

## UCN Research Data Management Plan

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### **Research Data**

The term “research data” refers to any information created or collected as evidence in the research process or commonly accepted in the research community as necessary to validate results and conclusions. Research data are valuable assets, which when properly managed, have the potential to be reused and recombined in innovative ways to derive greater value and advance research and scholarship. The management of this data draws upon a range of infrastructures and skill sets to support its documentation, storage, access, and preservation over the course of a research investigation and following its conclusion. While benefiting the original research from which data are derived, the broader potential and objectives underlying Research Data Management (RDM) are rooted in the larger movement for Open Science that presents a vision for accelerated scientific discovery and advancement enabled by new information technologies, which will allow research and underlying data to be reviewed, communicated, shared, and reused more openly and accessibly.

Sharing scholarly research data and making it widely accessible has many important benefits. A great deal of research data has been lost in the past by not being well managed, organized or kept available in accessible formats.

In recent years the Government of Canada, Canadian Tri-Agencies, and many global organizations have strongly committed to open science, open scholarship, and open access to research data. Canada's commitment is outlined in the document “Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation” ([https://www.ic.gc.ca/eic/site/113.nsf/eng/h\\_07657.html](https://www.ic.gc.ca/eic/site/113.nsf/eng/h_07657.html)).

An RDM plan is becoming a requirement of Canadian Tri-Agencies research grant funding, and funding from many other sources. Canadian Tri-Agencies include the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council (SSHRC). These funding agencies strongly support research data sharing, data management and open access. These agencies have set policies which will require grant funded researchers to organize and manage data produced for funded research, so that it can be shared with other researchers.

### **RDM Plan**

The RDM plan is a short-written document (generally a few pages) that describes the data you expect to acquire or generate during the course of a research project; how you will manage, describe, analyze, and store the data; and what mechanisms you will use at the end of your project to share and preserve your data. In so doing the plan describes all of the resourcing, ethical, legal, file management, security and storage issues required for the gathering, sharing and preservation of data.

RDM plans are increasingly standard operating procedures when securing research funding as there are many benefits associated with them. In Canada the Tri-Agencies released its RDM Policy ([https://www.science.gc.ca/eic/site/063.nsf/eng/h\\_97610.html](https://www.science.gc.ca/eic/site/063.nsf/eng/h_97610.html)) which states:

“All grant proposals submitted to the agencies should include methodologies that reflect best practices in RDM. For certain funding opportunities, the agencies will require data management plans (DMPs) to be submitted to the appropriate agency at the time of application, as outlined in the call for proposals; in these cases, the DMPs will be considered in the adjudication process.”

RDM plans are created in response to several questions asked of researchers by funders. Typically, researchers are given a template with questions and they must complete. In Canada, the Tri-Agencies accept RDM plans that are completed using the Portage DMP Assistant (<https://assistant.portagenetwork.ca/>) which incorporates a number of templates.

### **Purpose of an RDM Plan**

The purpose of an RDM plan is to foster a culture and develop capacity that supports researchers in adopting responsible RDM practices, following the FAIR Principles [1] to make research data findable, accessible, interoperable and reusable. The FAIR principles are balanced by the CARE Principles for Indigenous Data Governance [2] with considerations for collective benefit, authority to control, responsibility, and ethics.

In 2018 the Canadian Tri-Agencies released a draft of the Tri-Agency RDM Policy for Consultation, which will require institutions to create an institutional RDM strategy [3]. This plan complies with that requirement. In November 2021, an RDM Advisory Committee (RDMAC) was formed by UCN to develop the RDM plan for UCN. The RDMAC comprised of members from across UCN and included: Office of Research, UCN Libraries, UCN Research Ethics Board Chair, and Office of Research and Academic Innovation (RAI). The RDMAC developed the UCN’s draft RDM plan which was reviewed and approved by the Research, Education and Learning (REAL) Committee. The UCN’s Learning Council was informed about the RDM plan of UCN. The RDM plan will be reviewed and updated by the RDMAC every three years.

