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SHARED STEWARDSHIP OF RESEARCH DATA

Canadian Colleges, Institutes & Polytechnics

Research Data Management Workshop

December 7, 2018
Centennial College, Event Centre

Organized by:

Centennial College
Colleges and Institutes Canada
Research Data Canada
CARL Portage

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DESCRIPTION

Title: Research Data Summit for Colleges, Institutes, and Polytechnics

Description: Earlier this year Canada's Tri-Agencies launched a consultation on a new draft Data Management Policy, which will impact any organization that receives funds from the agencies. While it is good news in terms of research and sharing the data from the research enterprise, it means that institutions need to understand the impacts, including for their industry partners, and how best to respond. This emerging policy framework is accompanied by an increasing tendency for other funders and journal publishers to require the deposit of data and other outputs with publications. Given this emerging landscape, earlier this year Research Data Canada (RDC) facilitated a day-long workshop of University Vice Presidents Research on the new draft policy. RDC is pleased to be working with CICan, Centennial College, and CARL Portage to bring a similar workshop to colleges, institutes and polytechnics.

A data management-focused 1-day workshop for colleges, institutes, and polytechnics in Canada. A key goal is to review the draft Tri-Council data management policy, and facilitate the development of individual institutions' approaches to the policy and data management in general. The Summit will include updates on other issues in the digital research infrastructure file, including cybersecurity and intellectual property. This event is for senior administrators in applied research offices, computing/IT, and libraries. A formal invitation will follow with additional details and registration information. For more information contact Mark Leggott: mark.leggott@rdc-drc.ca.

Facilitator: Mark Leggott (Research Data Canada)

Date/Time: December 7, 7:30-16:00 Eastern

Location: Centennial College, Progress Campus, 941 Progress Ave., Toronto ON

Accommodation:

- Best Western, 38 Estate Drive, Scarborough, ON M1H 2Z1
- Travelodge Toronto East, 20 Milner Business Court, Hwy 401 and Markham Rd, Toronto East / Scarborough, ON M1B 3C6 CA
- Delta Toronto East (Toronto Hotel), 2035 Kennedy Road, Toronto ON, M1T 3G2
- HiExpress, 50 Estate Drive, Scarborough, ON M1H 2Z1

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Anyone using this network must read and accept the terms of the use.

For detailed instructions on how to connect see:
www.centennialcollege.ca/studenthub/student-services/it-help-desk/campus-wi-fi

AGENDA

7:30-8:30	Registration and Breakfast	
8:30-8:45	Welcome & Introductions	Marilyn Herie (Centennial), Mark Leggott
8:45-9:00	Background and Goals	Mark Leggott
9:00-9:30	Keynote Address	Jeffrey Taylor (NSCC)
9:30-10:00	Panel Discussion on Applied Research and the Draft RDM Policy	Paul Brown/Nityan Khanna (Mohawk College), Courtney Kennedy (Hamilton Health Sciences)
10:00-10:30	Overview of Tri-Agency Draft Policy Pillars	Kevin Fitzgibbons (NSERC)
10:30-11:00	Break	
11:00-11:30	Institutional Plan Pillar	Facilitated Discussion
11:30-12:00	Data Management Plan Pillar	Facilitated Discussion
12:00-12:30	Data Deposit Pillar	Facilitated Discussion
12:30-13:30	Lunch	
13:30-14:30	Update on Canadian Leadership in RDM/Open Science	Jeff Moon (Portage), Mark Leggott
14:30-15:30	Update on Key Issues in the DRI Landscape: DRI Funding, Cybersecurity + Intellectual Property	Jim Ghadbane (CANARIE) + Ray Hoemsen (Red River College)
15:30-16:00	Next Steps	Mark Leggott

Background and Goals

Background

In 2016 Canada's Tri-Agencies released the *Statement of Principles on Digital Data Management*, which was an indication of the Agencies' expectations on data management and the responsibilities of actors in the research community. Subsequently in 2018, the Tri-Agencies released the *Draft Tri-Agency Research Data Management Policy For Consultation*, requesting feedback from the research community so it could be considered in the development of the final policy. That feedback period ended in September, and the Agencies are currently reviewing it, and considering opportunities to strengthen the policy. This workshop is based on the core pillars of that policy, and ways that the college/institutes/polytechnics community can respond to the expectation for effective data management practices in projects funded with Tri-Agency funds.

Goals

The goals for this workshop are to:

1. review the proposed Tri-Council data management policy;
2. facilitate the development of individual institutions' approaches to data management;
3. provide an update on the latest developments in RDM from key organizations;
4. determine next steps and actions for the community.

Resources & Examples

1. *Tri-Agency Statement of Principles on Digital Data Management*, December 21, 2016.[1]
2. *Tri-Agency Data Management Policy Initiative*. Selected slides from the Tri-Agency slide deck presented in Halifax, February 15, 2018.[2]
3. *Tri-Agency Research Data Management Policy Consultation: Response by Colleges and Institutes Canada and Polytechnics Canada*. Colleges and Institutes Canada, 2018.[3]
4. COLLEGE APPLIED RESEARCH SERIES by Ray Hoesmen, CAURA Blog, August 22, 2017. [4]
    a. CAURA Article #1: *Colleges & Applied Research*
    b. CAURA Article #2: *Community/Industry Engagement & Partnerships*
    c. CAURA Article #3: *Intellectual Property*
    d. CAURA Article #4: *Students, Faculty & Curriculum*
5. *Inclusive Innovation at Colleges and Institutes: Highlights from the 2015-2016 - CICan Applied Research Survey*. Colleges and Institutes Canada, 2017.[5]

[1] https://www.science.gc.ca/eic/site/063.nsf/eng/h_83F7624E.html Downloaded Nov 20, 2018.
[2] Nicolas Parker, personal communication, February 23, 2018.
[3] Christine Trauttmansdorff, personal communication, February 20, 2018.
[4] Copy provided by the author, Ray Hoesmen, original published version available at: https://cara-acaar.ca/CARAblog?path=&node=aug22-17
[5] https://www.collegesinstitutes.ca/file/inclusive-innovation-at-colleges-and-institutes-highlights-from-the-2015-2016-cican-applied-research-survey/

Government of Canada / Gouvernement du Canada

Tri-Agency Statement of Principles on Digital Data Management

1. Preamble

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 of Canada (SSHRC) (the agencies) are federal granting agencies that promote and support research, research training, knowledge transfer and innovation within Canada.

As publicly funded organizations, the agencies are strong advocates for making the results of the research they fund as accessible as possible. In promoting access to research results, they aspire to advance knowledge, avoid research duplication and encourage reuse, maximize research benefits to Canadians and showcase the accomplishments of Canadian researchers. These aspirations align with the Government of Canada's commitment to open science, as described in *Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation*(2014).

Research data include observations about the world that are used as primary sources to support scientific and technical inquiry, scholarship and research-creation, and as evidence in the research process. [1] Research data are gathered through a variety of methods, including experimentation, analysis, sampling and repurposing of existing data. They are increasingly produced or translated into digital formats. When properly managed and responsibly shared, these digital resources enable researchers to ask new questions, pursue novel research programs, test alternative hypotheses, deploy innovative methodologies and collaborate across geographic and disciplinary boundaries. The ability to store, access, reuse and build upon digital research data has become critical to the advancement of science and scholarship, supports innovative solutions to economic and social challenges, and holds tremendous potential for Canada's productivity, competitiveness and quality of life.

Governments and research funders across the globe are becoming increasingly aware of the value of digital research data, the importance of fostering reuse of digital research data and the need for policies to enable excellence in data stewardship. Canada has joined many other countries at the forefront of this movement, as shown in its support for the Organisation for Economic Co-operation and Development's *Declaration on Access to Research Data from Public Funding* (2004); its commitment to the *Open Government Declaration* (2011); and its approval of the *G8 Science Ministers Statement* (2013).

The Government of Canada's *Action Plan on Open Government* (2014) aims to maximize access to the results of federally funded research, to encourage greater collaboration and engagement with the scientific community, the private sector and the public. The action plan includes a commitment to adopt policies to support effective data stewardship.

The agencies believe that research data collected with the use of public funds belong, to the fullest extent possible, in the public domain and available for reuse by others. They also strongly support the creation of a robust and efficient environment for data stewardship in Canada and internationally. They have encouraged data stewardship through SSHRC's *Research Data Archiving Policy* (1990), and data sharing provisions for CIHR grant holders in the *Tri-Agency Open Access Policy on Publications* (2015). They will continue to promote excellence in data management practices within the Canadian research community.

This statement of principles outlines the agencies' overarching expectations regarding research data management, and the responsibilities of researchers, research communities, research institutions and research funders in meeting these expectations.

2. Objective

The objective of this statement of principles is to promote excellence in digital data management practices and data stewardship in agency-funded research. It complements and builds upon existing agency policies, and serves as a guide to assist researchers, research communities and research institutions in adhering to the agencies' current and future research data management requirements.

3. Expectations

Data Management Planning

Data management planning is necessary at all stages of the research project lifecycle, from design and inception to completion.

Data management plans are key elements of the data management process. They describe how data are collected, formatted, preserved and shared, as well as how existing datasets will be used and what new data will be created. They also assist researchers in determining the costs, benefits and challenges of managing data. They should be developed using standardized tools, where available.

Constraints and obligations

Research data must be managed in agreement with all commercial, legal and ethical obligations.

Data management should be performed in accordance with the requirements of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – 2nd edition*.This statement provides guidance on data management aspects of research involving humans, such as consent,

privacy and confidentiality, indigenous people's rights, secondary use of data and data linkage. Data management should also be performed in accordance with the requirements of the *Tri-Agency Framework: Responsible Conduct of Research*.

Adherence to Standards

Data should be managed in accordance with the most appropriate and relevant standards and best practices, while recognizing that these are in a state of rapid evolution.

Collection and Storage

Data should be collected and stored throughout the research project using software and formats that ensure secure storage, and enable preservation of and access to the data well beyond the duration of the research project.

Metadata

All research data should be accompanied by metadata that accord with international and disciplinary best practices to enable future users to access, understand and reuse the data.

