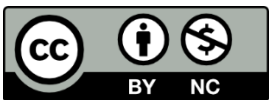
Building an Inter-Institutional and Cross-Functional Research Data Management Community: From Strategy to Implementation

Report and Recommendations from the 2023 Workshop at the University of Waterloo

April 2025



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Executive Summary

With the release of the Tri-Agency Research Data Management Policy (Government of Canada, 2021) in March 2021, all Canadian post-secondary institutions and research hospitals that administer Tri-Agency funding were required to develop and post institutional research data management (RDM) strategies by March 1, 2023. As institutions finalized their strategies, they began to consider what implementation would look like. To support inter-institutional, cross-functional dialogue around implementation, a two-day, SSHRC-supported workshop was hosted at the University of Waterloo in September 2023. Over 30 institutions of varying sizes and research intensities sent cohorts of three staff members—representing libraries, information technology, and research offices—to participate in five dialogues with researchers and key partners around challenges and collaborative solutions in RDM strategy implementation.

Through the dialogues, the participants made the following key high-level recommendations:

1. Provide clear expectations and communication around compliance, requirements and service provision
2. Secure buy-in from campus leadership
3. Identify financial support for RDM at institutions
4. Build staff capacity and support skills development, both within institutions and nationally
5. Create and sustain intra-institution coordination, collaboration and service integration around RDM
6. Explore inter-institution coordination and collaboration, including support for smaller institutions in meeting their RDM needs and requirements
7. Support the development of Indigenous Data Sovereignty policies and guidelines
8. Increase researcher training, support, and awareness around RDM
9. Develop national RDM support structures for collaboration and strategy, including a common understanding and language of RDM

These recommendations are relevant to a broad audience, including research funders, government agencies mandating and/or supporting RDM, professional organizations, academic consortia, university administration, researchers and practitioners.

The Waterloo workshop did not provide definitive answers as to how these recommendations should be implemented; rather, it was an opportunity to build a community of professionals from across RDM-supporting units who can work towards successful strategy implementation in their institutions. However, community is not enough. Institutions, research funders, and infrastructure providers must all commit to supporting RDM, whether through clear and timely guidance, sustainable resource provision, hiring and development of staff, or regular and robust training offerings. Ongoing, stable funding—both at the national and the institutional level—will also be necessary to ensure that support and services can be sustained for the long term. RDM is—and has always been—a shared responsibility, and all the parties mentioned above must step up to ensure that its implementation is a success in Canada.

Acknowledgements

The event was made possible in part by generous support by the Social Sciences and Humanities Research Council of Canada through the Research Data Management Capacity Building Initiative of the Connection Grant stream, and by in-kind and cash support from the University of Waterloo, the University of Calgary, the University of Ottawa, the Canadian Association of Research Libraries, OCLC, Compute Ontario, and the Digital Research Alliance of Canada.

The names on the SSHRC application were those of Ian Milligan (UWaterloo, Principal Investigator), Jennifer Abel (UCalgary), Caroline Hyslop (UOttawa), Alison Hitchens (UWaterloo), and Beth Sandore Namachchivaya (UWaterloo). However, this workshop would not have happened without the tremendous support of our incredible UWaterloo and Wilfrid Laurier volunteers: Sandra Keys, Christina Yee, Anneliese Eber (in her first week on the job!), Rachel Manes, Vicky Chung, and Anju Air.

Many thanks to all of the speakers during the workshop: Charmaine Dean (UWaterloo), Susan Haigh (CARL), Matthew Lucas (SSHRC), Lee Wilson (Digital Research Alliance of Canada), Jeff Moon (Compute Ontario), Lucia Costanzo (University of Guelph), Talena Atfield (UWaterloo), Jeff Doctor (Animikii Indigenous Technology), Jenny Godley (UCalgary), Bhaleka Persaud (UWaterloo), and Rebecca Bryant (OCLC Research).

The summaries of the dialogues were painstakingly compiled by Vicky Chung, with support from Sanda Keys. The report writing process was coordinated and led by Jennifer Abel (UCalgary), with authorial contributions from Ian Milligan (UWaterloo), Anneliese Eber (UWaterloo), Beth Sandore Namachchivaya (UWaterloo), Vicky Chung (UWaterloo), Jeff Moon (Compute Ontario), James Doiron (University of Alberta), Kelsey Poloney (University of Alberta), Michael Steeleworthy (Wilfrid Laurier University), Colleen Cochran (University of Saskatchewan), Kaelan Caspary (Ontario Tech University), and Rebecca Bryant (OCLC Research). Thanks also to the translators, who brought this report to life in French.

Finally, a huge thank you to all of those who participated in this workshop, as well as those who have joined the growing cross-functional community of practice since that time. Your work is what makes RDM in Canada happen, and your willingness to share your best practices, learn from each other, ask hard questions, and collaborate to move things forward keeps us all going.

Introduction

With the release of the Tri-Agency Research Data Management Policy (Government of Canada, 2021) in March 2021, all Canadian post-secondary institutions and research hospitals that administer Tri-Agency funding were required to develop and post institutional research data management (RDM) strategies by March 1, 2023. Over the following months, institutions of all varieties took on this not-insignificant task, some with extensive committee structures and detailed researcher needs assessments and consultation, others with one or two individuals working to best distill their researchers' and institution's capacities and needs. Some institutions used the resources developed by the Portage Network and the RDM Network of Experts, such as the Institutional RDM Strategy Development Template (Institutional RDM Strategy Template Revision Working Group, 2021) and the Maturity Assessment Model in Canada (Fry et al. 2021); others used international resources like the Research Infrastructure Self-Evaluation Framework (Rans & Whyte, 2017). Most institutions had at least some amount of cross-unit discussion of how different areas—such as libraries, research offices, information technology units, research ethics boards, and others—supported RDM, and what their role would be in a future strategy. Many of those involved in the work also took part in cross-institutional discussions through events like the Institutional Strategies Development Workshops hosted by the Digital Research Alliance of Canada in October 2021 or ongoing conversations on the CANLIB-DATA listserv.

In late 2022, as institutions began to finalize their strategies and pilot requirements for data management plans began to appear in certain Tri-Agency funding opportunities, thoughts began to turn to what would happen next. What would be necessary for institutions to implement their strategies? Were there best practices that could be followed? How would success be measured? Could the relationships that had been built during strategy development, both within and across institutions, be leveraged for the work that lay ahead?

It was in this context that library and research office representatives from the University of Waterloo, University of Ottawa, and University of Calgary envisioned a workshop that could help institutions make the transition from developing an RDM strategy to implementing it. Supported by a Social Sciences and Humanities Research Council Connections Grant in the Capacity Building stream, "Building an Inter-Institutional and Cross-Functional Research Data Management Community: From Strategy to Implementation" brought together cohorts of RDM-supporting staff in libraries, research offices, and information technology units from a variety of institutions to discuss their challenges, share best practices, and develop a community of practice to support the work going forward. Through five dialogue sessions over the course of two days in September 2023, the participants identified a number of needs and challenges, as well as pathways to solutions and recommendations for how to move forward with RDM strategy implementation.

Recommendations Emerging from the Workshop

The following recommendations were generated by workshop participants through the course of the five dialogue sessions; they have been distilled from the dialogues by the paper-writing team, and are more fully discussed in the sections devoted to each dialogue. For ease of finding the expanded discussion, the dialogues in which each set of recommendations is discussed are indicated after the heading[1].

Note that these recommendations are not targeted at a single audience; while RDM strategy implementation of necessity takes place within a given institution, the decisions and actions taken by others—including funders, service providers, legislators, and others—will affect that implementation.

1. **Provide clear expectations and communication around compliance, requirements and service provision (Dialogues 2, 3 and 4/5)**
    1.1. Research funders, particularly the Tri-Agencies, must provide institutions and researchers with a clear and timely understanding of their RDM requirements, including how compliance with those requirements will be assessed, as well as the timeline on which those requirements will be implemented. Clear and timely guidance must also be provided on RDM requirements within individual funding programs, as these can vary from program to program.

2. **Secure buy-in from campus leadership (Dialogues 1, 2 and 3)**
    2.1. RDM should be assigned to the portfolio of (at least) one member of senior/executive institutional leadership; the research portfolio is a natural fit, although RDM support will require collaboration among multiple units.
    2.2. Support for RDM at the senior/executive leadership level should not be dependent on who is in a given leadership role at a given time or whether there is a pressing external requirement to be met; rather, it should be included in strategic plans and campus-wide objectives.
    2.3. To ensure recognition of the importance of RDM by institutional leadership, firmer directives from granting agencies, particularly the Tri-Agencies, are needed.

3. **Identify financial support for RDM at institutions (Dialogues 2, 3 and 4/5)**
    3.1. Institutions, particularly smaller ones, need more funding to support RDM services and to recruit and retain skilled staff.
    3.2. Financial support for RDM, particularly in the area of staffing, should not be solely resourced through grants and soft-money allocations, but instead should be a dedicated and normalized part of operating budgets.
    3.3. For RDM costs on specific funded research projects, researchers should be encouraged to write those costs into their grant application budgets.

[1] The discussions from Dialogues 4 and 5 have been combined into a single section, as Dialogue 5 asked participants to prioritize the challenges and possible actions discussed in Dialogue 4.

