support
General digital research / Other	Digital research resource FAQ page, central list of digital research services, support for grant and ethics applications

Notably, both researchers and support unit staff identified several critical gaps in services, resources, and training, even though such supports are already offered at McMaster or as part of the broader national and/or provincial digital research ecosystems. Examples include training on research data management (RDM) best-practices, training on and support for the use of various software such as R and REDCap, guidelines related to data security and ethics, as well as platforms for storing and handling sensitive data. This finding points to a larger issue regarding the general promotion of available resources, and the necessity of disseminating information related to such services in a manner that is consumable by support unit staff and researchers (see [Theme 2](#)).

During discussions on resources and services that could support researchers in communicating research impact and facilitating research software development, participants frequently

expressed a need for additional information and clarification about these services. This finding points to the need for general information and guidance on these topics, as researchers and research support providers alike may not be familiar with these areas, let alone the specific needs they have related to these domains. While software development may only be relevant to some research groups, research impact tools and services have broader utility. This includes guidance on effectively communicating research findings, measuring and assessing impact, and maximizing the visibility of their work.

In addition to facilitating access or disseminating information related to specific services listed in [Table 2](#), it was suggested that the DRCP may be able to compile or support development of some of the identified resources (particularly regarding training on best practices) in conjunction with relevant support units.

Section 4: Summary of findings

This report presents the DRCP's findings from its Context evaluation of digital research support at McMaster, which included a synthesis of past assessment of the institution's digital research support environment, an inventory of current stakeholders and service providers, and a novel analysis of digital research needs, gaps, and opportunities.

Generally, our findings build upon and illustrate with greater detail the outcomes of previous reviews: McMaster's digital research needs are diverse, and the support environment is complex, with manifold service providers contributing to meet the diverse needs of its researchers at a variety of scales with a variety of service models. While specific service and support gaps were identified and numerous respondents perceived limited funding for fundamental resources, HQP, and infrastructure, our assessment suggests that the lack of coordination across the support landscape is a key root cause of many researchers' current challenges and perceived gaps. Summarized, this lack of coordination manifests itself in a variety of ways:

- While there are notable service and support gaps across the landscape, **researchers** also struggle to discover relevant services, discern what is available, and navigate the ecosystem to access them. When services are available and accessible, they are not always attuned to researchers' expectations and needs for responsiveness, flexibility, and specificity.
- In the other direction, **service providers'** understanding varies considerably in terms of the needs and expectations of their clientele, as well as the services and resources made available to researchers elsewhere within or beyond the institution. Often, providers rely upon informal networks and anecdotal interactions to collect information to scope their offerings and understand potential referral pathways.
- For **administrators**, the decentralized and uncoordinated nature of services increases the risk of operational inefficiencies, as some offerings may be duplicated, some underutilized, while other needs are left unmet or accommodated by external commercial providers. Furthermore, without a holistic and regularly updated view of support offerings and researchers' needs, it is difficult to assess the degree to which these inefficiencies exist within the institution and the best courses of action to address them.

Our engagement with research stakeholders on these topics generated extensive feedback about actions that could address current challenges and gaps, as well as general opportunities

to improve digital research support across the institution. In some cases, the DRCP was identified as best suited to implement the potential solution, while in others no specific candidate unit was identified. The prospective actions and opportunities are summarized below.

Ongoing engagement and information collection

A process for ongoing engagement with and feedback collection from research stakeholders is necessary to obtain a holistic view of digital research support needs that can be mapped to the services and supports available to address them. Throughout the interviews, participants emphasized the importance of connecting with researchers, research support staff, and research administrators regularly, and emphasized that the work initiated through this study should continue throughout and beyond the pilot. Researcher needs are constantly evolving as they take on new projects, move to a different stage in the research cycle, or develop new skills. Therefore, the University should institute a formal process whereby cross-sections of McMaster researchers are consulted at regular intervals regarding their research needs and the needs of their peers, which will ensure they feel heard, supported, and prepared to continue to successfully execute their research processes.

Enhancing communications within the research community

Improving and sustaining communication between researchers and support units would help align workflows and priorities. By establishing multi-faceted yet consistent mechanisms for communication amongst members of McMaster's research community, researchers can more easily discover and leverage the services and supports available to them, while service providers can better understand researcher needs and the offerings of other units within and beyond the institution.