Quality metadata are essential for making research data findable, and for the systems that use or mine the data. Standards are diverse and vary across disciplines, but metadata generally state who created the data and when, and include information on how the data were created, their quality, accuracy and precision, as well as other features necessary to enable understanding and reuse. When possible, common metadata standards should be adhered to.

Preservation, Retention and Sharing

Research data resulting from agency funding should normally be preserved in a publicly accessible, secure and curated repository or other platform for discovery and reuse by others. To determine whether data should be shared and preserved, researchers should consider the data needed to validate research findings and results, and support replication and reuse. They should look at the potential benefits that sharing the data will have for their own or other fields of research, and for society at large. Researchers should also consider whether any ethical, legal or commercial obligations prohibit sharing or preserving the data, and whether any of the data need to be de-identified or made available with restricted access.

Decisions regarding preservation, sharing and retention periods for data should be made in accordance with international and disciplinary best practices and relevant policies, seeking expert guidance where necessary. The rationale for data preservation, sharing and retention is normally defined in a data management plan.

Timeliness

Data should be shared as early as possible in the research process when they are considered to be informative and of appropriate quality.

Data release can be staged as research progresses, starting with metadata. Data supporting publications should be shared by the publication date, and where possible, should be linked to the publications. A defined period of exclusive use of data for primary research is reasonable in some cases.

Acknowledgement and Citation

Data are significant and legitimate products of research and must be recognized as such.

All users of research data should acknowledge – through citation and other practices or standards relevant to their disciplines – the sources of the data they are using, and respect the terms and conditions under which these data were accessed. Researchers who responsibly and effectively share their data should be recognized by funders, their academic institutions and users benefiting from the reuse of the data.

Efficient and Cost Effective

Data management should be efficient and cost effective. All data need to be managed, but not all data need to be shared or preserved – costs and benefits of doing so should be considered in the data management planning process.

4. Responsibilities

As per the roles they have traditionally occupied within the research system, researchers, research communities, research institutions and research funders share the responsibilities and costs of ensuring a robust and open research data environment in Canada. Therefore, they should work collaboratively in addressing the gaps in human and technical infrastructure to meet this objective. This section outlines their responsibilities in meeting the expectations described in Section 3.

Responsibilities of **researchers** include:

- incorporating data management best practices into their research;
- developing data management plans to guide the responsible collection, formatting, preservation and sharing of their data throughout the entire lifecycle of a research project and beyond;
- following the requirements of applicable institutional and/or funding agency policies and professional or disciplinary standards;
- acknowledging and citing datasets that contribute to their research; and
- staying abreast of standards and expectations of their disciplinary community.

Responsibilities of **research communities** include:

- developing data management standards, promoting and communicating existing standards to ensure that they are used, and working collaboratively to review and improve these standards;
- recognizing data as an important research output and fostering excellence in data management within their research community; and

- identifying, promoting and encouraging the use of repositories and platforms that meet or exceed data management standards.

Responsibilities of **research institutions** include:

- providing their researchers with an environment that enables world class data stewardship practices;
- delivering, or supporting access to, repositories or other platforms that securely preserve, curate and provide continued access to research data;
- supporting researchers in their efforts to establish and implement data management practices that are consistent with ethical, legal and commercial obligations, as well as tri-agency requirements, including the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – 2nd edition*, the *Tri-Agency Framework: Responsible Conduct of Research* and other relevant policies;
- providing their affiliated researchers with guidance to properly manage their data in accordance with both the principles outlined above and research community best practices, including the development of data management plans;
- recognizing data as an important research output and fostering excellence in data management;
- promoting the importance of data management to researchers, staff and students; and
- developing their own data management policies, ensuring that these policies are in accordance with the principles outlined above and provincial and national laws, and can accommodate the rapidly evolving research communities' best practices.

Responsibilities of **research funders** include:

- developing policies and requirements that enable and recognize responsible data management, in accordance with the principles outlined above;
- providing applicants with clear information and guidance with regard to fulfilling data management requirements;
- recognizing data as an important research output;
- promoting the importance of excellent data management; and
- where appropriate, providing peer reviewers with guidance and developing assessment material for including data management considerations in the application assessment process.

5. Statement Review

As the context for research data management evolves, the agencies–in consultation with the stakeholders for research data management in Canada–will review and revise this statement as appropriate.

Footnotes

1 Adapted from Research Data Canada definitions of ‘data’ and ‘research data’. See the RDC *Glossary*: http://www.rdc-drc.ca/glossary/.

Date modified:

2016-12-21

TRI-AGENCY POLICY DEVELOPMENT BACKGROUND

2013

Capitalizing on Big Data: Toward a Policy Framework for Advancing Digital Scholarship in Canada

2016

Tri-Agency Statement of Principles on Digital Data Management

2017-2018

Draft Tri-Agency Research Data Management Policy

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

INTENDED IMPACT OF A TRI-AGENCY DATA MANAGEMENT POLICY

The Tri-Agencies aim to contribute to a future research culture that sees:

- Strong data management as an accepted signifier of research excellence across disciplines, and a regular feature in the conduct of research;
- More Canadian datasets cited, and valued as a product of research in tenure, promotion and peer review processes;
- Canadian researchers equipped and ready to engage in international research collaboration where data management requirements are becoming the norm;
- Canadian research institutions ready to support the management of the data their researchers produce;
- Increased ability for research data to be archived, found and responsibly reused, to fuel new discovery and innovation.

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

- For consultation
- Feedback will inform final policy
- Proposed policy includes 3 possible requirements:
  1. Institutions: Institutional Strategy
  2. Researchers: Data Management Plans
  3. Researchers: Data Deposit
- Implementation: Phased, incremental

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

1. Institutions: Institutional Strategy

- Each institution administering Tri-Agency funds could be required to create an institutional research data management strategy. The strategy could outline how the institution will provide its researchers with an environment that enables and supports world class research data management practices.
- The strategy could be posted and made publicly available on the institution's website, with contact information to direct inquiries about the strategy.

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

Why Require Institutional Strategies?

- Recognizes the role of institutions in providing supports for data management
- Provides an opportunity for institutions to think through where gaps exist, and how to address them from a campus-wide perspective
- Could aid institutions in developing an approach that works for them, while encouraging alignment and collaboration with other institutions
- Could provide information to agencies about data management capacity
- Serves as foundation for the potential requirements that follow

Support
Portage Institutional Strategy Template

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

2. Researchers: Data Management Plans

- Grant recipients could be required to create data management plans (DMPs) for research projects supported wholly or in part by Tri-Agency funds. Grant recipients could submit these plans to their institution's research office as a condition of the release of grant funds.
- For specific funding opportunities, the agencies could require DMPs to be submitted to the appropriate agency at time of application; in these cases, they may be considered in the adjudication process.

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

Why Require Data Management Plans?

- DMPs are an emerging international best practice
- DMPs are an excellent way for researchers to identify opportunities and challenges in managing their data, well before those opportunities and challenges emerge
- Researchers claim that the process of developing a DMP helps them to improve their research plans and methodologies
- DMPs could serve the responsible conduct of research and the research ethics approval process
- DMPs help identify and mitigate issues related to ownership of data, potential for data sharing, etc.

Support
Portage DMP Assistant

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

3. Researchers: Data Deposit

- For all research data and code that support journal publications, pre-prints and other research outputs that arise from agency-supported research, grant recipients could be required to deposit these data and code in an appropriate public repository or other platform that will ensure safe storage, preservation, curation, and (if applicable) access to the data.

DRAFT
TRI-AGENCY DATA MANAGEMENT POLICY

Why Require Data Deposit?

- Methods, expectations and online security will change – storing in a secure location provides better chance for data to be safe and of use to the creator in the future
- Data deposit helps ensure proper use of public funds
- Facilitates reproducibility of results
- Facilitates data sharing

Support
Federated Research Data Repository

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

NSERC CRSNG

SSHRC CRSH

Colleges and Institutes Canada
Collèges et instituts Canada

POLYTECHNICSCANADA

Tri-Agency Research Data Management Policy Consultation
Response by Colleges and Institutes Canada and Polytechnics Canada

This response to the Tri-Agency Research Data Management Policy Consultation (RDM Policy) was prepared by Colleges and Institutes Canada (CICan) and Polytechnics Canada to ensure the RDM Policy reflects the unique context within which colleges[1] conduct applied research.

Canadian College Applied Research Context:
Colleges across the country play a lead role in Canadian prosperity by partnering with industry (particularly small- and medium-sized enterprises), and community organizations to engage in applied research that enhances their partners' competitiveness, efficacy and sustainability. With over 400 specialized research centres and laboratories, colleges and their students work with partners in all sectors to develop or refine solutions, products, services, technologies, and processes. College applied research is motivated by industry or community partner needs (pull model) rather than investigator- or curiosity-led research (push model) that is typical of universities.

The dual motivation for colleges to participate in partnered applied research is to contribute to the economic development of their regions (and beyond) and to provide students with experiential learning opportunities. Colleges typically do not commercialize themselves; instead they expect their partners to commercialize or to use the results of their collaborations. As such, colleges adhere to the principle that intellectual property (IP) is better exploited by the private sector, either giving partners ownership of the IP for research collaborations, or granting them royalty-free commercial rights. In most cases, data that is gathered through college applied research partnerships is considered proprietary to the partner and is not shared beyond the scope of the applied research project. Colleges typically do not publish the results of research in peer review journals, instead, they transfer knowledge (including technical reports) and technology directly to the partner.

The NSERC College and Community Innovation Program (CCIP) supports a suite of college partnership grants that encourage and support applied research partnerships with industry and community partners. Unlike other Tri-Agency research programs, CCIP is not eligible for the *Research Support Fund* (RSF). Instead, CCIP allows colleges to use up to 20% of their project grants to cover overhead and administration costs specific to the grant. This provision does not adequately cover the indirect costs of the applied research. The lack of predictable and stable research support funding leaves institutions operating on a grant-to-grant, short-term horizon, without capacity to invest in the long-term infrastructure and relationship building. The costs colleges incur to conduct applied research includes:

- Maintaining state-of-the-art labs and research infrastructure;
- Liaising and building partnerships with industry and community organizations;
- Recruiting, hiring and training staff including research services staff (communications, financial, project management, industry liaison/business development staff) faculty, lab technicians and technologists;
- Engaging students, including providing training on research methodology and policies;

[1] Colleges refers collectively to all publicly funded colleges, polytechnics, institutes and cégeps.