### Elements of a RDM Plan

The Portage Network has created a brief guide ([https://portagenetwork.ca/wp-content/uploads/2020/04/BriefGuide\\_Portage\\_EffectiveDMP.pdf](https://portagenetwork.ca/wp-content/uploads/2020/04/BriefGuide_Portage_EffectiveDMP.pdf)) to help plan and organize research. This guide contains, but is not limited to, the following questions researchers may want to consider:

|                            |                                                                                                                                                                                                                                                                                                                   |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General                    | <ul style="list-style-type: none"> <li>▪ Describe your project including its focus and purpose in terms that can be understood by anyone (try to avoid extensive use of jargon and explain acronyms)</li> <li>▪ Try not to leave sections blank or questions unanswered</li> <li>▪ Update as needed</li> </ul>    |
| Data Collection            | <ul style="list-style-type: none"> <li>▪ How will you collect your data, from where and in what format</li> <li>▪ What software will be used and how will you store and transfer data</li> <li>▪ Include file naming and version structures</li> </ul>                                                            |
| Documentation and Metadata | <ul style="list-style-type: none"> <li>▪ Describe how the data is documented and what is needed for others to understand it</li> <li>▪ Choose a metadata schema (description of your data) used by your discipline</li> </ul>                                                                                     |
| Storage and Backup         | <ul style="list-style-type: none"> <li>▪ Estimate how much storage space is required</li> <li>▪ Follow the 3-2-1 rule for backup: 3 copies of your data, on 2 different storage media, with 1 located offsite</li> <li>▪ State how others on your team will work with your data (create, modify, etc.)</li> </ul> |
| Selection and Preservation | <ul style="list-style-type: none"> <li>▪ Think about preservation-friendly, non-proprietary formats</li> <li>▪ Where will you deposit your data for long-term preservation and access</li> </ul>                                                                                                                  |
| Sharing and Reuse          | <ul style="list-style-type: none"> <li>▪ Consider funding and/or ethical requirements when sharing data</li> <li>▪ Choose an end user license outlining how your data can be used</li> </ul>                                                                                                                      |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Responsibilities and Resources | <ul style="list-style-type: none"> <li>▪ Determine who in your group will be responsible for data management and who controls the data</li> <li>▪ What resources are required to store your data</li> </ul>                                                                                                                                                                                                                                                                                   |
| Ethics and Legal Compliance    | <ul style="list-style-type: none"> <li>▪ Consider how you will store and transfer sensitive data securely</li> <li>▪ Consider how you will manage secondary use of sensitive data</li> <li>▪ Can a 'public' (anonymized, de-identified) version of your data be created</li> <li>▪ How will you manage legal, ethical, and intellectual property issues</li> </ul>                                                                                                                            |
| Budget                         | <ul style="list-style-type: none"> <li>▪ Estimate all costs associated with managing your data</li> <li>▪ Prepare a detailed budget outlining costs associated with different practices (e.g. storing data, responsibilities for managing data, etc.) and whether you need to hire help, license software, etc</li> <li>▪ It will demonstrate that your plan for managing data is realistic and thought out particularly for projects gathering and managing large amounts of data</li> </ul> |

### Indigenous Data Sovereignty

Indigenous research and data are obtained from Indigenous worldviews and interconnection with all aspects of Indigenous ways of being and knowing. Indigenous research and data are relationally accountable to the Indigenous collective from where it was gathered within. Researchers working with Indigenous communities must ensure that data sovereignty remains with Indigenous organizations. UCN does not assume ownership of Indigenous data.

At UCN we follow the Truth and Reconciliation Commission’s principles of reconciliation and the United Nations Declaration on the Rights of Indigenous Peoples. We sustain meaningful relationships with Treaty Five Elders and communities to create an equitable Canada and demonstrate the value of Indigenous ways of knowing.

Before beginning to plan research within an Indigenous community, organization or non-profit agency, it is critical to know that Indigenous knowledges cannot be owned by a single researcher or used for a purpose outside of the Indigenous collective’s approval. The First Nations Information Governance Centre’s (FNIGC) ownership, control, access and possession (OCAP) principles must be central to all research with First Nations (<https://fnigc.ca/>). Data frameworks for Inuit and Metis are not yet defined by the respective nations but concepts of OCAP can be applied. All Indigenous peoples self-determine how their knowledge is shared.

To ensure you are maintaining Indigenous data sovereignty, you are encouraged to enroll in online OCAP training. Indigenous knowledge gathering or research at UCN requires building relationships with Indigenous communities to ensure that data sovereignty of First Nations, Inuit and Metis are maintained.

Watch this OCAP video to better understand First Nation's data sovereignty – <https://youtu.be/y32aUFVfCM0>.

### **Before Writing a RDM Plan**

Researchers need to know the following key information before writing a RDM plan.

- Begin by gathering information from relevant UCN departments such as IT, Library Services, RAI and Office of Research.
- If you have co-researchers you will need to consult with them to define such things as: who owns the data, who needs to have access to different data sets, what licenses should be applied to the data, and who will manage different responsibilities.
- Take advantage of internal and external help, guidelines, information and training available.
- Researchers must be prepared to justify their decisions
  - Funders tend not to specify particular file formats, standards or methodologies that you are expected to use. You need to choose and demonstrate that the selections made are the most appropriate for your context, your discipline and future users.
  - Similarly, you need to present a convincing case for any restrictions on data sharing.