Realigning service priorities and operations

With improved information collection and communication, opportunities exist to adjust the focus and function of digital research support units for a more harmonious alignment with researcher expectations. For example, support units may wish to adapt, augment, or create additional service offerings to meet diverse research requirements and align with researcher workflows to cause minimal disruption to research procedures and approaches. A success measure for this work would be an alleviated administrative load on researchers as they engage with and utilize digital research support services.

Coordinating service delivery

Digital research support could be better coordinated to address a variety of issues identified by members of the researcher community. At a fundamental level, sharing information about researcher needs and other units' offerings can inform providers' decisions around service development and evolution, and encourage complementarity. Integrating the systems and workflows used by service providers to intake, triage, reassign, and respond to requests has the potential to yield efficiencies for service units, while also streamlining and improving the support experience for researchers. The support experience could be further streamlined by reducing researchers' points of entry for digital research support and improving rerouting of service requests to the appropriate units.

Improving awareness of digital research supports

A user-friendly “one-stop shop” for researcher self-service and navigation of available research support would allow researchers to locate support when and how they need it. Such a “one-stop shop” could take the form of a union catalogue that directs researchers toward instructional materials, guidelines, tools, and specific services as they exist on the websites of various service providers. Ideally, these resources are presented using formats and language that are intuitive and navigable by researchers of varying disciplines and roles.

Engaging researchers at career milestones

There is perceived value to developing resources for and targeting researchers at specific career or research stages—particularly when digital research support needs are acute or when practices and workflows are not as deeply entrenched, and researchers are more amenable to new services. For example, targeting outreach and training to graduate students or new faculty members may yield disproportionately large benefits and result in greater uptake and engagement with digital research support.

Section 5: Next steps

Over the coming year, the DRCP will engage with the McMaster research community to validate the findings of this report and co-develop a vision for the DRCP's role in realizing the opportunities that have been identified to improve digital research support at the institution. In the near term (October to December 2023), this report will be distributed broadly to the research community and a variety of opportunities for review and feedback—both synchronous and asynchronous—will be made available. Community feedback will serve as a primary input to the CIPP Input assessment, which will produce (by Fall 2024) an updated view of the current state, and a draft strategy that articulates a model for improved digital research support at McMaster. Outcomes will likely include recommendations for interconnected activities that support needs that have been identified for assessment and information collection, communication, coordination, and collaboration. The draft strategy will also clarify expectations for the DRCP's role in facilitating such solutions over the remainder of the pilot.

While the DRCP engages with the community to build a shared strategy, it will also continue to build the foundations of a coordinating layer that can realize the opportunities identified in this report. The DRCP will further collaborate with partners across the institution to pilot resources and services that address clear and present needs in key areas. This includes resources and services that facilitate training and help researchers discover and access the digital research support available to them when they are needed.

Appendices

Appendix A: Information collection methods - Context, Input, Process, Product (CIPP) program evaluation framework

The CIPP Program Evaluation model was designed to be used by evaluators to systematically pose relevant questions and conduct assessments around user needs through the onset, duration, and end of a project⁶. This approach is unique in that it can be used in both program development and assessment. CIPP effectively:

- *identifies the needs of users*
- *helps stakeholders design a service that can effectively address these needs*
- *assists in implementing the service in a manner that generates the desired outcomes*
- *concurrently assesses the efficacy of such design*

"The thrust of CIPP evaluations is to provide sound information that will help service providers regularly assess and improve services and make effective and efficient use of resources, time, and technology in order to serve the well-being and targeted needs of rightful beneficiaries appropriately and equitably."

Stufflebeam & Shinkfield, 2007

Evaluation Phases

The CIPP model provides direction for evaluation through four successive phases ([Table 3](#) & [Table 4](#)). These phases are iterative and build upon the successive results of each evaluation:

Context: Assessing needs and opportunities for improvement

The purpose of the context evaluation is to identify the problems, needs, and opportunities that exist within the context of interest. The context evaluation helps define the program's goals and priorities and ensure that it is meeting the identified issues. These goals will also eventually serve as outcomes to judge the program's merit and responsiveness to the targeted needs.