4. **Build staff capacity and support skills development, both within institutions and nationally (All dialogues)**
    - 4.1. Staff within an institution who are assigned RDM responsibilities must have, at a minimum, the knowledge necessary to respond to researchers' basic RDM questions and to provide training and support.
    - 4.2. Institutions must provide ongoing skills development for staff supporting RDM, as well as sufficient resources—including time—to support the required work. Particular attention must be paid to those staff supporting RDM who have multiple areas of responsibility and who cannot focus all of their time on RDM.
    - 4.3. As colleges and smaller institutions do not currently have the staff capacity, knowledge and/or resources to support increased RDM requirements, their staff will need specific support and training around RDM, particularly in areas such as research partnerships with private industry and intellectual property considerations.
    - 4.4. Capacity and expertise in specialized areas of RDM—including discipline-specific knowledge, Indigenous data sovereignty, research security, sensitive data management, and technical skills (e.g., those related to curation and preservation)—must be sourced and/or developed.
    - 4.5. At the national level, there should be development of and support for a cohort of bilingual RDM professionals who can develop and deliver pan-Canadian resources.
    - 4.6. Institutions will need funding to support RDM services and to recruit and retain skilled staff; this need will only grow in the future, as more and more research teams choose and/or are required to implement RDM best practices in their work.

5. **Create and sustain intra-institution coordination, collaboration and service integration around RDM (Dialogues 1, 3 and 4/5)**
    - 5.1. In order to ensure the successful implementation of an institution's RDM strategy, all units providing RDM services and support—including (but not necessarily limited to) research offices, IT, and libraries—must coordinate, collaborate and communicate to provide effective, consistent support to researchers. At a minimum, this includes having regular meetings; keeping up to date on which units—and which people in each unit—provide which services at which points in the research life cycle; and ensuring RDM-related communication with researchers is consistent across units.
    - 5.2. Institutions are encouraged to create centralized 'hubs' to provide one-stop, cross-functional RDM support to their researchers.

6. **Explore inter-institution coordination and collaboration, including support for smaller institutions in meeting their RDM needs and requirements (Dialogues 2, 3 and 4/5)**
    - 6.1. Institutions should explore ways to mutually coordinate and collaborate on RDM support structures and services. Areas which could lend themselves to such

collaboration include shared digital research infrastructure, collaborative approaches to data security and management of sensitive data, and collaboratively developed and delivered RDM training.

6.2. As much as possible, larger institutions should help to support smaller institutions' responses to the Tri-Agency RDM Policy requirements.

7. Support the development of Indigenous Data Sovereignty policies and guidelines (Dialogues 3 and 4/5)

7.1. The development of policies and guidelines related to Indigenous data sovereignty and RDM must not be merely performative acts at the institutional or national level. Indigenous data and research experts—including scholars and keepers of Traditional Knowledge—and communities must be deeply engaged in the creation and rollout of such policies and guidelines, and must be appropriately and meaningfully supported and compensated for their engagement

8. Increase researcher training, support, and awareness around RDM (Dialogues 2, 3 and 4/5)

8.1. RDM training and support for researchers and students must be available at their point of need.

8.2. Researchers should be involved in the development of RDM training.

8.3. RDM training and support must be fluid in order to address changing concerns and gaps in knowledge systems.

8.4. Within institutions, the units providing RDM support must coordinate their training offerings to avoid duplication.

8.5. Cross-institutional RDM training initiatives, opportunities and resources should be developed.

8.6. A national-level RDM training strategy should be developed, and a national-level RDM education program could also be explored.

8.7. A central repository of open RDM training materials that institutions can modify to meet their researchers' and students' needs should be developed.

8.8. A cross-institutional/national training calendar should be made available to allow researchers and students to find appropriate RDM training opportunities.

8.9. Leaders within the researcher community should be identified who might advocate for RDM practices and improve buy-in from others in their discipline.

9. Develop national RDM support structures for collaboration and strategy, including a common understanding and language of RDM (Dialogues 1, 3 and 4/5)

9.1. Following the example of this workshop, a national, cross-functional community of practice should be created for those supporting RDM. This community, comprising professionals from libraries, IT, and research offices, should meet regularly to assist members in developing skills, knowledge and best practices. National-level funding should be provided to support this community.

9.2. A national body for RDM collaboration and strategy should be created. This organization could provide guidance and leadership to institutions; provide unified responses to Tri-Agency requirements and other national policies related to RDM; work alongside the Digital Research Alliance of Canada to create resources for Canadian institutions; and help to coordinate the various collaboration strategies described in this report and ensure that initiatives continue forward.

9.3. In order to build robust RDM support systems, whether at the institutional, regional, or national level, those providing support must come to a shared understanding of what is meant by key concepts, and must have some common language which can be used to discuss them. While each functional area will continue to have its own particular terminology, it is imperative to ensure that for the purposes of creating collaborative, cross-functional systems that can adequately support researchers' RDM needs, foundational concepts and standard terminology must be mutually understood.

The Context of RDM in Canada

The Canadian research data management landscape is rapidly evolving, with significant advances in recent years with respect to policies, infrastructure, and related supports. However, RDM involves many elements of the research lifecycle. While some areas have seen significant growth in recent years, there has been a lack of direction and standards with respect to many of its interrelated parts. Moreover, RDM is still relatively new to the majority of stakeholders across the Canadian research ecosystem, especially researchers. As a result, RDM is arguably a poorly understood, and thus somewhat underutilized, component of the research process.

Robustly and sustainably evolving and growing the Canadian RDM landscape is a shared responsibility that must involve funding agencies, postsecondary institutions, infrastructure and services providers, academic libraries, research communities and researchers. Today, the Canadian RDM landscape is witnessing the mantle of shared responsibility being taken on by key entities such as the Tri-Agencies (SSHRC, CIHR, NSERC), the Digital Research Alliance of Canada, academic libraries, and postsecondary institutions, working together to develop, deliver, and maintain a wide range of supports and services across Canada. However, there is still much work to do.

The Development of RDM in Canada

While the history of RDM in Canada can be traced back across decades, a significant amount of meaningful progress and growth occurred in the 15 years before the community convened in Waterloo, with collaboration being a common theme throughout this time. In 2008, the Canadian Research Data Strategy Working Group—a collaborative effort composed of representatives situated across a range of Canadian research organizations, infrastructure providers, and funders—released a gap analysis report (Research Data Strategy Working Group, 2008) that indicated moderate to large gaps across all indicators, primarily due to “a lack of policies, infrastructure, and funding mechanisms for data stewardship, as well as a research culture that does not recognize the value of data management”. The report suggested that not addressing these gaps would result in Canadian researchers lacking tools they need to remain at the leading edge, and ultimately to declining Canadian research excellence, innovation, and capacity. It was additionally highlighted that these issues could not be resolved in isolation, but rather that they needed to be addressed collectively, and with participation across all stakeholders and sectors.

In 2011, the Group released the *Mapping the Data Landscape* report (Research Data Strategy Working Group, 2011) which built on the findings of the previous gap analysis and put forth the first draft of a National Strategy for Research Data in Canada. Investment in research was vigorously advocated for, and research data were identified as primary academic outputs. The report called for the systematic management of research data, including with respect to their long-term stewardship and preservation, in order to advance and support Canadian research excellence and innovation. High level goals notably included RDM-specific education and

training, development of clear policies regarding open data, coordinated efforts to develop and implement trusted data environments and repositories, postsecondary institutions supporting researchers' data management needs, and fostering a Canadian research culture that values and actively supports and promotes RDM. The proposed national strategy included a five-year roadmap with the following recommended actions:

1. **Policies**: Canadian governments should establish policies that make recipients of public research funding accountable for managing research data;
2. **Standards**: Funding agencies should require adoption of appropriate standards for data management, and researchers should ensured data management standards are accounted for when creating and analyzing research data;
3. **Data management plans**: Should be required as part of funding applications; and
4. **Infrastructure**: Appropriate infrastructure solutions should be developed to support collection, management and preservation of research data.

The work of the Research Data Strategy Working Group provided the impetus for facilitating the establishment of many of the supports and services available across the Canadian RDM landscape today, as well as the formation of two key organizations: Research Data Canada and the CARL Portage Network.

Formed shortly after the release of the national strategy recommendations, Research Data Canada was a stakeholder-driven and -supported organization focused on supporting the Canadian research landscape in Canada, particularly with respect to RDM. It focused on coalescing key stakeholders to develop strategy, facilitate communication and partnerships, promote education and training, measure progress and bring attention to RDM-related gaps.

Launched in 2015 by the Canadian Association of Research Libraries (CARL), the Portage Network was dedicated to advocating for and supporting the shared stewardship of research data in Canada through working within the academic library community to coordinate RDM expertise, services and technology, while seeking to collaborate with other stakeholders (see e.g., Humphrey, 2020). Portage operations were organized around two primary areas: a Network of Experts and infrastructure platforms.

The Portage Network of Experts spanned across multiple Expert Groups composed of individuals situated within institutions and organizations across Canada, focusing on discrete but interrelated areas of RDM, including training, research intelligence, data management planning, data discovery, preservation and curation. Portage also led the development and delivery of three important infrastructure platforms that continue to play key roles in the Canadian RDM landscape today.