### **Creating an RDM Plan**

Creating an RDM plan can help keep you and your research team organized. The Portage Network created a bilingual tool called the Data Management Plan (DMP) Assistant. It takes you through the RDM planning process step-by-step, asking questions about your research and providing guidance.

To get started with the DMP Assistant:

- Create an account at <https://assistant.portagenetwork.ca/>.
- Choose a template. There are several from which to choose. The default Portage template should fulfill your RDM needs.
- Answer the questions as fully as possible.
- Share your plan with your research team to have others contribute.
- You can export or print your plan, and you can revise your plan throughout your research project.

### **Best Data Handling Practices**

Good data management begins by understanding some important components including: file management, selecting good file formats, good data versioning, good metadata practices, identifying tools that can help with file management, and how to work with sensitive data.

## **Funder and Publisher/Journal Requirements**

Before writing your RDM Plan, consult all relevant publisher or funder requirements around data sharing. These requirements are increasingly common and may inform how you manage data. For example:

- Ensuring that the data is shareable.
- Determining where you share your data (if so, this needs to be included in your RDM Plan).

## **Storing and Preserving Data**

RDM plans ask researchers to address how their data will be stored, backed up and made accessible to any co-researchers in a secure manner - particularly when dealing with sensitive data and privacy. It should also be noted that storing and backing up data is not the same as data preservation. The Tri-Agency's FAQ section on Data Storage ([https://www.ic.gc.ca/eic/site/063.nsf/eng/h\\_97609.html#1d](https://www.ic.gc.ca/eic/site/063.nsf/eng/h_97609.html#1d)) outlines many of the resources available to Canadian Researchers.

Consider how the data may be reused. For example, to validate your research findings, conduct new studies, or for teaching. Decide which data to keep and for how long. This could be based on any obligations to retain certain data, the potential reuse value, what is economically viable to keep, and any additional effort required to prepare the data for data sharing and preservation. Remember to consider any additional effort required to prepare the data for sharing and preservation, such as changing file formats. Consider how datasets that have long-term value will be preserved and curated beyond the lifetime of the grant. Outline the plans for preparing and documenting data for sharing and archiving. If you do not propose to use an established repository, the RDM plan should demonstrate that resources and systems will be in place to enable the data to be curated effectively beyond the lifetime of the grant.

Both Dataverse and Federated Researcher Data Repository (FRDR) preserve data. Knowing this, you should house your data in either one. You can place the data in either - as well as place it in a repository recommended by a funder or publisher. Doing this will ensure data persistence.

## **Citing Data**

Data requires citations for the same reasons journal articles and other types of publications require citations: to acknowledge the original author/producer and to help other researchers find the resource.

A dataset citation includes all of the same components as any other citation:

- author,
- title,
- year of publication,
- publisher (for data this is often the archive where it is housed),
- edition or version, and
- access information (a URL or other persistent identifier).

Standards for the citation of data are not uniformly agreed upon and have yet to be codified by the National Information Standards Organization (an organization that sets technical standards for other bibliographic materials). However, many data providers and distributors and some style manuals do provide guidelines.

Be sure to follow the general citation format for the style manual. It is always better to provide more information about a resource rather than less!

### **Sharing and Licensing Research Data**

One of the reasons to create an RDM plan is to make the data useful for reuse. But you need to know whether, in your circumstances, data can be openly licensed. Factors to consider:

- Do you HAVE TO share data as part of a research grant? If so, you will need to release appropriately selected and formatted data using an Open License.
- Are you required to share data by a publisher? If so, you will need to release appropriately selected and formatted data using an Open License.
- Are you FORBIDDEN TO share data because of one of the following circumstances:
  - You have confidential data that *cannot be amended in such a way that it remains useful - but does not violate privacy.*
  - *You are gathering data in partnership with an Indigenous community and data sharing was not agreed to.*
  - Patent restrictions (etc.).
  - You are reusing data and do not have permission to share it.
    - If data is not licensed for reuse, you can only share the data if you obtain permission from the person who created/owns the data.
    - Do not indicate that you will reuse and share other researchers' data in your RDM plan UNTIL YOU HAVE SECURED PERMISSION TO DO THIS.

### **Locating Open Data**

#### ***Federated Researcher Data Repository (FRDR)***

**FRDR** (<https://www.frdr-dfdr.ca/repo/?locale=en>) is a comprehensive data service provided by the Canadian Association of Research Libraries and Compute Canada. FRDR enables researchers to:

- Deposit research datasets - it is the preferred place to store massive data sets in Canada.
- **Search** it's datasets.
- **Search** research data deposited to [other repositories across Canada](#).