Input: Examining the strategies, plan, and resources available to implement the intervention or service

The purpose of the input evaluation is to assist with constructing a project that can best address the needs identified within the context evaluation. This involves identifying potential approaches and plans, inventorying resources available to help with meeting set needs, as well as considering their feasibility with respect to achieving the defined goals.

Process: Evaluating the intervention's cost and implementation

The purpose of the process evaluation is to monitor, document, and assess the implementation of the service. In turn, the process evaluation provides feedback throughout the execution of the service that can be used to identify implementation issues and adjust operations to ensure the service is meeting user needs.

⁶ Stufflebeam, D. L., & Shinkfield, A. J. (2007). Evaluation theory, models and applications. San Francisco, CA: Jossey-Bass.

Product: Identifying the intervention or service's positive and negative outcomes

The purpose of the product evaluation is to identify and assess both the unintended and intended costs and outcomes over the short and long-term of the program.

This phrase provides feedback during the program's implementation on the extent to which the original goals are being addressed and provides insight into its accomplishments.

Formative and Summative Uses of CIPP

Each phase in the CIPP model has a formative and summative component to guide the development and evaluation of a project. Within the formative and improvement-based phases, CIPP asks:

Table 3 Formative components of CIPP

Context	Input	Process	Product
What needs to be done?	How should it be done?	Is it being done?	Is it succeeding?
Where are the gaps in the digital research support services available to McMaster researchers?	How can the Digital Research Commons Pilot bridge these gaps and meet the needs of the research community at McMaster?	Is the Digital Research Commons Pilot meeting the goals defined in the context and input evaluations?	Does the Digital Research Commons Pilot meet the needs of McMaster researchers, and is the model sustainable?

These questions are answered prior to and during the decision-making and implementation processes to provide timely and accurate information for strengthening the services provided.

Within summative evaluation, the information provided by these formative questions will be referenced in addition to other necessary information to address the following questions retrospectively:

Table 4 Summative components of CIPP

Context	Input	Process	Product
Was the program based on clear goals developed in alignment with the assessed needs of service users?	Was the effort guided by a defensible procedural design, functional staffing plan, appropriate stakeholder involvement, and a sufficient budget?	Were the plans executed competently and were modifications implemented as needed?	Did the effort succeed, in what ways and to what extent, and why or why not?

Using the CIPP model to evaluate the digital research support landscape will allow for the design, implementation, and evaluation of a cost-effective and resource-efficient digital research support commons to meet the diverse current and rapidly evolving needs of researchers at McMaster.

Context evaluation within the McMaster digital research landscape

Purpose

The purpose of the context evaluation within the DRCP context was to evaluate McMaster's digital research support landscape and use the findings to develop the goals and priorities for McMaster's Digital Research Commons Pilot (DRCP).

Within the scope of this project, our context evaluation involved conducting an environmental scan and current state evaluation of the digital research support-related resources, services, and training opportunities that exist within the research sphere at McMaster. Our activities included the following methods:

- *Document review (see [Appendix B](#)) and extraction*
- *Thematic analysis (Braun & Clark, 2021)*
- *Survey existing digital research units to determine available resources and services provided*
- *Interview with key stakeholders to determine how to best achieve the goals of the Digital Research Commons Pilot*

Methods and data sources

The methods within CIPP phases are iterative and build upon the successive results of each evaluation. Within the context evaluation an environmental scan and document review were conducted, with the results from the context evaluation informing successive phases of the evaluation model.

Results & outputs

Within the CIPP framework, the context evaluation is used to define the problems, needs, and opportunities that exist within the context of interest. This evaluation produced a description of the current digital research support services available to researchers at McMaster and their connections to national and provincial digital research support organizations ([Appendix D](#) & [Appendix E](#)).