- DMP Assistant, a freely available web-based bilingual platform currently hosted by the University of Alberta that guides researchers through the key components of a data management plan (DMP), helping them to create their own. Institutions and organizations are additionally able to be assigned administrator accounts so that they are able to customize the DMP templates and guidance offered within the platform to

support their local context and researchers. As of March 2025, there were more than 130 Canadian institutions and organizations with administrative accounts and using DMP Assistant to support their local needs. A move to the Arbutus Research Cloud at the University of Victoria is planned for later in 2025.

- The Federated Research Data Repository (FRDR), a scalable federated platform to support data deposit, discovery, access and long-term preservation. With a mission to facilitate the findability, accessibility, and reuse of Canadian research data, and to act as a leader in the stewardship of Canadian research data, FRDR is a curated, general-purpose repository, custom built for large datasets, and open to Canadian researchers across all disciplines. As of March 2025, FRDR had over 580 published data sets spanning across disciplines, collections, and file formats.
- Borealis, the Canadian Dataverse Repository, a bilingual, secure, multi-disciplinary Canadian research data repository hosted by Scholars Portal and the University of Toronto Libraries. Borealis supports open discovery, management, sharing, and preservation of Canadian research data, and is available to researchers who are affiliated with a participating Canadian university or research organization and their collaborators. As of March 2025, over 70 Canadian institutions and research organizations were using Borealis to host their researchers' datasets.

The Digital Research Alliance of Canada (the Alliance) formerly known as the New Digital Research Infrastructure Organization (NDRIO), was officially launched in 2019 with a mandate to support research in Canada across three primary areas: RDM, Advanced Research Computing (ARC), and Research Software (RS). With respect to RDM, the Portage Network and its framework—including the Network of Experts[2], DMP Assistant and FRDR—migrated to the Alliance in 2021 where they continue to be situated. Today, Alliance RDM continues to operate with the support of a community-driven Network of Experts that spans key areas across the research lifecycle including DMPs, training, research intelligence, discovery and metadata, repositories, sensitive data, data curation and data preservation. The Alliance additionally delivers Lunaris, a scalable national data discovery service, and provides partnership support to Borealis.

The Tri-Agency Policy

In March 2021, after substantial consultation with the research community, the Canadian Institutes of Health Research (CIHR), Social Sciences and Humanities Research Council (SSHRC), and the Natural Sciences and Engineering Research Council of Canada (NSERC)—collectively referred to as the Tri-Agency or Tri-Council—released the Tri-Agency Research Data Management Policy (the Policy; Government of Canada, 2021). The policy was developed to support research excellence and open science in Canada, and highlights the importance of implementing effective RDM practices across the research lifecycle, including with respect to

[2] Note that while the employees of the Portage Network became NDRIO/Alliance employees, the members of the Network of Experts did not; they continue to be volunteers providing their time to support RDM efforts in Canada, albeit now under the banner of the Alliance rather than Portage.

data management planning, metadata and documentation, collection and storage of data, Indigenous data sovereignty, and long-term data stewardship.

The Policy consists of three main pillars, with the first requiring all post-secondary institutions and research hospitals in Canada eligible to administer Tri-Agency funds to develop and release a publicly available institutional RDM strategy. The second and third pillars respectively focus on data management planning and data deposit, with both increasingly becoming requirements of funding opportunities moving forward.

The Policy outlined a phased timeline for research institutions to develop strategy and implement RDM strategies. Crucially, they argued that "…research data collected through the use of public funds should be responsibly and securely managed and be, where ethical, legal and commercial obligations allow, available for reuse by others." (Government of Canada, 2021) They further acknowledged that approaches to RDM would reflect the diversity of inquiry and data collection and curation methods within and across the disciplines. Institutions had the deadline of March 1, 2023 to publish their institutional RDM strategies. The Agencies also identified the initial sets of funding opportunities that would be subject to the DMP requirement. Institutions would thus benefit from opportunities to collaborate on both strategy and implementation planning.

The Challenges of Compliance and Uncertain Expectations

Challenges that institutions have been facing regarding the Policy include the staggered roll-out of the DMP requirement in funding opportunities, and uncertainty around how and when the data deposit requirement will be implemented.

Despite the fanfare surrounding institutional RDM strategies, as of this writing only a few Tri-Agency funding opportunities require applicants to submit a DMP. Similarly, the compliance expectations remain unclear as to whether compliance with DMPs or the spirit of the Policy would be handled at grant renewal time (i.e., through the discipline-specific merit or peer review committees) or whether there would be a more robust approach to compliance, as in the approach the Agencies have taken towards ethics (Panel on Responsible Conduct of Research, 2021; Panel on Research Ethics, 2022), where full compliance is expected and enforced. Compliance checking mechanisms may also practically differ as a function of the funding call; for example, those programs with mid-project reporting requirements could potentially seek to include a DMP compliance mechanism as part of their reporting.

With respect to data deposit, to date there have not been any funding opportunities including a data deposit requirement, and there is not yet a firm timeline for when these requirements will begin. Similar to the DMP requirements, there is currently a lack of clarity, notably with respect to what the actual requirements are, and what is meant by and constitutes 'data deposit'. The Tri-Agency policy states that while grant recipients are required to deposit data, they are not required to share it; however, there is an expectation that appropriate access to data is provided in accordance with the FAIR principles (Wilkinson et al., 2016). Feedback provided to the Tri-Agency, including from the Network of Experts, is that the stated data deposit requirement and

accompanying statements are confusing and lack clarity. The consideration of long-term data stewardship, data deposit, and access is new to many, if not most, researchers; thus, providing clear requirements and clarification with respect to what is being asked is key to their successful implementation, and ultimately to supporting Canadian researchers and their research.

There has been concern in the Canadian RDM-supporting community about the loss of momentum between most institutions achieving the release of their institutional RDM strategy by March 2023, followed by not seeing tangible changes in their grant application workflows. In addition, an uneven compliance environment will mean uneven adoption. Good RDM costs money, and grant money is in short supply.

The Impetus for the Workshop

As Canadian institutions began posting their institutional RDM strategies in 2023, each institution now needed to consider how to operationalize these strategies, and how to respond to the challenges described above. Through a variety of channels—including institution-internal discussions, discussions between practitioners at different institutions, and listservs like CANLIB-DATA—it became apparent that people were anxious to learn about others' best practices, and to find ways in which they could work together to support the work moving forward. These informal discussions also shone light on several specific areas where institutions had concerns:

- **Indigenous Data Sovereignty**. As institutions move to meet their obligations under the Truth and Reconciliation Commission of Canada's Calls to Action, they need to support those who work with Indigenous data: both Indigenous researchers and researchers who are working with Indigenous communities. How can we ensure that the principle of "nothing about us without us" is followed when it comes to research data generated about and with Indigenous communities? Particular attention will need to be paid to the CARE Principles for Indigenous Data Governance (Carroll et al., 2020) and the First Nations Principles of OCAP® (First Nations Information Governance Centre, 2021).
- **Multi-Institutional RDM Collaboration**. While on-campus IT and RDM services are effective to varying degrees, multi-institutional work is challenging within the architecture of many on-campus enterprise systems. As soon as a researcher wants to share or receive data from another institution, they encounter authentication challenges, guideline or policy issues, and the mismatch between different cloud-hosted IT systems (e.g., Microsoft and Google).
- **Capacity Building**. Institutional strategies and consultations are leading institutions to launch new services. But, if advertised extensively, they may be immediately overwhelmed. How can new services be sustainability built? How can they leverage existing infrastructure?

These challenges and conversations inspired the decision to host an event at the University of Waterloo in September 2023, "Building an Inter-Institutional and Cross-Functional Research

Data Management Community: From Strategy to Implementation". A collaborative event hosted by the University of Waterloo, University of Calgary, and University of Ottawa, the workshop was supported by a SSHRC Connection Grant under the RDM capacity-building stream. Canadian institutions were invited to apply to send cohorts of up to three individuals from the areas of libraries, information technology/research computing, and research support. While only a small number of applications was initially expected, the call attracted applications from nearly 30 institutions of various sizes and research intensities from across the country, demonstrating the appetite for the discussion. Thanks to additional support from the University of Waterloo, all institutions who applied were invited to send cohorts to the event. The workshop brought together well over a hundred attendees to share and develop knowledge and skills related to RDM best practices, discuss implementation strategies, and help their institutions meet both the letter and spirit of the Tri-Agency Research Data Management Policy. Speakers included researchers; representatives from CARL, the Digital Research Alliance of Canada, Compute Ontario, and the OCLC library organization; and experts in Indigenous Data Sovereignty. Following short plenary sessions, much of the workshop was held in active discussion. The full list of participating institutions and organizations can be found in Appendix A; the program can be found in Appendix B.

The Dialogues

The five dialogue sessions were run according to the Chatham House Rule (Chatham House, 2025). For three of the sessions, attendees were asked to arrange themselves at 16 tables based on a particular organizing principle, as described below; in the other two sessions, participants were free to sit where they wanted. Each dialogue was shaped by four to five guiding questions, listed below. Prior to the dialogues, a note-taking Google document was created for each table for each session; these documents were open to all attendees to edit, although each table was encouraged to select a note-taker. Following the workshop, the notes were organized and summarized by Vicky Chung, with support from Sandra Keys; the paper-writing team then identified the key themes, challenges and potential solutions emerging from each dialogue.

Dialogue 1: Challenges By Functional Areas

The first dialogue invited attendees to discuss RDM strategy implementation in small groups based on their functional areas: libraries, IT, and research offices. Four guiding questions were given:

Question 1: What issues need to be addressed by particular portfolios? What issues have to be dealt with across or between portfolios?