- Ensuring the policies (such as Research Ethics, Integrity in Scholarly Research and Scholarship and Intellectual Property) and regulations that maintain Canadians' confidence in the research process and results are in place, updated as needed and that research staff are trained and compliant; and
- Developing projects, writing grant applications, reporting to funders and disseminating results.

Many of these items (i.e. training, project and grant development) also require faculty time, which colleges can't fund until after awards are received. The lack of funding to cover indirect costs inhibits the ability of colleges to maximize their support to SMEs' innovation, the economic development of their region and the skills development of the labour force. It also places a considerable financial burden on colleges conducting applied research and is a barrier to entry or to capacity growth in applied research for many colleges.

RDM Policy Considerations:

1. Almost all college-based applied research is initiated by and conducted with private sector and community partners. Intellectual property resulting from applied research typically remains not with the college but with the research partner; as a result, any data generated from these research projects are considered proprietary by the partner. It is therefore essential that the RDM Policy clearly define how data that is considered proprietary by the partner should be managed, stored and precluded from data sharing where appropriate. "Commercial constraints" are mentioned in the current RDM Policy for consultation in section 3.2 *"…DMPs outline ethical legal and commercial constraints the data are subject to, methodological considerations that support or preclude data sharing, and which data repository has been selected for data deposition (if applicable)".* But more clarity is necessary. We recommend adding a section to the RDM Policy on data that is considered proprietary by the partner that clarifies how this data is to be managed, stored and, if appropriate, precluded from data sharing.

2. To implement the Tri-Agency RDM Policy, colleges will need to provide researchers and their partners with a platform to store and share data, training, support and encouragement to develop and utilize strong research data management plans. Creating and maintaining a research environment that offers this kind of support involves long-term costs and commitments that are inconsistent with the CCIP's current grant-by-grant allowance of 20% for administration and overhead. It is even more challenging for the colleges that do not yet hold Tri-Agency funds or have received very few awards. This makes the barrier to entry into applied research more difficult for emerging applied research colleges, in particular ones in rural areas that are already dealing with funding challenges. We recommend a stable, long-term research support funding solution for the college sector be implemented in advance of the launch of the RDM policy.

3. Colleges will also need time to implement the RDM Policy including establishing their own institutional policy, as well as developing resources, communication and training to researchers and their partners. We recommend providing minimally 18 months for academic institutions to implement RDM within their organizations.

4. Currently, Portage, Compute Canada and the Canadian Association of Research Libraries (CARL) are collaborating to provide a scalable federated platform for digital research data management (RDM) and discovery—the Federated Research Data Repository (FRDR). This is currently only open for select institutions to use. We recommend that the timing of compliance with the RDM Policy come after the full implementation of systems like the FRDR platform and other repositories, and their accessibility to any publicly-funded research institutions.

5. *The Portage Network* provides key resources for sharing research data. Their Steering Committee currently does not have college representation on it. We recommend that the Portage Network invite colleges and/or CICan and Polytechnics Canada to join their Steering Committee to ensure that RDM tools, platforms, systems and training reflects the needs of colleges and their partners. In addition, CICan and Polytechnics Canada will work with their membership to encourage more colleges to join the Portage Network and build college-specific templates on the *Digital Management Plan (DMP) Assistant.* We also recommend that the timing of compliance with the RDM Policy come after appropriate support for full implementation of systems like the FRDR platform and other repositories, and their accessibility to any publicly-funded research institution.

6. The primary mandate of college libraries is to support student learning. Colleges do not have resources or staff dedicated to research data management. Research support funding will be necessary to equip college libraries or centralized personnel within the research office to play a role in creating and supporting RDM activities. Organizations such as CARL, RDC, regional library consortia, and the Research Data Alliance could offer excellent support and leadership by engaging with the college applied research community.

7. Sharing best practices is valuable to promote the adoption of a new policy and opportunities can be more limited for smaller colleges and those in rural or remote areas. We recommend that organizations like Portage Network and RDC organize college-specific events or collaborate with CICan and Polytechnics Canada to design and deliver appropriate training and resources and make them available as broadly as possible including online.

8. Given the unique context within which colleges conduct partnered applied research it is important that colleges are included in development of Digital Research Infrastructure (DRI) infrastructure and services. We recommend that colleges are considered key participants in the development of the infrastructure and services that will come under the ISED-supported organization mandated with allocating the RDM portion of the $572 million for Digital Research Infrastructure (DRI), as per the most recent federal budget.

COLLEGE APPLIED RESEARCH SERIES - CAURA Article #1: Colleges & Applied Research

January 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College

This article is the first of a series which will, from the college point-of-view, address topics such as:

- applied research;
- intellectual property management;
- community/industry engagement and partnering models; and
- faculty/student engagement and curriculum integration.

Over the last decade, colleges and polytechnics have become an integral part of Canada's innovation environment; with a growing number of supports for college-specific applied research at the federal and/or provincial level – as well as by the colleges themselves.

Targeted investments by the Tri-Councils through the College and Community Innovation program in college-based applied research programs have grown from ~$3M in 2004 to ~$48M in 2014. These investments are intended to increase community and/or regional level innovation by building capacity within the college sector to work with local companies, especially Small- and Medium-Sized Enterprises (SMEs); as well as to support applied research and collaborations *"that facilitate commercialization, technology transfer, adaptation and adoption of new technologies."*. Concurrently, Tri-Council investment in university-based research partnerships have grown. For example, NSERC's university-focussed partnerships program have grown from ~180M in 2004 to ~300M for 2014.

At the same time, the number of NSERC-eligible colleges has expanded from literally a handful to nearly 100 institutions from sea to sea to sea.

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness.

"Applied Research" is generally considered to be the application of knowledge, focussed on the resolution of a problem or need (usually identified by industry or other organizations within the community) with the objective of delivering a satisfactory resolution or result. This is distinct from the "basic" or "discovery" research (and related timelines) associated with the university sector. In Colleges, the focus is more on the "how" than the "why".

Applied research is carried out on a group basis, with students often playing a key role since applied research (especially in the polytechnic model of education) is an integral component of the applied learning experience.

Commercial rights to research results are routinely assigned to industry partners, while the College retains rights for further research and education purposes. Most colleges do <u>not</u> typically engage in the traditional academic "patent and license" model.

Technology "diffusion" (adoption and adaption of technology) is of greater relevance than technology "commercialization" – since college-based applied research is often responding to an industry-specific product-, process- or service need.

In Canadian colleges, the role of the "applied research" office encompasses those which would normally be found in the typical university research services, technology transfer and industry liaison offices. Partnership and relationship development and maintenance are integral aspects of the job for applied research office personnel.

With the ever-increasing expectation of public investments in research to create impact, not just benefit; the colleges and universities have a complementary and, more often, a collaborative role to play supporting local and regional economic development.

COLLEGE APPLIED RESEARCH SERIES - CAURA Article #2: Community/Industry Engagement & Partnerships

March 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College

"***Private Sector Partnerships with Colleges & Institutes Spike as Applied Research Solutions Fuel Economic Benefits***" was the headline of the March 5, 2014 News Release[1] by the Association of Canadian Community Colleges. A recent environmental scan revealed a 19% increase in applied research partnerships over the previous year (and 51% over the last five years), with nearly 5,500 industry partnerships reported – along with an increase in private sector funding of college applied research of 21% to $72 million. Business and industrial research accounted for 96% of external funding. The majority of these partnerships (86%) were small- and medium-sized enterprises (78%) or micro-enterprises (8%). And, over 800 social innovation partnerships with community organizations and companies were reported; as well as nearly 50 international partnerships (an emerging area of interest) in 21 countries.

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness. Students are an integral element in applied research, enabling them to gain practical experience as part of their applied learning experience. Technology diffusion (adoption and adaption of technology) is of greater relevance than technology commercialization. Colleges are driven by market needs (or pull) of the community, especially industry. Since most applied research activities are directed towards a particular client need; institutions such as Red River College routinely assign commercial rights to the client/partner, while retaining rights for research and education purposes. As a result, patenting (by the institution) is a relatively rare occurrence; most colleges do not typically engage in the traditional academic "patent and license" model.

Polytechnics Canada's submission[2] to the Government of Canada's consultation on Science Technology and Innovation Strategy has reinforced this point-of-view: "***College applied research is motivated by building Canadian talent, not by driving discovery, nor by attracting world-class talent. Applied research is driven by solving Canadian industry problems, involves students in applied research and is characterized by industry-friendly intellectual property policies.***"

Key factors/elements in industry/community engagement and partnerships for colleges include:

- Economic development as a mandate of the college, often explicitly stated in the Vision or Mission.
- Strong community connections, especially with fourth pillar organizations (such as the National Research Council's Industrial Research Assistance Program), SMEs, economic development agencies, and Program Advisory Committees (typically one for EVERY academic program offered by a college).
- Government policy which has encouraged/driven the academic community to undertake more industry-relevant research and development, especially with SMEs; resulting in new initiatives like NSERC's well-received "ARD" (college) and "ENGAGE" (university) programs which have helped to catalyze industry partnerships. A Social Innovation pilot program for colleges was just announced.
- Strong desire by colleges to see research results used for economic benefit in the community, rather than as a source of royalty revenue; coupled with minimal interest in patenting by the institution, hence little need to negotiate licenses or royalties, which can be a very time consuming (and often irritating) exercise for little (potential) return.
- Industry-experienced faculty who broaden/deepen their experience/knowledge with applied research.
- Student engagement through class projects, capstone courses, business and entrepreneurship case studies, cooperative and term employment as well as internships (NSERC's I-USRA program is now open to college students enrolled in degree programs), and integration of research into curriculum.
- Flexible and nimble approaches to applied research, which can be inter-disciplinary in nature and often utilize a team or group approach with a relatively fast turnaround time.
- Mutual needs and benefits – which are the key to successful partnerships.
- Applied research offices are a "one-stop-shop" for industry liaison, research services, technology diffusion and knowledge transfer – and can offer practical, timely and cost-effective solutions.