Appendix B: Previous digital research support assessments reviewed in this study

Document	Year(s) covered/ conducted	Scope
Campus Information Technology Services Review	2015-2016	A full review of all technology-related services at McMaster with the aim of better understanding needs and potential improvements that could be made to IT service delivery which would impact budget submissions.
McMaster University's Strategic Research Plan	2018-2023	An institution-wide plan for McMaster's research mission.
Research Technology Services Review (not available publicly)	2019	This report examined the status of research technology services at McMaster University in 2019 and made recommendations for improvement. This review included a widely distributed online survey to help identify concerns, in-person interviews, and subsequent analysis of results as well as of previous reports and other material.
Faculty of Health Sciences Information Technology Review (not available publicly)	2019-2020	This review includes an assessment of the Faculty of Health Sciences' Information Technology (IT) services to identify needs within the Faculty and how they were being met by the existing organization and service delivery model.
IT Strategic Plan	2019-2021	An institution-wide plan for delivering technologies and complex digital systems across McMaster.
McMaster's Digital Research Infrastructure Needs Position Paper	2020	A position paper submitted to the Digital Research Alliance of Canada as part of their Pan-Canadian Needs Assessment on the needs of McMaster researchers and challenges commonly encountered in the ecosystem.
Compute Ontario's Provincial Digital Research Needs Assessment	2021	A needs assessment based on the Ontario-based data obtained from the Digital Research Alliance of Canada's Pan-Canadian Needs Assessment.
Digital Research Alliance of Canada Pan-Canadian Needs Assessment	2021	A nation-wide needs assessment with the purpose of determining Canadian researchers' current and future needs related to digital research support.

We'd like to hear your thoughts on this document! Please use this form <https://u.mcmaster.ca/drcp-feedback> to provide feedback. Information collection for this period ends Dec. 31, 2023.

Document	Year(s) covered/ conducted	Scope
McMaster's Organizational Chart	2022	A chart which provides an overview of the structure of McMaster University in January 2022.
The Current State of Research Data Management at McMaster	2022	An assessment of McMaster's current Research Data Management (RDM) capacity, needs, challenges, and opportunities [pre-publication draft was used for the purposes of this review].

Appendix C: Survey and focus group question sets

Research support and Faculty IT units survey:

1. *Based on the information provided in our email, is there anything you would like to add or alter to the description of your unit? [open-text]*
2. *Which of the following do you provide within the scope of digital research services? [select all that apply]*
 - *Access to Resources (infrastructure, software, tools, computing systems, etc.)*
 - *Support (assistant related to the use of tools/procedures concerning digital research)*
 - *Training (formal opportunities for education around the use of digital research infrastructure/tools)*
 - *Other [open-text]*
3. *Which of the following statements best describes how your unit is funded to provide services?*
 - *Our services are covered under a core funding allocation*
 - *Some of our services are funded through cost recovery*
 - *All of our services are funded through cost recovery*
 - *Our services are covered under a partial core funding allocation (please specify the percentage covered by core funding [numeric response])*
 - *Please explain how your services are funded. [open-text]*
4. *Is access to your services limited to a specific faculty/department/unit?*
 - *No*
 - *Yes*
 - *Please specify which faculty/department/unit(s) can use your services.*
5. *Who can access your research services? [select all that apply]*
 - *Faculty/Principal Investigators*
 - *Research Staff (Research Coordinators, Research Assistants, technicians, etc.)*
 - *External Collaborators*
 - *Postdoctoral fellows*
 - *Graduate Students*
 - *Undergraduate Students*
 - *Other [open-text]*
6. *What do you see as the most significant support gaps for research at McMaster – whether particular to your unit or more broadly? [open-text]*
7. *What services or training regarding the following areas do you think would most benefit researchers you service? Please explain. [open-text]*
 - a. *Research IT Security*
 - b. *Research Software Development*
 - c. *Research Impact*
 - d. *Research Data Management*
8. *What opportunities exist for the DRCP to improve how support for researchers is coordinated between your unit and other units? [open-text]*
9. *How might coordinate research support at McMaster benefit the research communities your unit serves? [open-text]*
10. *Is there anything else you would like to tell us? [open-text]*

Deans focus group questions:

1. *What gaps + barriers currently exist in your access to digital research services that would support research in your community?*
2. *What resources, services, or training regarding software development in research would most benefit researchers in your community?*
 - a. *Are there specific research groups or individuals we should talk to about their research software development needs?*
3. *What resources, services, or training regarding IT security in research would most benefit researchers in your community?*
4. *What resources, services or training regarding online data collection would most benefit researchers in your community?*
5. *What resources, services or training regarding research impact would most benefit researchers in your community?*
6. *What specific stakeholders (e.g., individuals or groups) from your research community should be included in our outreach and engagement activities?*
7. *How can information about the DRCP, its services, resources & training best be disseminated to researchers within your faculty/unit, and how might this approach differ for different stakeholders/users [staff, students, faculty, research support]?*
8. *Are there any other services that we have not focused on that may be beneficial to include in the DRCP's operations following our pilot?*