Question 2: Who takes the lead? Why?

Question 3: What steps can or should you take to ensure that the distribution of work and necessary collaborations are effective?

Question 4: What additional comments, questions, or thoughts you would like to raise?

The responses to these questions are grouped under major themes below.

RDM issues that must be addressed

In general, the issues identified as part of implementing an institutional RDM strategy can be broken down into two complementary categories: 1) responsible provision of services, and 2) operational challenges.

Responsible provision of services

Participants noted many issues and services that must be addressed across the research lifecycle, including researcher training and outreach, DMPs, active data management, long term repository deposit and storage, data storage costs, and compliance monitoring. In addition, there are several overarching challenges that span many individual services, including the need to responsibly and ethically address Indigenous data sovereignty, manage sensitive data, and ensure data are secure. Responsible service provision also includes ongoing skills development for workers together with sufficient resources, including time, to support the required work.

Operational challenges

In counterpoint is the need for institutions to address emergent operational challenges, particularly the need for cross-campus coordination among various campus RDM stakeholders. This is a formidable challenge because these units have traditionally worked in silos, with their own vocabularies and goals. Developing functional operational structures among trusted partners will take time.

While libraries have often assumed a leadership role in RDM, particularly through the development of nationalized infrastructure such as the DMP Assistant and data repositories, they are under-resourced, and participating librarians expressed a palpable anxiety about meeting future service demands. Research offices will likely be tasked with RDM compliance monitoring, although there remains considerable uncertainty about whether monitoring will take place at the institutional level, the researcher level, or both. IT units may be less aware of researchers' RDM needs due to the lack of dedicated positions for supporting research computing and infrastructure, suggesting a need for improved resourcing for research and digital support.

Addressing the operational challenges by developing cross-functional teams from multiple campus units was seen as an important precondition for successfully implementing an RDM strategy, along with a sincere commitment from campus leadership and an institutional strategic vision. Coordination is required, and the addition of some type of overarching team, committee, or "RDM hub" is recommended to connect units, build capacity, provide services, and avoid

duplication. Intermediate steps might also include conducting a service inventory or responsibility assignment (RACI) matrix, to understand the cross-campus portfolio of services and capacities and to begin articulating roles and responsibilities.

Establishing campus leadership

In discussing the need for campus leadership to support the institutional RDM strategy, one participant seemed to speak for many when they said, “Everyone agrees RDM is important, but people are more resistant to take responsibility.” While recognizing the complementary responsibilities and strengths of each of the units, participants overwhelmingly stated that campus leadership is needed, and that the responsibilities for RDM efforts should reside with the research office due to its centralized role in overseeing the institutional research enterprise, including research administration, research integrity, and compliance. At minimum, the Vice-President for Research (VPR) should serve as the executive sponsor for RDM, providing institutional-level strategic vision, even as the majority of RDM tasks may be delegated to other units. Which tasks get delegated to which units will be dependent upon local conditions.

While advocating for centralized leadership and authority from the research office, workshop participants also emphasized the need for increased collaboration and coordination between the research offices, libraries, and IT. Historically, libraries have done the heavy lifting in providing RDM related services for their institutions, with one participant describing libraries as the “de facto leader” of RDM efforts, doing all the work. Libraries provide a wide range of services, including training and support, and guidance on effective data management and data storage options, and often provide direct support for data storage, sharing, and archival services. Libraries have also been heavily involved in national RDM initiatives, and will undoubtedly carry on contributing vital support, knowledge, and guidance in the field of RDM.

IT units have provided services that fall under the RDM umbrella for years, including active data management as well as long term data storage and sharing. Like libraries, IT units have been heavily involved in national RDM initiatives, and large-scale, multi-site projects that require significant infrastructure, such as SuperDARN. Workshop participants described IT units as continuing partners in RDM support on campus, but not as the institutional leader.

Between the three units, research offices have typically provided fewer direct services for researchers under the RDM umbrella, instead playing a significant role in fostering the campus research climate and supporting and/or coordinating more strategic aspects of RDM at institutions. They also house research compliance activities, including research ethics boards (REB), and typically develop, monitor, and enforce policies related to the responsible conduct of research.

While participants felt that increased campus leadership was necessary, they also saw the need for greater formalization of collaborative structures among RDM stakeholders.

Addressing challenges with new operational structures

Implementing RDM hubs

Workshop participants from organizations of all sizes agreed that the responsible provision of RDM services requires expertise and support from multiple campus units. In order to improve support for researchers and minimize gaps and duplication, campus stakeholders must work in closer coordination, regardless of which unit ultimately takes the lead for RDM. How existing ties between stakeholders might be strengthened will be dependent on a university's operational considerations, including budget, collaborative models, disciplinary strengths, and strategic mandates. However, participants emphasized that building cohesive institutional capacity requires the institutional courage to make RDM a shared commitment between campus stakeholders.

Institutions must address the operational challenges that exist because of the diffusion of RDM services. Participants recommended coordination through cross-functional teams, committees, or an "RDM hub," which might be defined as a cross-functional and collaborative operational structure adopted in order to optimize RDM support for researchers. This hub model has been adopted by some universities in Canada to support the coordination and delivery of RDM services based on a campus-wide strategy; it offers an increased level of service integration where RDM programming is centrally coordinated even as service provision remains distributed across multiple units. Existing organizational structures remain unchanged, but responsibility and accountability for RDM support is distributed among stakeholders to ensure it is a shared concern and improve its standing on campus.

The RDM hub model can provide significant benefits to researchers by aggregating different nodes of RDM expertise into a central service package, improving knowledge transfer and reducing friction in service acquisition. From the perspective of the university, RDM hubs stand to clarify mandates, improve internal communications, and make service delivery more timely and consistent. While the scope and depth of cross-functional coordination within an RDM hub is institutionally dependent, participants asserted that improved coordination of RDM services would increase the use of local services and ultimately support researchers with their data management requirements.

Supporting national collaboration

Workshop brainstorming on cross-functional RDM collaboration was not limited to local service delivery but also included discussion on how RDM advocacy and consensus-building happens nationally. While participants acknowledged the important roles that professional organizations like CARL, the Canadian Association of Research Administrators (CARA), the Canadian Association of Research Ethics Boards (CAREB), and the Canadian University Council of Chief Information Officers (CUCCIO) play within research data management services, they also noted the irregularity of cross-organization discussions on RDM. Participants emphasized the significant benefit in regularly assembling library, research office, and IT professionals to

discuss the state of RDM in Canada, in order to collectively consider issues, opportunities, and solutions. The Waterloo workshop itself demonstrated the value of these cross-functional gatherings. It was clear that continuing engagement between the stakeholder groups was desired, especially if that engagement could build consensus and plot strategic roadmaps for RDM services and expectations, and participants welcomed regular convenings.

Dialogue 2: Challenges by Institutional Characteristics

The second dialogue invited attendees to discuss RDM strategy implementation in small groups based on the characteristics of their institution: institutions with clinical, medical and/or biomedical research efforts; universities; colleges, polytechnics, and smaller universities; and French-language institutions. Participants self-identified which grouping their institution would best fit into. Four guiding questions were given:

Question 1: How well will your existing staff complement be able to handle researchers'/funders' RDM requirements?

Question 2: Where can you source additional resources (human, financial, infrastructure) if needed?

Question 3: What kinds of training do your staff need to be able to support your researchers?

Question 4: How committed are the senior/executive leadership of your institution to providing support for RDM? How can/do you make the case to them for support?

The responses from the French-language discussion have been included with the responses based on institutional size/type, as appropriate.

Ability of existing staff complements to handle RDM requirements

Clinical/Medical/Biomedical Institutions

The first concern in this area was staff knowledge sets and their ability to handle researcher/funder RDM requirements. While services and support for RDM services have been developed, their operationalization may be dampened by staff knowledge of the subject. From a clinical perspective, many concerns were raised about assessing RDM and data handling practices for health data and sensitive data; for example, not all research offices, libraries, or IT departments may have the appropriate knowledge sets to work in this field.

Regardless of institutional knowledge, capacity to handle RDM requirements in the clinical area was a deep concern. If all research teams were to implement RDM best practices in their work, support centres like research offices, REBs, and libraries would encounter a significant resource issue. One participant noted that “the ship is still sinking”: i.e., they didn’t think that institutions are in a position to effectively provide the support that the research community will need to implement RDM and data deposits today, let alone in the future.

Consistency of practice at institutions and across the sector was also raised. With little training in this area, there is a concern that institutional requirements and benchmarks will vary between organizations, potentially causing inconsistency of practice. Differing regulatory frameworks from one province to another may affect this as well.

The lack of DMP assessments and of compliance measures was raised often at the workshop. Participants noted that there is no rubric on how DMPs are to be assessed at the Tri-Agencies. At the institutional level, in most circumstances there are few requirements to convert planned activities listed in a DMP into managed processes that steward research data during the life of the research program and after project wind-down. Finally, many participants noted that another internal body like an REB might benefit from DMP review mechanisms but most ethics boards do not have post-award data reviews at all.

Universities

Librarians from universities noted that they are at capacity already, with one participant describing their position as containing at least five discrete areas of responsibility and noting their focus cannot be on just RDM. IT professionals also indicated they were also already overstretched. An additional capacity consideration was a perceived disparity of resources between smaller and larger institutions.