[1] http://www.accc.ca/xp/index.php/en/comm/news-releases/827-nr-20140305

[2] http://www.polytechnicscanada.ca/sites/default/files/PC_B_Submission_STIConsultation.pdf

COLLEGE APPLIED RESEARCH SERIES - CAURA Article #3- Intellectual Property

May 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College

Community-based economic development is a key driver of applied research in the college system, which supports industry innovation, productivity, and competitiveness. Technology diffusion (adoption and adaption of technology) is of greater relevance than technology commercialization. Most colleges do little, if any, curiosity-driven research. Therefore, most college applied research is industry focussed.

Many industry applied research projects are supported by funding from the Tri-Council, most often the Natural Sciences and Engineering Research Council (NSERC). Intellectual Property (IP) can be an integral component of the research results - in which case NSERC policy does not make any claim to the IP, while generally expecting benefits to accrue in Canada. However, NSERC does expect/require that:

- industry partners have the ability to use the research results for commercial purposes;
- institutions and their researchers are able to use the research results for academic purposes; and
- students are able to publish their thesis and acknowledge their participation on their resumes.

With the support of NSERC, the Association of Canadian Community Colleges has developed an "**IP Toolkit**[3]" which contains college-based IP-related practices and agreement exemplars. In contrast to the university sector, Canadian colleges tend to have relatively similar IP policies[4,5], which generally exhibit the following characteristics:

- mandatory institutional ownership of IP developed with college resources;
- mandatory disclosure of inventions; and
- equitable sharing of any net returns from commercialization activity.

However, since there is a strong desire by colleges to see research results used for economic benefit in the community, rather than as a source of royalty revenue, coupled with minimal interest in patenting by the institution; there is little need to negotiate licenses or royalties, which can be a very time consuming (and often irritating) exercise for little (potential) return for all concerned.

As a result, colleges frequently grant commercial rights to research results to their industry partners, while retaining rights for academic (research and education) purposes. For example, under Red River College's Intellectual Property Policy (A10), the College has mandatory institutional ownership of IP (to enable maximum clarity if a licensing situation may arise), including any IP which is created by students employed on the project. The policy is flexible enough to accommodate transfer of ownership, in the event the private-sector partner(s) require ownership. The College's normal practise is to grant private sector partners commercial rights (royalty free), while the College retains rights for further research and education. As a result, there have never been any IP-related problems or issues between the College and industry since this practise was instituted in 2004. Industry finds the College to be very "IP friendly" and agreements on applied research projects are normally negotiated and signed rapidly.

There are several advantages to such college-based IP policy and practise commonalities, such as:

- industry partners working with multiple colleges tend to find similar practises dealing with IP;
- there is clarity with respect to IP ownership, in the event a licensing situation arises;
- IP does not create barriers to collaboration, fostering greater industry engagement;
- institutional IP protection (and thus legal) costs are non-existent or greatly minimized, since patenting by the institution is relatively rare;
- the time to negotiate project agreements is minimized, resulting in faster turnaround; and
- **IP is NOT an impediment to industry-academic research collaborations!**

[3] http://www.collegesinstitutes.ca/what-we-do/applied-research/ip-toolkit/

[4] Intellectual Property Policies in Colleges and Institutes. Ray Hoemsen, P. Eng., Red River College. Presentation to the Association of Canadian Community Colleges Applied Research Symposium, Edmonton AB. February 27, 2008.

[5] National Model of Intellectual Property (IP) Practices in College/Institute Applied Research Projects. Association of Canadian Community Colleges IP Working Group. Report for NSERC. March 2012.

COLLEGE APPLIED RESEARCH SERIES - CAURA Article #4 – Students, Faculty & Curriculum

September 2014: Ray Hoemsen, P. Eng., Director, Applied Research & Commercialization, Red River College

Applied research – which is driven by community needs - in Canada's colleges and polytechnics enhances the applied learning experience of the students (all undergraduates), broadens and deepens the experience of the instructors and serves to enhance the curriculum; while adding value in (and benefit to) the local economy.

Since most full-time instructors generally have 20 or so contact hours per week, they themselves have limited time to dedicate to applied research. Therefore, students play an integral role in applied research since they are often hired (at rates which can exceed what a postdoctoral student would receive from a granting council) to carry out applied research (under the supervision of the instructor or a dedicated research professional). And, of course, more and more students have the opportunity to undertake classroom-based applied research activities – especially in capstone courses.

Colleges routinely grant their applied research clients commercial rights to project research results, while retaining rights for further research and education purposes (this is also an expectation of the Tri-Council). Therefore, there is ample opportunity to integrate learnings into curriculum – be it an existing or new course, a workshop, or customized training. This is normally led by the Schools (or Faculties).

Colleges and Institutes Canada[6] reported that in 2012-13 more than 29,000 students were involved in applied research – a ten-fold increase in participation over the last five years. This translates to nearly 13 students for every faculty, staff, industrial expert and technician involved in applied research. And Polytechnics Canada[7] data shows that since 2007/08 nearly 46,000 students have been involved in hands-on applied research projects, supplementing the efforts of more than 5,200 staff and faculty; servicing the needs of nearly 7,000 Canadian companies (93% of which were SMEs).

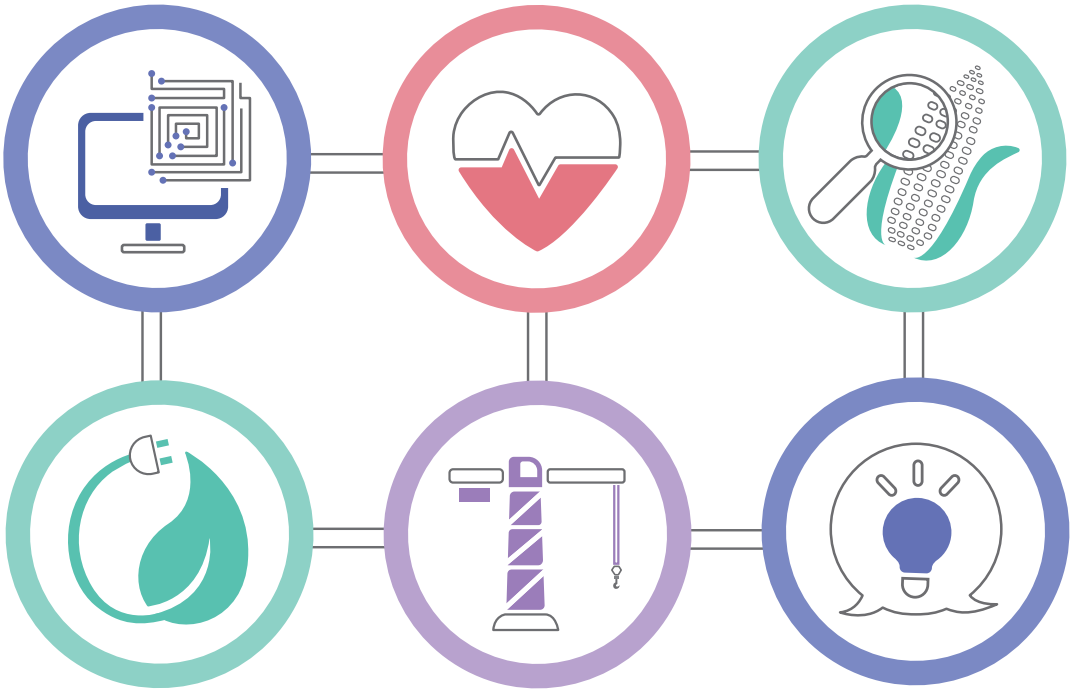
Some best practices[8] for supporting college faculty and student engagement in applied research are:
- faculty release time and/or salary top-up;
- student salary or research grant (direct to student);
- student placement salary support (direct to employer);
- provision of materials, supplies, equipment and facility access; and
- enabling technology diffusion and transfer, including travel to conferences and workshops.

In this regard, the lessons learned (over the last decade) at Red River College include:
- flexible intellectual property policy incents industry engagement;
- students and instructors are integral and essential components in responding to community needs;
- supportive government policies and programs have helped to build college applied research capacity, but there are limited supports for non-degree college student engagement (other than the Tri-Council's College and Community Innovation Program);
- employ students (at market rates) to work on industry applied research projects;
- use internal and external grants to engage students;
- do not overlook the use of capstone projects;
- students love competitions (e.g. Society of Automotive Engineers, solar car challenge, etc.);
- partner with other academic institutions; and
- hire students in the applied research office (i.e. "walk the talk").

In closing, at CAURA's Got Talent! (June 2014), the panel on student engagement in applied research in the colleges and polytechnics identified key outcomes as *"increased skill acquisition and development; the ability to apply learning to real world contexts; and increased employability (and employment)"*.

[6] Applied Research at Colleges and Institutes 2012-13. Colleges and Institutes Canada. http://www.collegesinstitutes.ca/what-we-do/appliedresearch-2/scan-2012-13/ downloaded September 11, 2014.
[7] Polytechnics Canada Applied Research Metrics 2013/14. July 1, 2014.
[8] Eligible costs under the Tri-Council's College and Community Innovation Program, administered by NSERC.

Colleges and Institutes Canada
Collèges et instituts Canada



Inclusive Innovation at Colleges and Institutes :

Highlights from the 2015-2016 CICan Applied Research Survey

Colleges and Institutes Canada
Collèges et instituts Canada

Colleges and Institutes Canada is the national and international voice of Canada's publicly supported colleges, institutes and polytechnics. We work with industry and social sectors to train 1.5 million learners of all ages and backgrounds at campuses serving over 3,000 urban, rural and remote communities in Canada. The Association operates in 29 countries via 13 offices around the world.

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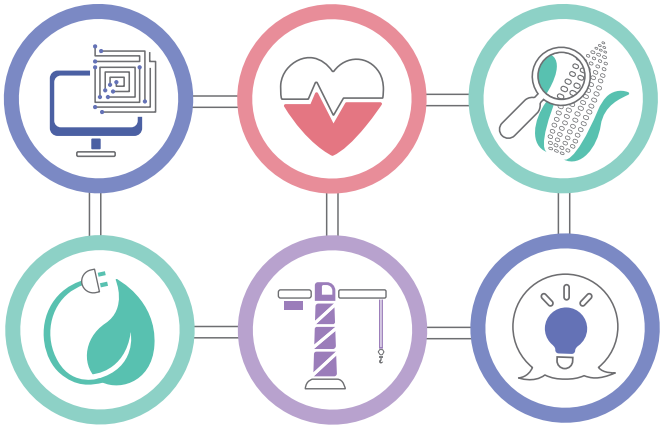
We would like to thank Erin for the creative design of this report.