Faculty IT and IT support focus group questions:

1. *What gaps + barriers currently exist in your access to digital research services that would support researchers in your faculty/unit?*
2. *What resources, services, or training regarding software development in research would most benefit researchers in your faculty/unit?*
 - a. *Are there specific research groups or individuals we should talk to about their research software development needs?*
3. *What resources, services, or training regarding IT security in research would most benefit researchers in your faculty/unit?*
4. *What resources, services or training regarding online data collection would most benefit researchers in your faculty/unit?*
5. *What resources, services or training regarding research impact would most benefit researchers in your faculty/unit.*
6. *What specific stakeholders (e.g., individuals or groups) from your research community should be included in our outreach and engagement activities?*
7. *How might coordinated digital research support look between the DRCP and your faculty/unit and how best can we ensure coordination of services?*
 - a. *What specific stakeholders should be included in this process?*
8. *How do you think information about the DRCP, its services, resources & training can best be disseminated to researchers within your faculty/unit, and how might this approach differ for different stakeholders/users [staff, students, faculty, research support]?*
9. *Are there any other services that we have not focused on that you think may be beneficial to include in the DRCP's operations following our pilot?*

Appendix D: Digital research support providers: Institutional and external

The following table illustrates the McMaster and internal units identified as providing digital research support services. **Service-providing units are italicized.** This is not an exhaustive organizational chart: only the organizational units related to services are shown.

Units that have validated information via a follow-up survey are denoted with an asterisk

<p>Office of the Vice-President, Research</p> <ul style="list-style-type: none"> • <i>McMaster Industry Liaison Office (MILO)*</i> • <i>Research Security</i> • <i>Research & High-Performance Computing Support*</i> <ul style="list-style-type: none"> ○ <i>SHARCNET [External]</i> • <i>Research Ethics and Compliance</i> <ul style="list-style-type: none"> ○ <i>McMaster Research Ethics Board (MREB)*</i> ○ <i>Animal Research Ethics Board (AREB)</i> • <i>Canadian Research Data Centre Network (CRDCN) [External]</i> • <i>Assistant Vice-President, Research Administration</i> <ul style="list-style-type: none"> ○ <i>Research Office for Administrative, Development and Support (ROADS)*</i>
<p>Office of the University Librarian McMaster University Library</p> <ul style="list-style-type: none"> • <i>Distinctive, Legacy, and Digital Heritage Collections</i> <ul style="list-style-type: none"> ○ <i>Digitization Services</i> • <i>User Services and Community Engagement</i> <ul style="list-style-type: none"> ○ <i>Lyons New Media Centre</i> • <i>Teaching and Learning</i> <ul style="list-style-type: none"> ○ <i>Teaching and Learning Support</i> • <i>Digital Scholarship Infrastructure and Services</i> <ul style="list-style-type: none"> ○ <i>Sherman Centre for Digital Scholarship [with Faculty of Humanities]*</i> ○ <i>Research Data Management (RDM) Services [Dotted line to RHPCS]*</i> ○ <i>Data Analysis Support Hub (DASH)*</i> ○ <i>Research Software Development Team (RSDT) [Dotted line to RHPCS]</i> ○ <i>Research Impact [with Health Sciences Library]</i>
<p>Office of the Provost and Vice-President, Academic</p> <ul style="list-style-type: none"> • <i>Dean, Faculty of Humanities</i> <ul style="list-style-type: none"> ○ <i>Humanities Media and Computing</i> • <i>Dean, Faculty of Social Sciences</i> <ul style="list-style-type: none"> ○ <i>Spark: A centre for social research innovation*</i> ○ <i>Social Sciences Tech Team</i> ○ <i>Secure Empirical Analysis Lab (SEAL)*</i> ○ <i>Research Data Centre (RDC) [Dotted line to CRDCN]</i> • <i>Dean, Faculty of Science</i> <ul style="list-style-type: none"> ○ <i>SciTech*</i> • <i>Dean, Faculty of Engineering</i> <ul style="list-style-type: none"> ○ <i>Engineering IT Support</i> ○ <i>McMaster Centre for Software Certification (McSCert)</i> • <i>Dean, DeGroote School of Business</i>