Participants also noted that it was unclear what would be needed to handle researcher/funder RDM requirements in terms of staff time/work and who is best suited to do individual tasks. Participants repeatedly asserted that it was challenging to not know what department holds responsibility for individual tasks related to RDM compliance. This made it difficult to assess if current staff have skill sets needed to support RDM requirements. Relatedly, participants expressed frustration on generally unclear expectations; for example, IT departments would appreciate advanced warning about IT resources identified in a DMP. As well, it was noted that advanced warning of expectations from the Tri-Agencies would be of value.

Colleges and Smaller Institutions

Capacity was a significant concern for participants in this group. It was noted that professionals are often in split roles where RDM is an element of a broader portfolio. There was also concern that RDM institutional strategies have not been implemented widely, and worry as to increased requirements and workload once widely dispersed. Participants also noted that additional training is required due to limitations on capacity.

Participants also noted feeling unprepared for college-specific RDM considerations and desired additional training specific to the college research environment that would include topics such as research partnerships with private industry and intellectual property considerations.

Sourcing additional resources

Clinical/Medical/Biomedical Institutions

Participants in this group noted the importance of looking for additional resources for RDM within existing envelopes as an expedient way to address this gap. For instance, institutions should consider novel means to fund RDM services through existing Research Support Fund (RSF) lines, or advocate for a broadening of the fund's provisions to simplify this. Other avenues mentioned include consortial collaborations to streamline costs or find efficiencies in scale; this has been a successful model within libraries. Participants also noted the importance of researchers writing RDM funds into grant packages to facilitate RDM implementation.

While providing these suggestions, participants nevertheless raised concerns that resourcing RDM through grants and soft-money allocations risks keeping RDM services chronically underfunded. Without a regular, normalized commitment of funds, there is a risk that the kind and quality of RDM services will vary between projects, institutions, and regions.

Universities

Participants noted that additional resources could potentially be sourced directly from the grant budget. This is particularly relevant for IT-related resources; for example, a grant budget could include the cost of technology as well as salaries to support and maintain the technology, which could be managed centrally on campus. National training was also broadly indicated as a source of additional resources.

Participants indicated a number of challenges with sourcing additional resources as needed. First, financial challenges include the need for dedicated, central financial resources. Budgets and hiring freezes made it difficult to source human resources. Second, human resource related capacity to record metadata was also identified. Finally, infrastructure resources around data retention and storage were also needed.

Suggestions identified included centralizing or standardizing elements of RDM services. Firmer directives from granting agencies, specifically the Tri-Agency, may result in greater allocation of resources to RDM.

Colleges and Smaller Institutions

Participants were generally unsure as to sources of additional resources. There was a consensus that human, financial, and infrastructure resources should be mandated as part of institutional budgets. A significant concern was the difficulty in sourcing resources when expectations from granting agencies are not known; participants do not have the data required to support business cases when anticipating needs.

A key consideration for participants was that college funding capacity is lower when compared to universities, although the anticipated funding needs to support RDM are comparable.

Staff training needs

Clinical/Medical/Biomedical Institutions

Participants were hesitant to identify actual training needs by theme or subject matter. The consensus, rather, came down to a need within the RDM ecosystem generally, but particularly for funding agencies, to identify and prioritize the breadth and scope of necessary RDM services, and to be given a clear understanding of RDM compliance measurements and benchmarks. One participant said that training needs to be tied to compliance and accountability: “what does compliance look like in terms of RDM, and does it overlap with REB and finance compliance?” Another participant noted that “as a sector we haven’t done a really good job at defining what RDM is and how it impacts the research lifecycle”, and what services are “manageable for institutions [to support] according to size, and according to policy.” In this regard, any discussion of training must be matched to building baseline measures to measure RDM policy compliance and service delivery effectiveness.

Universities

Training gaps identified by participants included cross-training between the Office of Research, Library, and IT departments. A degree of confusion as to what department supports what area was noted by participants; it is hoped that additional training in those functional areas would be of value. Additional areas of training identified included training related to RDM and Equity, Diversity, and Inclusion, the Principles of OCAP®, and IT. Participants noted that it was imperative to involve researchers directly in decisions and plans around training, and to acknowledge that researchers and staff cannot engage in RDM without training.

Finally, there was discussion of the value in a low bar for training. A participant noted that “[g]ood enough RDM is good enough at this stage”. Relatedly, training that focuses on the benefits of learning new tools (the proverbial carrot vs. the stick, as a participant described it) was identified as a suggested approach to training at this stage.

Colleges and Smaller Institutions

Participants from this sector noted that training specifically related to data curation is needed. As well, training that covers the basics of RDM would be of value, with specific needs for basic RDM training that focuses on how RDM is applied directly at their institution.

Senior leadership commitment to RDM

Clinical/Medical/Biomedical Institutions

Participants noted that institutional leadership is committed to research data management, but that budget constraints make it challenging to operationalize effectively. There have been calls to position RDM to align it with tenure and promotion, but faculty collective agreements may be

an impediment. Instead, advocacy for external causes such as the Declaration on Research Assessment (DORA) may move the needle for leadership and institutions.

Universities

Overall, participants were not confident in the commitment of senior/executive leadership to supporting RDM at their institutions. Notably, the potential for RDM support rests on who is in a leadership role at a given time; it is not considered by participants to be intrinsic to the institution's wider strategic plan. Participants also noted specific concerns about the absence of RDM in institution-wide strategic plans. Commitment and support were also noted as theoretical and dependent on budget availability.

Colleges and Smaller Institutions

Participants expressed concern as to the commitment from the senior/executive leadership to providing support for RDM at their institutions. It was noted that the commitment was contingent on a perceived requirement, with many leaders focused on the institutional strategy requirement with little consideration of implementation and long term impact. Similarly, participants expressed concerns about commitment as RDM is not included in strategic plans or institution-wide objectives. Without a perceived crisis or threat of consequences, participants felt it was difficult to gain support and attention for RDM support at their institutions. Finally, it was noted that budget availability impacted commitment, with one participant noting that commitment is analogous to budget available to leadership.

Dialogue 3: Challenges by Thematic Areas

The third dialogue encouraged participants to join small groups focusing on themes which were identified via a pre-workshop survey. These themes were:

- Resources and Capacity
- Supporting Researchers
- Building RDM Awareness and Knowledge
- Sensitive Data, Ethics, and Security
- Indigenous Data Sovereignty
- Intra-Institution Coordination
- Technical Questions & Concerns
- RDM and Grant Applications

In practice, the discussions coalesced around four of these themes: Supporting Researchers; Sensitive Data, Ethics and Security; Indigenous Data Sovereignty; and Resources and Capacity. As in previous dialogues, the groups were given several guiding questions:

Question 1: What have your successes been?

Question 2: What challenges have you had/are you having?

Question 3: Where/what are the gaps that you're seeing?

Question 4: What lessons have you learned that could help you and/or others going forward?

Question 5: What additional comments, questions or thoughts you would like to raise?

Supporting Researchers

One of the biggest challenges in RDM in recent years has been supporting researchers and developing functional and accessible support systems. However, despite many challenges, the community has also celebrated many successes. Across Canada, key individuals are beginning to come into the appropriate roles as institutions continue to implement their RDM strategies through cross-campus collaboration. Through these implementation plans, institutions are gaining researcher attention while also receiving valuable feedback about how to best support researchers, including building RDM awareness and knowledge for various aspects of the research lifecycle.

Despite the successes of the last several years, there are still challenges and gaps to address. Notably, there remains great uncertainty about what the future of RDM will look like in Canada as it relates to funding. This has resulted in a variety of challenges for both RDM professionals and researchers alike. At the time of the workshop, guidelines from funding agencies were unclear about how DMPs and data deposit requirements will be implemented, evaluated, and monitored for compliance. This has resulted in unclear expectations about what will be required of researchers receiving Tri-Agency funding, and has made building RDM support systems at institutions difficult, as what support systems will be needed also remains unclear. Additionally, questions surrounding the alignment, or lack thereof, between publisher and funding requirements, as well as what is required of unfunded researchers, remain prevalent in the national discourse.

In many ways, this lack of inter-policy clarity and understanding of what RDM is outside of data deposit has led to misunderstandings and a lack of knowledge across campuses. Although researchers have become increasingly aware of RDM and the Tri-Agency RDM policy in the last several years, institutions still have work to do to ensure communication surrounding RDM is clear, effective, and appropriate for the target audience. As institutions move forward with building awareness and knowledge across campuses, it is important to address researcher concerns in a way that both builds knowledge and creates systems of support. For example, many researchers have concerns and fears surrounding data deposit, including what that means, what depositing data looks like, and how stringent Tri-Agency requirements and compliance measures will be.

While training and education are clear methods to address these concerns and build RDM awareness that will ultimately support researchers, the RDM community has identified a number of roadblocks that hinder the efficacy of current training and education methods. Notably,

researchers need communication and training surrounding RDM to be at the right time, the right place, and in a format that works for them. Additionally, it is important to ensure this communication is reaching the right people who are doing RDM work. In larger laboratory settings, this may mean reaching graduate students who take on the bulk of RDM work; however, in smaller college settings, the principal investigator may be doing most of the RDM work. Although reaching such diverse audiences at the right place and time presents a challenge, it highlights the need for IT services, the research office, and the library to be involved in communication, training and support from the beginning. This also holds in the college realm, where the few faculty doing research may be harder to reach.