Introduction



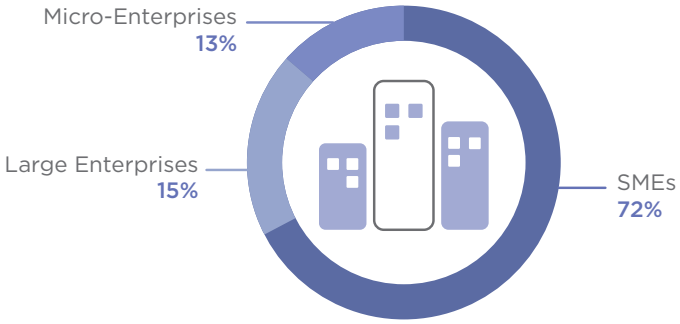
Canada's colleges and institutes, together with their public and private sector partners, foster innovation in all sectors of the economy: from building and construction technology to healthcare and agri-food. Over the past five years, they have significantly increased their institutional and human capacity and now offer environments in which entrepreneurial solutions to real-world problems are developed and implemented.

The following is a summary of the 2015-2016 Survey of Applied Research Activity based on 119 responses.

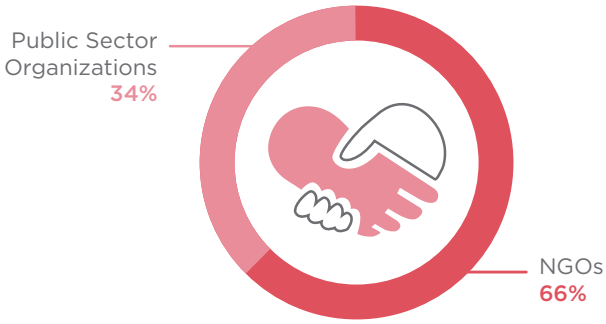
Partnerships

- Since 2010-2011 the number of partnerships with SMEs[1] has increased by **23%** and the number of partnerships with large enterprises[2] has increased by **51%**
- The largest growth since 2010-2011 has occurred in partnerships with micro-enterprises[3] (increase of **560%**) and the non-profit sector (increase of **76%**)

Over 6,300 Private Sector Partnerships

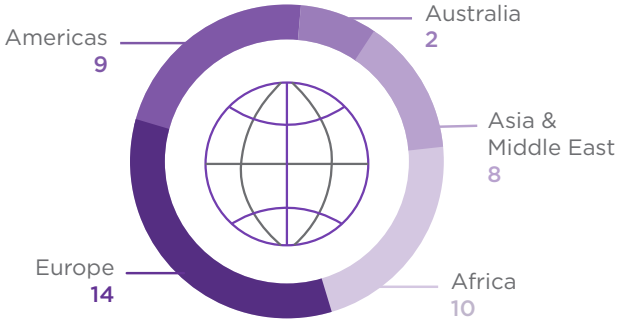


Over 500 Non-Profit Sector Partnerships



Over 125 PSE Sector Partnerships

Over 40 International Partnerships

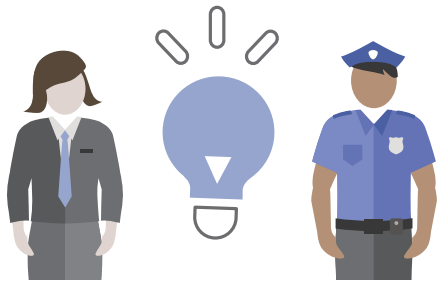


[1]Defined as 5 to 500 employees
[2]Defined as over 500 employees
[3]Defined as 1 to 4 employees

Applied Research Capacity

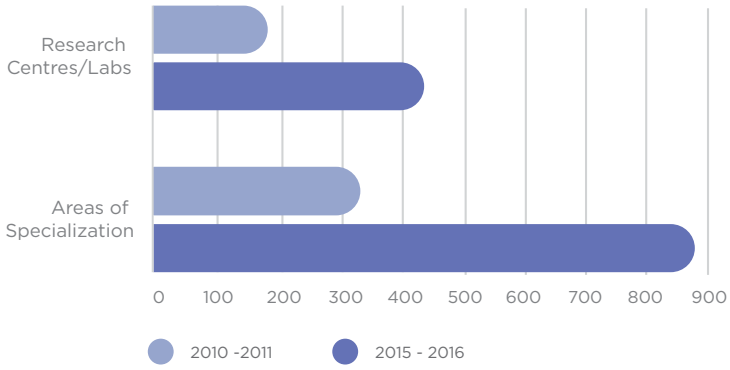
Examples of Areas of Research and Development in Social Innovation

- Communications and Media
- Design, Visual and Performing Arts
- Disadvantaged Populations (e.g. Indigenous peoples, immigrants, persons with disabilities)
- Education and Scholarship of Teaching and Learning
- Environmental Awareness and Planning
- Industrial Relations
- Justice
- Management, Business and Financial Services
- Public Safety
- Social Services



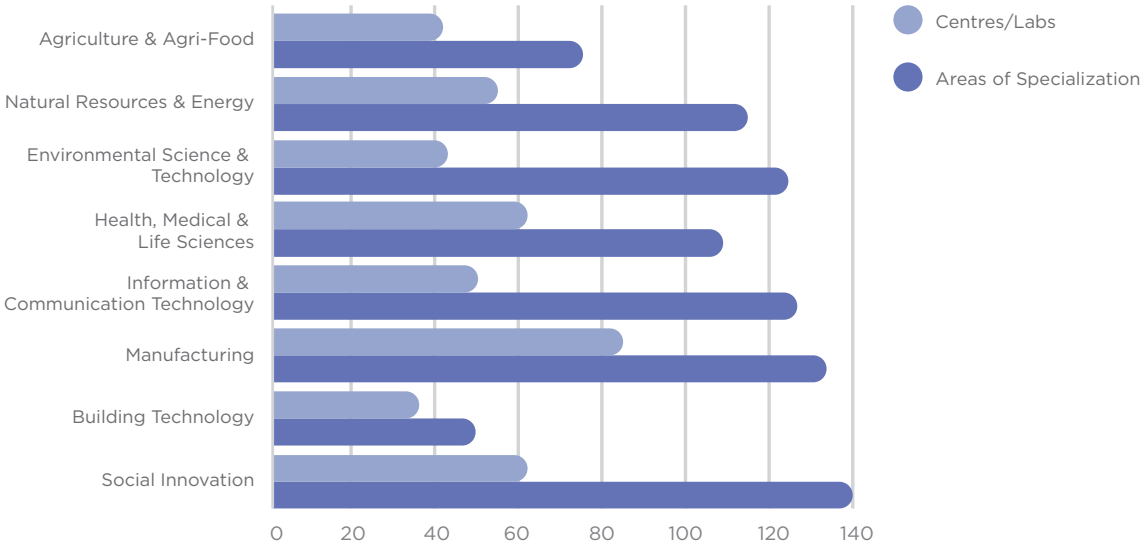
- Over **90%** of respondent institutions have a dedicated applied research office
- Over **400** specialized centres and labs
- Almost **900** projects or areas of specialization

Growth in Number of Research Centres/Labs and Areas of Specialization



The number of colleges and institutes eligible for funding from the federal granting agencies has increased since 2010-2011: from **84 to 107** for the Natural Sciences and Engineering Research Council of Canada (NSERC), from **38 to 93** for the Social Sciences and Humanities Research Council (SSHRC) and from **none to 4** for the Canadian Institutes of Health Research (CIHR).

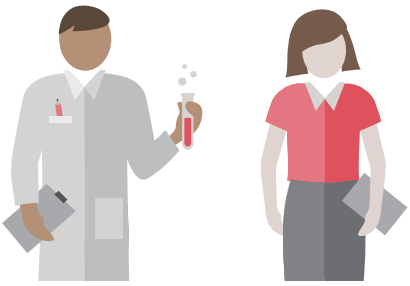
Applied Research Specializations



Professional and Student Capacity

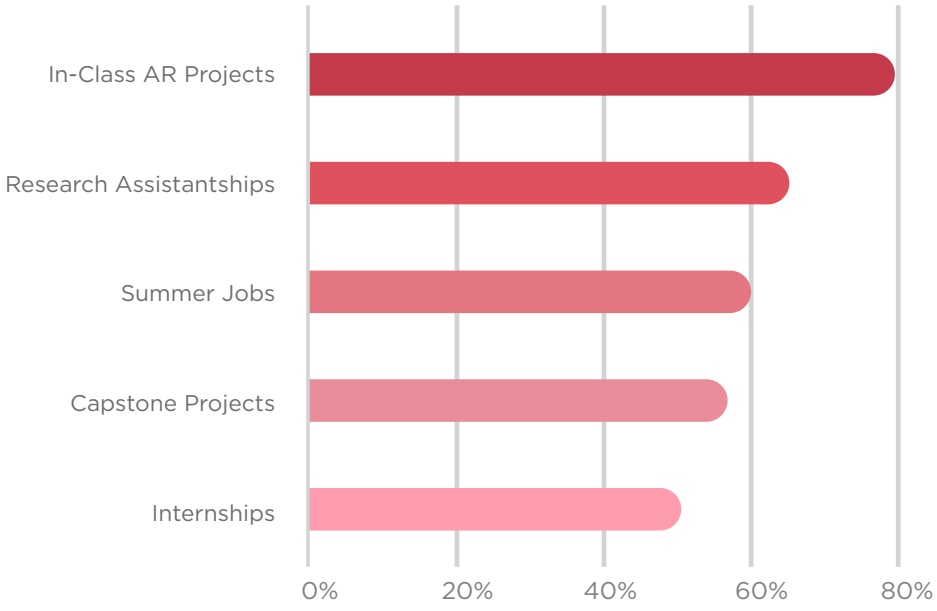
How do Colleges and Institutes Support Faculty in Applied Research?