- *DeGroot School of Business IT Services*
- **Dean and Vice-President, Faculty of Health Sciences**
 - Assistant Vice-President
 - *Computer Services Unit (CSU)**
 - Executive Vice-Dean and Associate Vice-President, Academic
 - *Health Sciences Library**
 - Vice-Dean, Research
 - *Health Research Services**
 - *Central Research Facilities*
 - *Research Ethics Administration*
 - *Hamilton Integrated Research Ethics Board (HiREB) [with HHS, SJHC]**
 - Associated Research Centres and Institutes
 - *McMaster Immunology Research Center (MIRC)*
 - *Population Health Research Institute (PHRI) [with HHS]**
 - Research Facilities
 - *McMaster Genomics Facility*
 - *ICES McMaster [with HHS, SJHC, ICES]*
 - *Clinical Research Support unit*
 - Service-providing research labs
 - *McArthur Research Lab*

Office of the Associate Vice-President and Chief Technology Officer

- **University Technology Services***
 - Campus (Core) Infrastructure Systems
 - *Networks*
 - *Systems*
 - *Technical*
 - Enterprise Applications and Data Systems
 - *Data Systems*
 - *Enterprise Applications*
 - *Integration Services*
 - Information Security Services
 - *Information Security for Researchers*
 - IT Strategy and Services

Office of the Associate Vice-President, Real Estate and Partnerships

- *Media Production Services*

Affiliated Research Hospitals

- *The Research Institute of St. Joe's Hamilton**
- *Hamilton Health Sciences' Research Administration*

External Service Providers

- *Canadian Research Data Centre Network (CRDCN) [National]**
- *Centre for Advanced Computing [Provincial; Dotted line to Compute Ontario]*
- *Compute Ontario [Provincial; Dotted line to Digital Research Alliance of Canada]*
- *Digital Research Alliance of Canada [National]*

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- *HPC4Health [Provincial; Dotted line to Compute Ontario]*
- *ICES [Provincial; Dotted line to Compute Ontario]*
- *SciNet [Provincial; Dotted line to Compute Ontario]*
- *SHARCNET [Provincial; Dotted line to Compute Ontario]*
- *Vector Institute [Provincial]*
- *Domain-specific DRI service provides (e.g. Ontario Brain Institute, Genome Canada)*

Appendix E: Oversight and provision of digital research support services

The following text summarizes the key digital research support services provided to McMaster researchers, presented in accordance with their overseeing organizational units. The following descriptions reflect information collected from websites and summaries provided within documentation regarding these units. A more granular list of service providing units is found in [Appendix D](#).

Office of the Associate Vice-President and Chief Technology Officer & University Technology Services

The Office of the Associate Vice-President and Chief Technology Officer is responsible for strategy, implementation, policy advice, and guidance on all matters related to technology at McMaster. This includes priority setting, investment management, process improvement, application implementation, enterprise networks and infrastructure, telecommunications, security, service, standards, and support. Included in this portfolio is oversight of University Technology Services (UTS).

University Technology Services

This also includes overseeing University Technology Services (UTS), which is responsible for providing IT support to staff, students, researchers, and faculty members across the University. While enterprise IT provided by UTS includes university-wide services used by non-research staff (such as internet and email services), research IT is a more specialized subset of these services employed with the purpose of advancing research. Although UTS provides enterprise IT, their services are often used in research settings.

Office of the Provost and Vice-President, Academic, Faculties & Faculty IT Support

The Office of the Provost and Vice-President Academic are responsible for supporting McMaster's students, staff, faculty members, and researchers, including investing in resources that encourage student curiosity, faculty innovation, and service excellence, as well as overseeing teaching and learning, the McMaster Libraries, and student life. This also includes overseeing each of the six faculties at McMaster (Business, Engineering, Health Sciences, Humanities, Science, Social Sciences). Additionally, faculties have access to IT support staff in specialized units. These include the Humanities Media and Computing Center, Engineering IT Support, SciTech (Science IT), Social Sciences IT, DeGroote School of Business Information Technology Services, and the Computer Services Unit in the Faculty of Health Sciences.

Office of the University Librarian & McMaster University Library

The Office of the University Librarian is responsible for the leadership, evaluation, development, and administration of the McMaster University Library, and for ensuring that the Library's resources and priorities are effectively and efficiently aligned with University needs. Affiliated entities include Mills Memorial Library, Innis Library, and the H.G. Thode Library of Science and Engineering.