Despite knowing how institutions should be communicating with researchers and other RDM practitioners across campus, there were still many concerns about how to functionally do it and what this realistically looks like. One concern surrounded a lack of shared understanding of what it means to do RDM and what educators are actually talking about when they use terms like “raw data”, “data deposit”, and even “data” more generally. Traditionally, data is thought of as numbers in a spreadsheet; however, data are much more than that, and RDM applies to all kinds of data across a wide variety of disciplines. This highlights that creating a shared language across campus is integral to building RDM awareness and supporting researchers. Without this, it is difficult to have meaningful conversations across campus. Creating a common knowledge base across the three supporting units and disseminating this knowledge across campuses is thus key to future success.

Sensitive Data, Ethics, and Security

Participants noted a substantial number of “known unknowns” as well as “unknown unknowns” when it comes to supporting researchers who are generating and/or working with sensitive or restricted research data. Key among these is the concern that institutional REB policies for working with sensitive digital research data need updating to clearly articulate best practices for research data management and sharing in an environment of both increased multi-institutional research collaboration and federal data-sharing requirements. Although each institution develops its own REB policy and best practices, there is an opportunity to establish consistent practice across institutions in core areas, especially with regard to sensitive data, to ensure both security and access where appropriate.

Attendees noted a pan-Canadian gap in clear guidance and training, for both researchers and those who support them, on how to work with sensitive research data throughout the research lifecycle: e.g., on the basics of ethics, sensitive data management, use of appropriate technology infrastructure and resources, and application of security practices in a networked digital research environment. Participants emphasized that although federally-supported research infrastructure exists through the Alliance, there is not yet a controlled access infrastructure. Individual researchers bear the responsibility for ensuring that their data are securely managed, and de-identified when necessary, prior to being made accessible. Many shared the concern that the process of implementing and managing controlled access to sensitive data is not well understood among Canadian researchers, nor among those who

support them. This is clearly a short-term opportunity for Canada to develop robust technology solutions, coupled with critically needed national education and training support, working in close collaboration with local research administrators, technology professionals, and librarians.

Indigenous Data Sovereignty

While somewhat of a nebulous topic in RDM policy and conversations, prioritizing the integration and consideration of Indigenous data sovereignty into all RDM work is paramount to continuing decolonization work at institutions and ensuring Indigenous communities retain control over their data. Continuing the work of decolonization within RDM is a lengthy, resource-intensive, and involved process and there is a general lack of resources to address current damaging classification systems and indexes. As such, participants noted that performative allyship remains common in higher education, academia, and RDM. However, while the foundation of RDM itself may inherently be colonial, work can be done to ensure Indigenous data sovereignty is respected and upheld throughout all RDM processes.

There have been successes in working towards decolonization in this area, including identifying advocates of Indigenous data sovereignty both inside and outside the university. Additionally, efforts have been made to truly take the time to consult on Indigenous data sovereignty aspects of RDM and RDM support systems. However, despite these successes, it is important that Indigenous data and research experts, and indeed communities, continue to be deeply engaged in the development of any such policies and guidelines that relate to Indigenous data sovereignty and RDM.

One way that Indigenous data sovereignty work may continue to move forward is by developing robust policies and guidelines at the national level for which Indigenous data and research experts are deeply engaged in the creation and rollout. However, any such guidelines at either national or institutional levels cannot be performative and must be mindful of Indigenous scholars' time, which is already limited and stretched across campus initiatives. Indigenous scholars' and community members' involvement in this work, including training and consultation, must be compensated appropriately and in meaningful ways.

In addition to robust guidelines, participants said that maintaining open and clear communication with Indigenous communities is integral to decolonizing RDM and working towards full Indigenous data sovereignty. This will include taking the time necessary to consult on Indigenous data sovereignty as it relates to RDM support, recognizing that there is no one-size-fits-all approach to doing this. While this adds to the complexity and time needed to ensure Indigenous rights are being respected and upheld, it is important to remember that this work cannot happen in a vacuum. The First Nations Principles of OCAP® (First Nations Information Governance Centre, 2021) can provide a good starting point for conversations about Indigenous data sovereignty; however, they are specific to First Nations communities, and are not blanket principles that can be applied to every research project. Any Indigenous-based research must respect and comply with the community protocols from each nation the research impacts.

Resources and Capacity

In addition to knowing what is needed to support researchers' RDM needs, participants expressed the growing need for additional people support; the development of a national-to-local people-oriented communication network among research facilitators; integration of RDM into their institution's strategy and governance; and new, different, and additional resources.

Early successes noted at the workshop include the fact that researchers already consult with librarians locally regarding RDM needs. In fact, all three groups of professionals (library, IT, and research administrators) noted that having strong positive working relationships with individual researchers was a key factor in holding researchers' attention while the institution transitions into RDM program implementation. Attendees further noted that communication and collaboration across units were a welcome, albeit unintended, consequence of the institutional RDM strategy requirement. However, they also acknowledged that while the required strategy work helped to raise the profile of RDM among researchers and senior leadership, that awareness has not always resulted in adoption or implementation activities beyond noting the need for compliance. Some attendees noted that their institutions had established an ongoing RDM implementation and support program, while others indicated that their institutions had not yet made a transition from strategy to implementation committee. Overall, attendees noted that both the formal and the informal RDM outreach and communication channels that they have established with other units (research offices, libraries, IT, faculties) are essential factors for institution-wide RDM adoption.

Attendees noted further suggestions aimed at integrating RDM communication and programming into an institution's mainstream activities, including assigning RDM support to the portfolios of one or more senior leaders; situating the locus of RDM services and people expertise in the library, with user-facing, highly-visible spaces; and integrating RDM into research, data, and IT governance.

Across the board, attendees expressed the need for additional human resources at the local level, with expertise in the three areas (library, information technology, research administration). While a few attendees noted that their institutions had either re-purposed existing positions or created new positions to address RDM, most indicated that their institutions had not yet taken these steps. They commented that while the volume of RDM-related work across the three areas is not yet substantial, researcher activity is ramping up, and the existing lack of guidance about RDM requirements in specific funding programs causes many, including researchers, to spin their wheels while seeking answers to RDM questions as they develop research proposals.

Participants noted that there is a missed opportunity, in the current disjointed sea of data- and-ARC-centric solutions offered at the national and provincial levels, to focus national resources on training and facilitating communication among those who are locally responsible for assisting researchers. These professionals, who interact regularly with researchers, are the best potential link in establishing a robust Canadian RDM network. Not engaging these groups more substantively will further delay uptake of, for example, the significant national investment in

research data repositories (i.e., Borealis, FRDR), as well as the understanding of federally-supported storage solutions. Researchers currently have few, if any, inducements or local supports to leverage this game-changing infrastructure. Attendees emphasized, in small group as well as whole group discussions, a key need being federally-supported investment in providing robust communication and facilitation of the nascent inter-institutional network of RDM support expertise emerging from the Waterloo workshop. At present, communication and facilitation of this network is accomplished by investments from the four SSHRC workshop sponsoring institutions, and each of the 30+ institutions of the workshop attendees. The five members of the workshop planning committee, in addition to UWaterloo's RDM Librarian and an MLIS co-op student, have been coordinating quarterly meetings, a Slack channel, and a listserv that supports group discussions about RDM program implementation, and identifying a path toward establishing a vibrant Community of Practice across the 130+ attendees from 33 institutions. Establishing the future people-centric network with these groups of professionals is clearly a near-term, low-hanging fruit opportunity for advancing the Canadian digital research ecosystem.

Dialogues 4 and 5: Challenges with opportunities for collaboration

In the fourth and fifth dialogues, the workshop attendees were not grouped in any predetermined way. Rather, they self-organized to address RDM-related challenges that could be at least partially addressed by improved collaboration.

Dialogue 4 was introduced by a presentation by Rebecca Bryant on the idea of **social interoperability**: that is, the creation and maintenance of working relationships across individuals and organizational units that promote collaboration, communication, and mutual understanding (see Bryant et al., 2020).The guiding questions for Dialogue 4 were as follows:

Question 1: Which of the challenges that you've been discussing could be best solved by inter-institutional collaboration?

Question 2: Of these challenges, which of these are social interoperability challenges (as framed by Rebecca's presentation)?

Question 3: Choose one or two challenges and discuss which tactic(s) would move things along.
Question 4: What additional comments, questions or thoughts you would like to raise?

Some of this discussion extended into Dialogue 5, where participants were asked to identify short-term (1-6 months) and medium/long-term (1-2 years) priorities among these challenges and opportunities.

Challenges

Culture and communication

Participants identified and discussed a number of challenges centred around culture and communication which could present opportunities for collaboration, including discussions of institutional culture, professional culture, and communication within and between institutions.

Researcher pushback

Participants discussed researcher reluctance to learn and incorporate research data management practices in their workflows. Researchers were at times unwilling to discuss their data outside of the research team and/or unwilling to share their data more widely. This was associated with either a lack of awareness of RDM best practices and institutional RDM support, or simply not recognizing the importance of RDM as an essential part of research practice. Some researchers did not feel that generic solutions to data storage and management were sufficient for their discipline-specific research needs.