- Assistance with proposal development and writing
- Point of contact for funders and partners
- Identification of potential partnerships
- Awareness building activities
- Networking and contact identification



- Almost **3,000** faculty and staff engaged in applied research (up from **1,600** in 2010-2011)
- Over **25,000** students engaged in applied research (an increase of more than **80%** since 2010-2011)

Student Participation in Applied Research (AR)

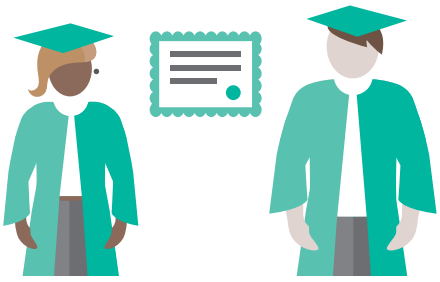


Entrepreneurial Capacity

Did you know?

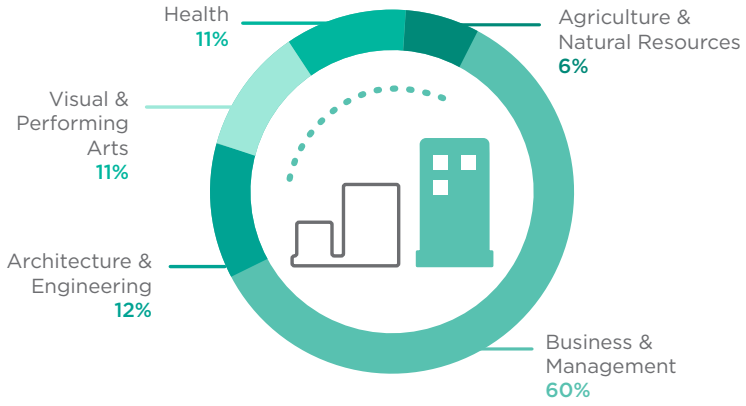
Colleges and Institutes have:

- Applied research chairs in new venture and entrepreneurship
- New venture support specialists
- Diploma programs in entrepreneurship
- Hackathons/idea jams

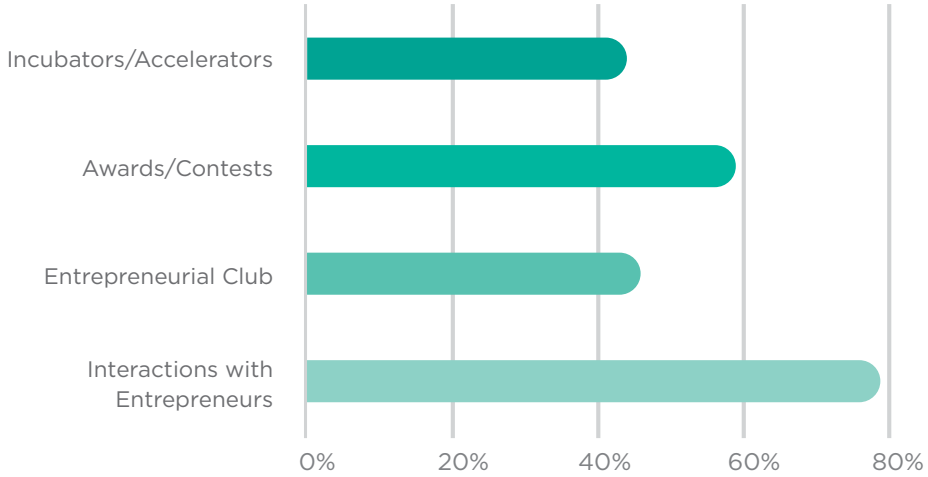


- **13,500** student entrepreneurs received support from their institutions

Programs that Integrate Entrepreneurship



Student Entrepreneurship Support



% of Institutions Who Offer Opportunities

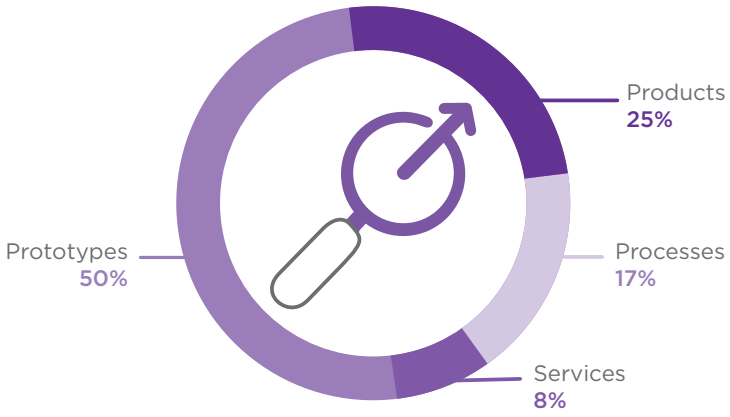
Research Results

Examples of new technologies emerging from partnerships with industry:

- Hydroacoustics and their application to fisheries
- Aquaponics and precision agriculture
- Wearable, interactive, mobile technologies in the health sector
- Energy harvesting devices
- Gamification
- New technology for water quality monitoring
- E-learning innovations

- **900** new products, processes, services and prototypes developed
- In less than a year **65%** of products, **75%** of processes, **65%** of services and **75%** prototypes developed

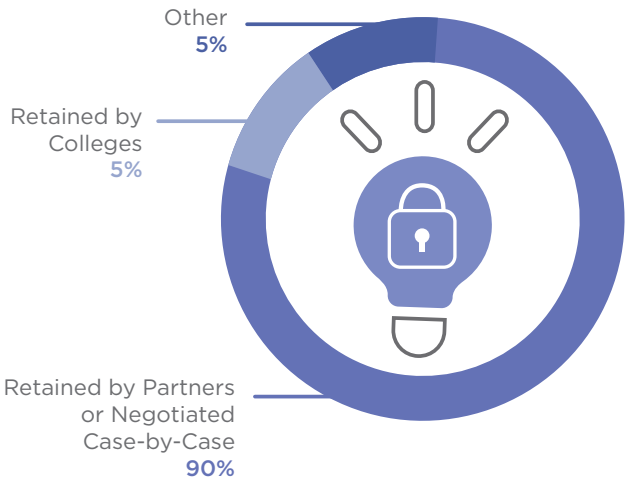
Distribution of Total



Intellectual Property

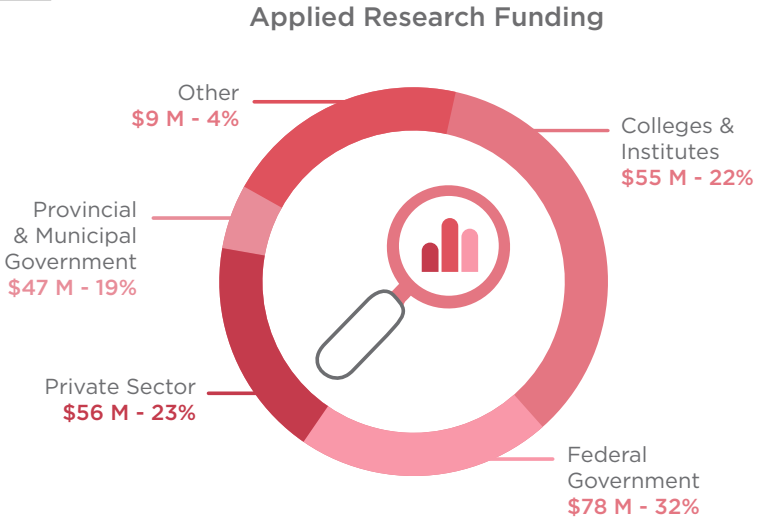
- Industry partners typically reserve **exclusive commercialization rights**, and in the case where the college retains IP, it is most often made available to the partners at no cost

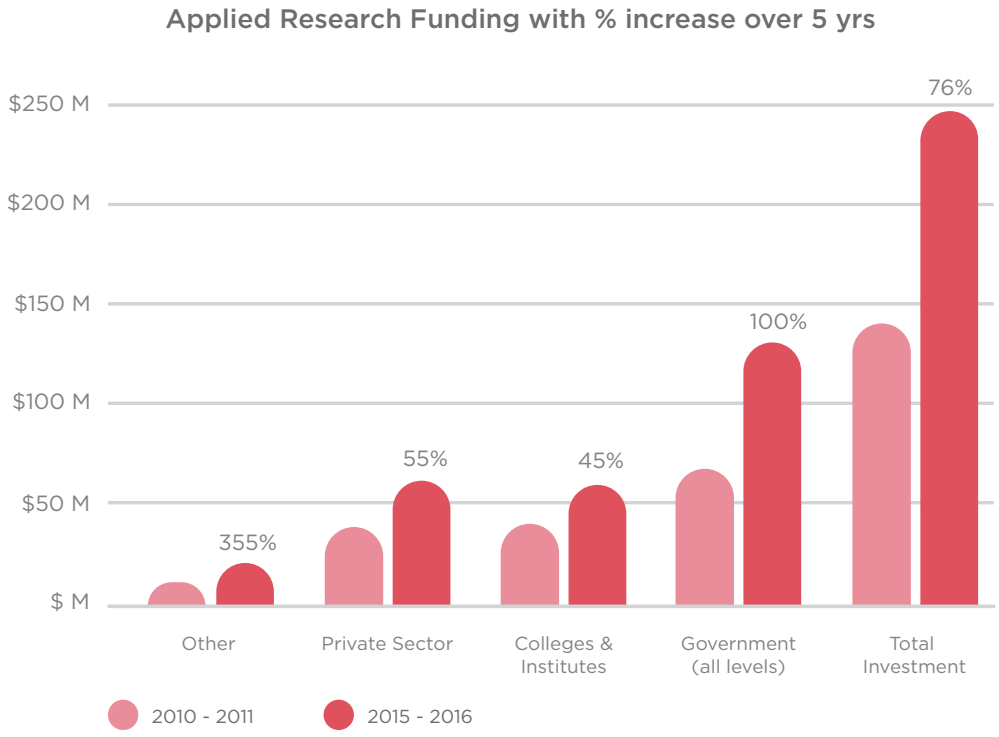
Intellectual Property Rights



Applied Research Funding

- Colleges and institutes together with government[4] , the private sector and other sources[5] invested a total of **$246** million in applied research[6] in 2015-16, an increase of **76%** over 2010-11
- For every **$1** of federal investment, an additional **$0.87** is invested by private sector and not for profit





[4] All three levels of government: federal, provincial, municipal
[5] Includes: NGOs, community service organizations, foundations, international partnerships
[6] Totals may not add up due to rounding