In addition, FRDR provides important [backup, storage and archiving services](#).

#### ***Re3Data***

**Re3data** (<https://www.re3data.org/>) is a global registry of research data repositories that covers research data repositories from different academic disciplines. It includes repositories that enable permanent storage of and access to data sets to researchers, funding bodies, publishers, and scholarly institutions. It lists repositories by:

1. [Country](#)

2. [Content Type](#) and
3. [Subject](#)

**Re3Data** is also searchable. Use it to determine where you can look for, or contribute relevant data.

### ***Government of Canada Open Data Portal***

Using **Open Data Portal** (<https://open.canada.ca/en/open-data>) you can:

- Search open data that is relevant to Canadians,
- Learn how to work with datasets, and
- See what people have done with open data across the country.

### **Data Repositories**

A data repository can be defined as a place that holds data, makes data available to use, and organizes data in a logical manner. A data repository may also be defined as an appropriate subject-specific location where researchers can submit their data.

Data repositories may have specific requirements concerning subject or research domain; data re-use and access; file format and data structure; and the types of metadata that can be used. Librarians can assist researchers in finding a data repository by evaluating and recommending subject-specific repositories that would be best suited to hold or find and use biomedical research data.

Many data repositories have restrictions on who can deposit data into them based on funding, academic qualification, and quality of data. There are, however, a number of data repositories that are classified as "open"; and as a result, are essentially open to receiving data from anyone. Some universities have an Institutional Data Repository known as Dataverse. The Government of Canada also provides Canadian Researchers with access to the FRDR which can house massive data sets.

### **RDM Training and Resources**

#### ***Digital Research Alliance of Canada/Portage Webinars***

Digital Research Alliance of Canada/Portage offers a [series of webinars](#) (<https://alliancecan.ca/en/services/research-data-management>) on RDM-related topics and training. Recordings are on the [CARL YouTube channel](#) (<https://www.youtube.com/channel/UCK59-sdDLfQgUUoAuiOVQeQ>).

The following Portage webinars provide overviews of specific RDM topics:

- [Beginning with the end in mind \(data documentation\)](#)
- [Support Your Research with DMP Assistant 2.0!](#)
- [Support Your Research with Data Management Planning!](#)
- [Reducing Risk: An Introduction to Survey Data Anonymization](#)
- [Research Data Preservation in Canada](#)
- [Introduction to FRDR/DFDR](#)



### **Training**

- [MANTRA](#) - free, online course for students, researchers, academics and librarians who manage digital data.
- [Portage Canada's Training Resources](#) - find presentations, webinars, guides, and more.
- [Data Management Skill Building Hub](#) - a repository with open educational resources regarding data management.
- [Research Data Management Toolkit](#) - provides materials relevant to researchers, research support and IT specialists.
- [PARTHENOS Training Modules](#) - PARTHENOS (Pooling Activities, Resources and Tools for Heritage E-Research Networking, Optimization and Synergies) has developed a series of online training modules webinars.

### **Books and Articles**

Here is a selection of books and articles about research data management:

- Exploring Research Data Management by Andrew Cox and Eddy Verbaan. Publication Year 2018.
- Managing Research Data by Graham Pryor. Publication Year 2012.
- Principles of Data Management and Presentation by John P. Hoffmann. Publication Year 2017.
- Foundational Practices of Research Data Management by Kristin A Briney, Heather Coates and Abigail Goben. Research Ideas and Outcomes 6: e56508. Publication Year 2020.

### **References**

[<sup>1</sup>] Wilkinson, M. D. et al. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data*, 3, 160018. doi:10.1038/sdata.2016.18.

[<sup>2</sup>] Global Indigenous Data Alliance (2019). CARE Principles for Indigenous Data Governance. Retrieved from <https://www.gida-global.org/care>.

[<sup>3</sup>] Government of Canada (2018). Draft tri-agency research data management policy for consultation. Retrieved from [http://www.science.gc.ca/eic/site/063.nsf/eng/h\\_97610.html](http://www.science.gc.ca/eic/site/063.nsf/eng/h_97610.html).

### **Acknowledgement**

Adapted from Brandon University, Saint Mary's University, Queen's University Office of Indigenous Initiatives, Indigenous Research and First Nations Information Governance Centre, and Chapter Eight, *Pathways to First Nations Data Sovereignty in Indigenous Data Sovereignty*.

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Updated on February 22, 2023.