Participants also noted that researchers face challenges around having sufficient staff, time, and expertise to develop DMPs and to implement them throughout the project. Many felt they did not have the time to attend RDM training or include RDM as a topic in their courses, nor did they have a dedicated data manager for their projects. Participants found that researchers tended to view RDM as unimportant to their project and something they felt obliged to do solely because of external requirements. Promoting researcher, disciplinary, and institutional cultures supportive of data management planning, training, and data sharing is an area ripe for collaboration.

Researcher buy-in

Even in the absence of active pushback from researchers, there still exists the challenge of convincing researchers to embrace RDM practices such as creating and following DMPs, depositing data into repositories for open discovery, and improving their RDM awareness/skills through training. Participants reported that even among researchers who were aware of RDM resources and practices, not all were fully convinced of their importance in supporting and improving their research. Some researchers felt that they could not depend on available technology to meet all their data management needs, or were simply unaware of institutional resources available to support RDM. In addition, frontline support staff in libraries and IT did not feel that they had the discipline-specific knowledge necessary to promote buy-in from researchers. Participants suggested that leadership within the research community is lacking for RDM (e.g., having RDM “champions” among researchers), and that collaboration with research offices and administration could help address this challenge.

Shared language

Participants discussed the lack of a shared language between researchers, libraries, administration, and IT as a challenge for communicating about RDM. They found that it was difficult to promote understanding between researchers and institutional support when the

language and acronyms used to describe RDM topics were not understood and/or consistent between disciplines. These challenges exist both between those providing institutional support, and between researchers and those providing support.

Communication of Tri-Agency requirements

Faced with the implementation of Tri-Agency RDM requirements, participants found that while researchers may be more aware of RDM, they were less clear about reasons for these requirements, who was responsible for what, and how and by whom these requirements would be vetted. Researchers were increasingly aware of the requirement to create DMPs without actually understanding the value of these plans in their own research. A unified response to this communication challenge could help alleviate some of the anxiety researchers are feeling. Participants felt that for some institutional units, such as IT, requirements of the Tri-Agency RDM policy were unclear on what specifically they were required to provide. Overall, workshop participants felt that communication of the new requirements was unclear and confusing.

Training

Throughout the discussion of challenges, the topic of education and training for RDM came up repeatedly. Participants discussed the need for collaboration in RDM training development and delivery, and identified some specific challenges around training that would be best solved by collaborative initiatives.

Lack of RDM training for researchers

Some participants spoke about their institution’s inability to provide RDM training for researchers. This is a greater issue for smaller institutions and colleges that often lack dedicated RDM support staff or expertise. Even institutions with staff resources dedicated to RDM faced the challenge of effectively engaging researchers in training offerings. Participants suggested that developing cross-institutional training models, shared resources and modules, and collaborative training initiatives would help address this challenge. It was also suggested that making RDM training mandatory for graduate students and researchers within an institution would further encourage engagement.

Lack of RDM expertise

Some participants described the institutional challenge of having staff who are assigned RDM responsibilities lacking the RDM expertise necessary to provide training and/or to respond to researchers' RDM questions. This was especially true for topics such as Indigenous data sovereignty, research security, and sensitive data management.

Coordination of RDM training

Participants also identified a lack of coordination in the way RDM training was provided, both within a single institution as well as across institutions. This lack means that institutional units might be duplicating effort, with researchers getting partial and/or potentially conflicting information from different units within or between campuses. Similarly, institutions offering

similar training were not collaborating with each other to offer workshops outside their organization. Participants felt that coordinating training could help avoid the same work being done multiple times, make better use of limited staff time, and improve the quality of training offered.

Additionally, the lack of a guiding RDM training strategy was identified as a challenge for coordinating training. Without a pan-Canadian or regional strategy, institutions were left to plan RDM training on their own.

Lack of awareness for and uptake of RDM training

Institutions found that researchers often knew little about existing RDM training and resources and found it challenging to raise this awareness. How RDM training is delivered was another challenge, who observed that researchers would not attend RDM training if it did not fit their schedule or preferred format. Institutions that offered RDM workshops found that registration was often low and that researchers did not often request RDM training for graduate courses or research labs.

Intra-institutional challenges

Workshop participants identified challenges between organizational units, within institutional structures, and related to roles and responsibilities within their individual organizations.

Cross-departmental collaboration

Participants noted that at some institutions, units involved in RDM (e.g., libraries, IT, ethics, and others) did not regularly meet or collaborate with one another. This resulted in units not giving consistent information to researchers and duplicating effort for RDM training and/or consultations. Taking development of institutional RDM strategies as another example, some participants felt that there was insufficient cross-unit collaboration among RDM-engaged units. Relationship building between units was identified as essential to ensuring a unified RDM service and vision for institutions.

Roles and responsibilities

Participants also spoke to the challenge of not knowing all of the individuals or units who might be involved in RDM in their institution. Different units are involved at different points in the RDM lifecycle and do not always know who else is a part of it. Participants reiterated that relationship-building within their institution and regular meetings were important in addressing this challenge.

Personnel and staffing

Workshop participants discussed the lack of appropriate or sufficient staff dedicated to RDM as a challenge to delivering services. The overarching conclusion was that institutions needed more funding to support RDM services and to recruit and retain skilled staff. Specific staffing challenges identified included a lack of bilingual professionals to develop and deliver pan-Canadian resources, difficulties retaining staff, a shortage of networking opportunities post-

COVID, and too few applicants with key technical and/or specialized skills (e.g., Indigenous data sovereignty, sensitive data).

Institution type and size

Certain challenges are specific to the type or size of institution, as discussed in Dialogue 2 above. The challenges discussed here are those which participants identified as the most likely to be addressed with collaboration.

The discussion centred on the differences between large and small institutions and the resulting service gaps arising from associated differences in funding and staffing levels. Participants from smaller institutions did not feel they could independently or effectively respond to Tri-Agency policy requirements or contribute meaningfully to national RDM strategy development without support from larger institutions.

Participants also discussed the “uneven playing field” between small and large institutions. With increased competition for grant money, skilled staff, and other resources, small institutions were struggling to meet the needs of researchers for RDM services. Funding and staffing levels have not kept pace with growing demand for RDM services and expertise at many institutions.

Collaborative solutions for these challenges

Technology

Workshop participants suggested sharing digital research infrastructure across institutions as a way to alleviate the operational challenges of RDM. Participants from the IT sector observed that current technical infrastructure is not designed to support collaboration, and data security requirements make inter-institutional sharing difficult. Participants noted that the library sector tends to have more experience in collaborative efforts than IT, and suggested looking to successful library collaborations for examples. Potential new shared infrastructure can be modeled after services such as Borealis and the DMP Assistant. Shared technology could include distributed data storage, a national learning management system (LMS), or research computing networks.

Another way in which technological challenges could be addressed is through sharing approaches to data security, data management best practices, and storage strategies among institutions. Sharing and discussing tools, technologies, and approaches will help institutions better plan their own strategies and solutions.

Culture and communication

Many of the challenges identified in the workshop discussion were related to social interoperability. These could be addressed by creating networks of communication and redefining professional and institutional culture to be more collaborative around RDM.

Relationship building

Building relationships between stakeholders is an essential step in improving communication around RDM. This includes both building relationships between researchers and research support services, and between units that provide RDM support.

Workshop attendees suggested identifying leaders within the researcher community who might advocate for RDM practices and improve buy-in from others in their discipline. Participants noted that many researchers already go to the library with RDM questions, and that they could build on those existing relationships. One suggestion was for librarians to co-present with researchers at conferences on projects they collaborated on to highlight the value of institutional RDM services to others. Another suggestion was to include RDM workshops at conferences outside of the library sphere.

Participants also discussed the importance of identifying all units on campus who provide RDM support or guidance and having those units meet regularly. Improving communication between units like libraries, IT, ethics, and research administration would ensure that guidance given to researchers is consistent and reliable. This would also improve understanding of the roles and responsibilities of all units in providing RDM support.

Unified language at national and local levels

One of the challenges of interdisciplinary collaboration is the differences in language used to describe the same topics. Creating and maintaining a cross-functional glossary of RDM terminology, abbreviations, and acronyms would improve collaboration and communication between institutions, units, and disciplines. Such a glossary could also include aspects of digital research infrastructure such as advanced research computing, research software, and cybersecurity, as these overlap with RDM. At the local level, this could include defining the various resources within an institution, such as data repositories, enterprise storage systems, and related units.

Bilingual by design

A challenge with improving national communication in Canada is the need for resources to be in both English and French. This can often mean additional pressure on individual bilingual staff to translate resources or create content. Participants suggested building support for dedicated bilingual staff who could create resources and deliver training in both languages. They also suggested collaborating and building relationships with Quebec institutions, and for national organizations to make RDM resources bilingual by design rather than as an afterthought.

Training

RDM training was discussed throughout the workshop as a challenge, and it is an area that could be readily aided by cross-institution or intra-institutional collaboration.

Co-developed and co-delivered

Using regional organizations such as Compute Ontario as models, a national RDM education program could be developed and delivered collaboratively. Institutions could coordinate workshops that they already deliver and open them to partnered institutions through a national or regional training calendar. This type of collaboration could also allow staff to deliver training to external institutions and for institutions to work together to meet the training needs of more than their own organization, in particular ensuring that RDM training is available to researchers even at smaller institutions without dedicated RDM support staff.