List of Participating Institutions

Northwest Territories
Aurora College

Nunavut
Nunavut Arctic College

Yukon
Yukon College

British Columbia
British Columbia Institute of Technology
Camosun College
Capilano University
College of New Caledonia
College of the Rockies
Douglas College
Justice Institute of British Columbia
Kwantlen Polytechnic University
Langara College
North Island College
Northwest Community College
Okanagan College
Selkirk College
University of the Fraser Valley

Alberta
Bow Valley College
Grande Prairie Regional College
Lakeland College
Lethbridge College
Medicine Hat College
NAIT
NorQuest College
Olds College
Portage College
Red Deer College
SAIT

Quebec
Cégep de Jonquiere
Cégep de la Gaspésie et des Îles
Cégep de La Pocatière
Cégep de Sherbrooke
Cégep de Thetford
Cégep Garneau
Cégep régional de Lanaudière
Cégep Saint-Jean-sur-Richelieu
Collège Montmorency

Data Provided by Réseau Trans-tech for the 49 College Centres for the Transfer of Technology at the following cégeps:

Cégep de l'Abitibi-Témiscamingue
Cégep André-Laurendeau
Cégep de Baie-Comeau
Cégep Beauce-Appalaches
Cégep de Chicoutimi
Cégep de la Gaspésie et des Îles
Cégep John Abbott College
Cégep de Jonquière
Cégep de La Pocatière
Cégep de Lévis-Lauzon
Cégep Marie-Victorin
Cégep de Matane
Cégep régional de Lanaudière
Cégep de Rimouski
Cégep de Saint-Hyacinthe
Cégep de Saint-Jérôme
Cégep de Saint Laurent
Cégep de Sainte-Foy
Cégep de Sept-Îles
Cégep de Sherbrooke
Cégep de Sorel-Tracy
Cégep de Thetford
Cégep de Trois-Rivières
Cégep du Vieux Montréal
Cégep de Victoriaville
Collège Ahuntsic
Collège d'Alma
Cégep Édouard-Montpetit
Collège Lionel-Groulx
Collège de Maisonneuve
Collège Mérici
Collège de Rosemont
Collège Shawinigan
Dawson College

Saskatechewan
Parkland College
Saskatchewan Polytechnic

Manitoba
Assiniboine Community College
Red River College
University College of the North

Ontario
Algonquin College
Cambrian College
Canadore College
Centennial College
Collège Boréal
Conestoga College
Durham College
Fanshawe College
Fleming College
George Brown College
Georgian College
Humber College Institute of Technology and Advanced Learning
La Cité
Lambton College
Loyalist College
Mohawk College
Niagara College
Northern College
Sault College
Seneca College
Sheridan College Institute of Technology and Advanced Learning
St. Clair College
St. Lawrence College

New Brunswick
Collège communautaire du Nouveau-Brunswick
New Brunswick Community College

Nova Scotia
Nova Scotia Community College

Newfoundland and Labrador
College of the North Atlantic

Prince Edward Island
Holland College

Institutional Plan Pillar

Pillar

Institutional research data management strategies, that highlight how a researcher's institution will support the effective stewardship of the outputs of the research lifecycle.

What It Means

1. Institutions indicate how they are able to respond to the data management needs of researchers receiving Tri-Council funds.
2. This response is communicated to the institution's researchers, directly to those who have received grants, and indirectly to the full campus community.
3. Institutions are able to provide researchers with access to appropriate resources (internally or via regional and national networks) in support of research data management activities.

Response

1. Offices of the heads of research, computing, and the library work together with researchers to articulate the institutional approach.
2. This approach is communicated broadly via the institutional website, and other means.
3. Researchers are encouraged to work with their "community of practice" to define best practices and respond accordingly.

Resources & Examples

1. Example of an institutional open access/data policy: *Open Access & Dissemination of Research Output*. University of PEI Senate, February 10, 2012.[6]
2. Example of a conditions statement for stewardship of data: *Terms of Deposit Agreement for data.upei.ca.* University of PEI, Downloaded March 12, 2018.[7]
3. Guidance for creating an Institutional RDM Strategy: *Template - Institutional Research Data Management Strategy, Draft 4.* CARL Portage, February 26, 2018.[8]
4. Guidance for creating an Institutional RDM Strategy: *Institutional Research Data Management Strategy Guidance Document*. CARL Portage, February 26, 2018. [9]

[6] http://library.upei.ca/sites/library.upei.ca/files/UPEI%20Open%20Access%20Policy.pdf
[7] https://data.upei.ca/terms-deposit Downloaded Mar 12, Downloaded Mar 12, 2018.
[8] https://portagenetwork.ca/wp-content/uploads/2018/03/Portage-Institutional-Strategy-Template-v4-EN.pdf
[9] https://portagenetwork.ca/wp-content/uploads/2018/03/Portage-Institutional-Strategy-Guidance-v4-EN.pdf

University of Prince Edward Island	Policy No:	Revision No: 0
Policy Title: Open Access & Dissemination of Research Output		Page: 1 of 4
Creation Date: 10 February 2012	Version Date: 10 February 2012	Review Date: 2014
Authority: Senate	Responsibility: Research Advisory Committee	WWW Access:

1. Purpose

1.1 To facilitate preservation of and access to UPEI's scholarly output and research.

1.2 The Internet has vastly expanded the potential for dissemination of research output. Open access - free online availability - to the works that scholars have traditionally given away, in particular research articles, ensures the creation of a vibrant and accessible scholarly landscape. One copy of an article posted on the World Wide Web is freely available to anyone, anywhere. Open Access to the scholarly output of UPEI enhances the visibility and impact of UPEI research, for the individual researcher, departments and researchers, the university itself, and on a broader scale, scholarship per se. Research funding agencies and universities around the world either have, or are developing, open access policies. UPEI is aiming for a repository and accompanying policy that will be considered an exemplar for universities around the world.

1.3 The University community is committed to disseminating the fruits of its research and scholarship as widely as possible. In keeping with that commitment, the University adopts the following policy:

1.4 Scholars are encouraged to make their scholarly articles available and when possible, to retain copyright for their own intellectual work. The policy will apply to all scholarly articles written while the person is a member of the UPEI community except for any articles completed before the adoption of this policy and any articles for which the scholar entered into an incompatible licensing or assignment agreement before the adoption of this policy.

1.5 UPEI will provide assistance in making digital copies available and depositing them in a suitable repository. When possible, that will include deposit in the IslandScholar Repository.

1.6 The policy is to take effect immediately.

2. Scope

2.1 All UPEI scholars, including, but not limited to, staff, faculty, graduate and undergraduate students.

3. Responsibility

3.1 This policy is authorized by Senate.

3.2 The overall authority for this policy shall be the Senate.

3.3 The development and maintenance of the policy is the responsibility of the Research Advisory Committee of Senate.

3.4 The administration of this policy is the responsibility of the VP Research.

4. Policy

4.1 Scholarly research be deposited in an institutional repository (i.e., IslandScholar).

4.1.1 UPEI scholars are encouraged to routinely provide a copy of their article published in a scholarly journal or conference proceedings to place in the non-commercial open-access IslandScholar Repository, and to deposit in other open access repositories where such deposit is required by a funding agency, or desired by the author.

4.1.2 The scholarly work would be deposited, as the author's final post-peer review manuscript or (where permitted by the publisher) the publisher's PDF, immediately on acceptance for publication or presentation at a conference.

4.1.3 Wherever possible, open access would be provided immediately. A delay or embargo period before open access is provided, typically no longer than 6 months from the official date of publication, may be set in accordance with publisher policies.

4.1.4 To provide open access to the research repository via accepted international standards, such as Open Archives Initiative (OAI) and OAI Object Reuse and Exchange (OAI-ORE).

4.1.5 Scholars are encouraged to consider publishing in journals that freely and routinely provide the rights needed to fulfill this policy. In the event that a faculty member is requested to assign all or a part of his or her copyright in such scholarly work as part of a publication agreement, the faculty member is encouraged to request in the publication agreement the right, at minimum, to deposit in the IslandScholar system. The SPARC Canadian Author’s Addendum to Publication Agreement may be used for this purpose.

4.1.6 Scholars are encouraged to consider open access and affordable / sustainable scholarly communication venues in deciding on where to publish scholarly work and participate as peer reviewers or editors.

4.1.7 Scholars are encouraged to deposit other types of works in IslandScholar Repository, such as preprints, research data,

conference presentations and posters, and any other material deemed appropriate as representative of the individual's scholarly output. Where works cannot be easily transformed into a digital format for deposit, a descriptive metadata record be added to IslandScholar as a record of the work. The Library will provide scholars with the assistance needed to deposit their works in the repository.

4.1.8 Graduate students are encouraged to place in the IslandScholar Repository their signature/capstone projects, Master's or PhD thesis, immediately on acceptance.

4.1.9 Undergraduate students are encouraged to place in the IslandScholar Repository their honours thesis, immediately on acceptance, with the approval of their supervisor.

4.2 Scholars' research data be deposited in a Virtual Research Environment (VRE):

4.2.1 UPEI researchers and research groups are encouraged to deposit research data in a VRE (or similar repository) where appropriate and where the VRE has been provided to meet the research needs.

4.2.2 Research data be made accessible in a fashion and timeline deemed appropriate by the researcher/research group. Where possible, research data would be made publicly accessible on publication of results of the research. Where privacy rights of human subjects conflicts with full public access, the researcher/research group will aim for the most public access possible and consistent with privacy, for example by providing anonymized data, or providing full access to data to other research groups that can demonstrate having met acceptable research ethics guidelines for handling such private information.

4.2.3 On publication of the results, research data be linked to the final scholarly output in such a way as to satisfy funding agencies' requirements, as applicable.

4.3 Miscellaneous items/issues:

4.3.1 Where deposit in other repositories is either required or preferred, the scholar agrees that the Library staff may deposit in the other repository and/or copy items from the other repository to IslandScholar Repository where permitted. When there are multiple authors from a number of different institutions with similar policies, scholars will place the item in the IslandScholar Repository if listed as first author, or if no other author has deposited the item in an open access repository. If the item has been placed in another repository by another author, UPEI faculty may satisfy this policy by placing the metadata and URL to the open access version in IslandScholar.