Within McMaster University Library, there are various units that exist to support researchers by offering services related to archives, research data management (RDM), research impact, digital scholarship, and data visualization, among others. The University Library also oversees the Lewis and Ruth Sherman Centre for Digital

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Scholarship in partnership with the Faculty of Humanities, which provides consulting, training, and technical support to faculty and graduate students from all programs and faculties with all levels of technological experience.

Health Sciences Library

The Health Sciences Library (HSL), within the Faculty of Health Sciences (FHS), is focused on advancing health-focused research, professional clinical education, and scholarship. HSL provides instructional support through the life cycle of research projects, such as through consultation services, workshops, and eResources, among others.

Office of the Vice-President, Research

The Office of the Vice-President, Research (OVPR) is responsible for the strategic development of the research portfolio and all research-related policies and practices. This includes overseeing research funding and the development of strategies aimed at increasing McMaster's share of federal, provincial, and other funding opportunities; the development and maintenance of research infrastructure and platforms; and the development and implementation of strategies to foster innovation and commercialization. As part of their mandate, OVPR has accountability for research compliance.

Research High Performance Computing Support (RHPCS)

The OVPR also oversees Research High Performance Computing Support (RHPCS), which supports the computational and digital research needs of researchers from all disciplines across campus. This includes data storage and backups, data visualization and analysis programming, system hosting and administration, and research software engineering and programming. These services are not universally available to researchers, but rather are provided to contracting groups or units on a cost-recovery basis. Researchers are also able to access digital research infrastructure services and training through the Shared Hierarchical Academic Research Computing Network (SHARCNET), Compute Ontario, and the Digital Research Alliance of Canada who have staff distributed across the province including some local staff embedded within the RHPCS team.

Research Ethics Boards

The ethics boards at McMaster ultimately report to the University President. The McMaster Research Ethics Board (MREB) is administered by the OVPR, while the Animal Research Ethics Board (AREB) is administered by FHS, and the Hamilton Integrated Research Ethics Board (HiREB) is administered jointly between FHS and the affiliated research hospitals (Hamilton Health Sciences, St. Joe's Hospital).

Research Centres and Institutes

McMaster hosts 64 active [research centres and institutes](#), some of which offer digital research support to faculty members, staff, and students. Research Centres and Institutes are ultimately overseen by the OVPR, though their management and governance may be carried out by either faculties or the OVPR. Research Centres and Institutes providing digital research support include the Research Data Centre, Spark: A centre for social research innovation, and the Lewis and Ruth Sherman Centre for Digital Scholarship.

Provincial and National Service Providers

At the broader national and provincial levels, there are various entities that are responsible for fulfilling and supporting the digital research needs of researchers in Canada.

Compute Ontario

At a provincial level, [Compute Ontario](#) operates to bring stakeholders together in Ontario's digital research support ecosystem to coordinate provincial and federal investments and strategy for digital research support. Their mission includes ensuring that researchers in Ontario have access to the necessary digital research equipment, services, skills, and support to advance research, discovery, and creation. Compute Ontario works closely with provincial high performance computing consortia including SHARCNET, HPC4Health, SciNet, and the Centre for Advanced Computing (CAC). McMaster falls under the purview of SHARCNET, which offers a blend of computational facilities and technical support on libraries, programming & application analysis in partnership with 19 universities and colleges across southern, central, and northern Ontario.

The Digital Research Alliance of Canada

The [Digital Research Alliance of Canada](#) (the Alliance) is a national organization that is committed to improving access to digital tools and services for all Canadian researchers by working with their provincial and regional partners, including Compute Ontario, Calcul Quebec, ACENET, and the Prairie Digital Research Infrastructure Group. The Alliance champions and funds the national infrastructure and activities required for advanced research computing (ARC), research data management (RDM), and research software (RS) while providing platforms for the research community to access these tools. For example, the Alliance supports the [Federated Research Data Repository](#) (FRDR), a national platform that provides Canadian researchers in any discipline with a robust repository option into which large research datasets can be ingested, curated, processed for preservation, discovered, cited, and shared. Additionally, [Lunaris](#) is a scalable national research data discovery service that is also provided by the Alliance as a core service.