Another suggestion was to create training materials that institutions could modify and deliver themselves if they had the personnel available for it. Having a central repository of training materials such as presentation slides, course outlines, and instruction notes would help reduce the operational costs of developing and delivering RDM workshops or course-integrated training.

Integration and centralization to meet needs

Through collaboration between units like administration, libraries, ethics, and IT, institutions could develop a plan in which RDM training is required for new faculty and integrated into graduate programs. Key to this will be an understanding of what works best for researchers; communication and collaboration with researchers and faculty will be essential. Workshop participants suggested creating RDM hubs within institutions to provide researchers with one-stop, centralized access to RDM training and resources from a variety of campus units. A co-delivered program from IT, ethics, and libraries could be better received and attended than a workshop delivered by a single unit. This type of training could also be used to upskill data support staff to ensure that all groups working in RDM are aware of current tools and practices.

Community of Practice

Workshop participants agreed that creating a community of practice around RDM is essential to address the challenges discussed. Attendees praised the format of the workshop and indicated that more regular collaborative meetings with open discussions would help to develop this community of practice. Creating and maintaining opportunities for an evolving and growing community of practice to regularly connect could help to provide an informal place for practitioners to pose questions to others involved in RDM and discuss challenges and solutions in the line of work. These opportunities could come in the form of a listserv, Slack channel, and/or regular virtual meetings. Another suggestion was to share policies and strategies related to RDM across institutions.

Personnel and staffing

One approach to addressing the personnel and staffing challenge is to share resources such as staffing strategies and job descriptions between institutions. Through sharing such information, institutions can gain insights on effective staffing structures, and refine job descriptions to better attract qualified applicants.

Another approach to this challenge is for key areas and units situated across any given single institution to work collaboratively and to better define each other's roles and responsibilities as they pertain to RDM. This could help to support more effective delivery of RDM-related support and services across discrete but interrelated areas of the research lifecycle while avoiding unnecessary duplication and allowing available staff to be better equipped to provide the services needed by researchers.

Centralized organization

Workshop participants agreed that the creation of a national body for RDM collaboration and strategy was another necessary step in solving RDM challenges. This organization could provide guidance and leadership to institutions as well as provide unified responses to Tri-Agency requirements and other national policies related to RDM. A centralized national body could work alongside the Alliance to create resources for Canadian institutions such as a national DRI training strategy. This new body could help to coordinate the various collaboration strategies described in this report and ensure that initiatives continued forward.

Conclusion and Call to Action

Since the Research Data Management Community Workshop concluded at the end of September 2023, the landscape of RDM, research, and higher education in Canada has changed in many ways. For example, limits on study permits for international students have led to budget challenges for many post-secondary institutions which could affect their ability to support researchers; new federal guidelines and policies on research security have affected research and funding workflows (see Government of Canada, 2022); and more funders and publishers have implemented DMP and/or data sharing requirements. As well, some discussions have progressed in relation to the recommendations made by the workshop participants; for example, work is being done by the Alliance around developing a digital research infrastructure training calendar, which aims to include RDM-related training; Compute Ontario hosted a national summit on ARC and RDM training in April 2024; and work on the long-anticipated Controlled Access Management Initiative for Research Data (CAM) is underway.

Yet, as of this writing in early 2025, several key things remain the same. Researchers continue to conduct research; libraries, research offices, and IT departments continue to support them with their RDM needs; and all of these parties, as well as their institutions, are still somewhat unsure of what exactly the incoming RDM requirements will require of them, and how they will meet those requirements. This last element will ideally become clearer over the coming months and years: research data management is here to stay, and researchers and institutions will need to make it part of their planning and workflows. The Waterloo workshop did not seek to provide answers as to **how** this should be done; rather, it was an opportunity to build a community of professionals from across the range of units supporting RDM who can work towards successful RDM strategy implementation in their institutions. RDM is a 'wicked' problem (see e.g., Cox et al., 2016), and as such benefits from a cross-functional, multi-disciplinary, innovative and collaborative approach.

Simply building this community will not be the panacea for all RDM needs, though. Institutions, research funders, and infrastructure providers must all commit to supporting RDM, whether it be through clear and timely guidance, sustainable resource provision, hiring and development of staff, or regular and robust training offerings. Ongoing, stable funding—both at the national and the institutional level—will also be necessary to ensure that support and services can be sustained for the long term. RDM is—and has always been—a shared responsibility, and all the parties mentioned above must step up to ensure that its implementation is a success in Canada.

Appendix A: Participating Institutions and Organizations

This list includes all the organizations which sent cohorts to the workshop, as well as those of the organizers and the invited speakers.

Animikii Indigenous Technology
Athabasca University
Aurora College
Brock University
Canadian Association of Research Libraries
Carleton University
Compute Ontario
Dalhousie University
Digital Research Alliance of Canada
Fanshawe College
Lawson Health Research Institute
McMaster University
Memorial University
OCLC Research
Ontario Tech University
Queen's University
Scholars Portal
Sheridan College
Simon Fraser University
Social Sciences and Humanities Research Council
Thompson Rivers University
Toronto Metropolitan University
Université de Montréal
Université de Sherbrooke
University of Alberta
University of British Columbia
University of Calgary
University of Guelph
University of Manitoba
University of Northern British Columbia
University of Ottawa
University of Regina
University of Saskatchewan
University of Toronto
University of Waterloo
University of Windsor
University of Winnipeg
Western University
Wilfrid Laurier University
York University

Appendix B: Workshop Program

The original program for the workshop can be found at https://uwaterloo.ca/research-data-management-community-workshop/event-details (last accessed December 17, 2024).

Wednesday, September 27, 2023: Arrival and Networking Day		
Time	**Topic**	**Details**
6:00-8:00 pm	Networking reception	

Thursday, September 28, 2023: Plenary and Conversation Day		
Time	**Topic**	**Details**
8:30-9:00 am	Arrival, continental breakfast for arriving participants	
9:00-9:20 am	Welcome Remarks and Setting the Stage	
9:20-10:30 am	Plenary Discussion and Panel: The Big Picture, or why we care about RDM in Canada	Panel: ● Matthew Lucas, Social Sciences and Humanities Research Council ● Jeff Moon, Compute Ontario ● Lee Wilson, Digital Research Alliance of Canada ● Sara Anderson, University of Waterloo ● Lucia Costanzo, University of Guelph Moderator: Susan Haigh, Canadian Association of Research Libraries
10:30-11:00 am	Coffee break	
11:00 am - 12:15 pm	RDM Challenges - Functional Areas (small group conversations)	This conversation was arranged by **functional** groups, allowing conversation between those representing IT, Research, and Library roles. The focus was on challenges.
12:15-1:00 pm	Lunch	

1:00-1:10 pm	Afternoon logistics and reminders	
1:10-2:10 pm	RDM Challenges - Type of Institution (small group conversations)	Continuing the conversation on challenges, new conversations were held between individuals representing different **types** of institutions, such as medical/doctoral universities, comprehensive universities, primarily undergraduate universities, or community colleges
2:15-3:15 pm	Plenary Discussion and Panel: What are the research challenges of RDM?	Panel: ● Talena Atfield, University of Waterloo, and Jeff Doctor, Animikii Indigenous Technology ● Jenny Godley, University of Calgary ● Bhaleka Persaud, University of Waterloo Moderator: Ian Milligan, University of Waterloo
3:15-3:45 pm	Coffee break	
3:45-4:45 pm	RDM Experiences (small group conversations)	Small group conversations at tables arranged by themes to discuss experiences around implementation so far
4:45-5 pm	Wrap-up	
5:00-5:30 pm	Break	
5:30-7:30 pm	Dinner and networking	

Friday, September 29, 2023: White Paper Day		
Time	**Topic**	**Details**
8:30-9:00 am	Arrival, continental breakfast for arriving participants	
9:00-9:15 am	Welcome and Plan for the White Paper	
9:15-9:35 am	Social Interoperability of Research	Rebecca Bryant, OCLC Research

9:35-10:35 am	What Can We Gain from Collaboration? (small group conversations)	Small group discussions on the common challenges and opportunities that would benefit from collaboration. Particular emphasis may be on consortial opportunities or building other collaborative networks.
10:35-11:00 am	Coffee break	
11:00 am-12:00 pm	Recommendations and Priorities (small group conversations)	Small group discussions on what they would recommend and prioritize for action by the community
12:00-1:00 pm	Lunch	
1:00--2:00 pm	Setting the Stage for the White Paper to Come	
2:00-2:15 pm	Farewell remarks and next steps	

List of Abbreviations

ARC: Advanced Research Computing
CARA: Canadian Association of Research Administrators
CARE: Collective Benefit, Authority to Control, Responsibility and Ethics
CAREB: Canadian Association of Research Ethics Boards
CARL: Canadian Association of Research Libraries
CIHR: Canadian Institutes of Health Research
CUCCIO: Canadian University Council of Chief Information Officers
DMP: Data Management Plan
FAIR: Findable, Accessible, Interoperable and Reusable
FRDR: Federated Research Data Repository
IT: Information Technology
NSERC: Natural Sciences and Engineering Research Council
OCAP®: Ownership, Control, Access and Possession. OCAP® is a registered trademark of the First Nations Information Governance Centre (FNIGC).
RDM: Research Data Management
REB: Research Ethics Board
SSHRC: Social Sciences and Humanities Research Council

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