5. Reporting and Review

5.1 The University Librarian will submit an annual report to the Research Advisory Committee on Open Access participation through UPEI's repository, Island Scholar. Initial review of this Policy will be initiated by the Vice President, Research, after 3 years.

Terms of Deposit

You retain ownership of any content deposited into the University of Prince Edward Island's Research Data Repository (https://data.upei.ca). When selecting a license for your content (e.g. when you Archive or Publish) you agree to allow the Robertson Library to steward the content for as long as is necessary, and under the following terms:

- you the Depositor warrant that you are the copyright holder of the work and/or have retained the unrestricted permission from other copyright holders to deposit the content to data.upei.ca;
- Robertson Library shall always act so as to ensure the privacy and confidentiality of any data which it holds;
- Robertson Library shall encourage users of the data file to make appropriate acknowledgement to the principal investigator(s) through bibliographic citations and similar acknowledgements in any publication or other presentation based upon the data file;
- that these Terms and Conditions apply only to the data portion of the deposited content, but all documentation files and metadata are unrestricted and may be made available to any person, institution, or organization without restriction, unless otherwise specified by the Depositor;
- Robertson Library may, consistent with good archiving practice and standards (see the Tri-Agency Draft Guidelines [1]), alter the physical format of the data file, through cleaning, reformatting or other data processing techniques, and that the terms and conditions outlined herein shall also apply to such versions or editions of the data file as may be produced by these means;
- you the Depositor release the Robertson Library and its staff of all liability from claims arising out of the use of this site;
- Robertson Library will take reasonable care to preserve the integrity of the deposited data and will not be liable for loss of or damage to parts of or the entire deposit.

Links

[1] http://www.science.gc.ca/default.asp?lang=En&n=83F7624E-1

Template - Institutional Research Data Management Strategy

Draft 4

Prepared by the Portage Institutional RDM Strategy Working Group

There is growing recognition in the research community and beyond of the importance of managing and providing access to research data, both for the purpose of verification and transparency of research as well as for reuse and integration of data for new discoveries and innovation. Over the past decade, the Canadian Association of Research Libraries (CARL) has been expanding its efforts to raise awareness of the benefits of research data management (RDM) and build capacity for research institutions to support RDM activities. In an effort to increase capacity across Canada for RDM, in 2015 CARL launched the Portage initiative, a national, library-based RDM network that is working in the higher education community to coordinate expertise, services, and technology in RDM.

In recognition of the benefits of RDM, organizations around the world are adopting policies and practices to improve the way research data is being managed. In Canada, the Tri-Agency published a Statement of Principles on Digital Data Management in spring 2016, which outlines expectations and responsibilities for RDM in the academic community. As a follow-up, the agencies are developing a draft RDM policy, for consultation with the community, which will likely propose a requirement that research institutions develop an institutional strategy for RDM.

Institutions play an important and expanding role in supporting RDM. Researchers need local support for the adoption of good data management practices. Additionally, collectively they can provide stable and sustainable solutions for preserving and providing access to research data. The following template has been produced by a multi-stakeholder working group convened by CARL and Portage to assist Canadian institutions in developing a strategy that will improve RDM at both the institution and within the research community more broadly and will lead to greater consistency across institutions. While it is recommended that institutions try to address each of the four major components included in the template, we recognize that each institution may do so with varying levels of depth and detail depending on the size and capacity of the institution.

Last updated: 26 February 2018

Template - Institutional Strategy for Research Data Management

Definitions

The CASRAI dictionary provides the basis for a common understanding of the terms and definitions in this template.

CASRAI defines research data as “data that are used as primary sources to support technical or scientific enquiry, research, scholarship, or artistic activity, and that are used as evidence in the research process or are commonly accepted in the research community as necessary to validate research findings and results. All other digital and non-digital content have the potential of becoming research data. Research data may be experimental data, observational data, operational data, third party data, public sector data, monitoring data, processed data or repurposed data.”[1]

Please refer to the CASRAI dictionary for definitions of the other terms used in this document.

Objectives

A RDM strategy will improve the institutional capacity to support researchers in the management of research data and adhere to the emerging Tri-Agency policy requirements. The specific objectives of a strategy are as follows:

- To promote research excellence within the university and research community through the adoption of good data management practices
- To support institutions in evaluating their current capacity in the area of RDM
- To identify what changes are needed in order to comply with funder policies and other RDM requirements
- To define a roadmap to develop institutional capacity for research data stewardship
- To ensure research data storage, retention and availability for access and reuse, where appropriate.

[1] CASRAI http://dictionary.casrai.org/Research_data

Strategy Components

There are four main components of an institutional strategy:

1. **Raise awareness:** Researchers' perspectives towards data sharing are varied, as are levels of expertise in terms of good data management practices. There is a need to raise awareness within the research community about the benefits of and best practices for good data management, as well as impending policy requirements.

2. **Assess institutional readiness:** To effectively manage data holdings and fully realize their potential, an organization must first be aware of the location, condition, estimated growth, and value of those data sets. Institutions can undertake a review the data landscape on campus, using one of a number of existing tools.

3. **Formalize RDM practices:** Formalizing the expected practices around RDM through the adoption of guidelines, procedures or policies is an important step in establishing an effective and sustainable approach to RDM at the institution. This will set the tone and underscore the institutional commitment and expectations. Depending on the institution, this could be implemented through a set of coherent guidelines or procedures, or through the implementation of a cohesive policy. Community engagement and consultation is a key aspect for getting buy-in for any new requirements.

4. **Define a roadmap:** A pragmatic roadmap will help institutions build capacity for RDM over the medium term. Best practices in RDM contribute to research excellence, greater efficiency and greater transparency of research. This will ensure that institutions are able to adhere to RDM requirements and continue to improve institutional capacity for RDM activities.

Template

For each of the four components below, the institution can develop a more detailed and concrete plans, which may include timelines, and the people or departments that will be responsible for carrying out the activities.

The activities in the template can be undertaken concurrently, with the exception of the roadmap, which will be based on information gathered in the assessment of institutional readiness activity.

For more information on each of these sections, please consult the accompanying guidance document.

Institutional Research Data Management Strategy Template
1. Raise awareness
1.1 Identify stakeholder communities on campus
1.2 Recruit local champions to help promote the value of RDM and engage with various communities
1.3 Develop awareness materials and resources for different communities
1.4 Determine and apply the appropriate delivery mechanisms for outreach
1.5 Participate in the Tri-Agency consultations around RDM policy

2. Assess institutional readiness
2.1 Define the ideal state for RDM on campus
2.2 Undertake a survey of institutional data assets and data management practices on campus
2.3 Evaluate existing RDM services: ● Data management plans ● Institutional support and training ● Data repositories and archiving ● Institutional policies and procedures
2.4 Identify gaps in the existing RDM environment
3. Formalize RDM practices
3.1 Adopt policies, guidelines or procedures that advance good practices and assign responsibilities. These may address a variety of aspects of RDM such as: ● Data quality and standards ● Data access and sharing ● Data retention ● Long-term data preservation ● Data management plans ● Privacy ethical issues and intellectual property ● Other aspects: principles, scope, and monitoring and rewarding compliance

4. Define a roadmap

4.1 Based on the information gathered in the previous components of the strategy, a roadmap should include the following information such as:

- What are our current practices and what support do we have in place?
- What are the gaps?
- What must we do to meet any identified gaps?
- When will we do it?
- Who will take responsibility?
- What resources are needed for each item and how will we secure those resources?
- How will the roadmap be assessed over time and success be measured?

Institutional Research Data Management Strategy

Guidance Document

1. Raise awareness

Institutions should develop a plan for engaging with stakeholders on campus and communicating the benefits and requirements for research data management (RDM). Depending on the nature and size of the institution, this plan could will involve a range of materials and outreach activities that address the relevant issues across a variety of stakeholder communities (e.g. discipline specific, career level, department or division, etc.) including:

1.1 Identify stakeholder communities on campus
1.2 Recruit local champions to help promote the value of RDM and engage with various communities
1.3 Develop awareness materials and resources for different communities
1.4 Determine and apply the appropriate delivery mechanisms for outreach
1.5 Participate in the Tri-Agency consultations around RDM

Resources:

- How and why you should manage your research data: a guide for researchers. JISC (2016): https://www.jisc.ac.uk/guides/how-and-why-you-should-manage-your-research-data
- Starting the Conversation: University-wide Research Data Management Policy. OCLC (2013): https://er.educause.edu/articles/2013/12/starting-the-conversation-universitywide-research-data-management-policy
- Portage Training Resources: https://portagenetwork.ca/training-resources/

2. Assess institutional readiness

Institutions should undertake a review of the current data landscape on campus and assess existing capacity and resources for managing the research data produced on campus.

2.1 Define the ideal state for RDM on campus

This can involve looking at best practices across various divisions and research communities, identifying appropriate service models and determining the costs and funding mechanisms for comprehensive RDM on campus.

Resources:

- Directions for Research Data Management in UK Universities. JISC (2015): http://repository.jisc.ac.uk/5951/4/JR0034_RDM_report_200315_v5.pdf
- Research Vision. JISC (2015): https://www.jisc.ac.uk/sites/default/files/research-vision.pdf
- Using RISE, the Research Infrastructure Self-Evaluation Framework. DCC (2017): http://www.dcc.ac.uk/resources/how-guides/RISE

2.2 Undertake a survey of institutional data assets and data management practices on campus

In order to build up an accurate picture of this context it is necessary to engage in a period of information gathering and analysis. Institutions should be aware of the scale and nature of the data being produced and current practices for managing data among their researchers. By engaging with researchers in this way, institutions can understand the key RDM issues they face and identify any gaps in infrastructure and desired support.

Resources:

- Research Data Asset Inventory. Jisc and UK Data Archive (2012): http://www.data-archive.ac.uk/media/375380/rde_datainventoryform_01-00.pdf
- Data Asset Framework. JISC, DCC and University of Glasgow: http://data-audit.eu/index.html
- Developing a Data Management Framework using the Capability Maturity Model. ANDS (2017): https://www.ands.org.au/__data/assets/pdf_file/0005/737276/Creating-a-data-management-framework.pdf

2.3 Evaluate existing RDM services

Institutions should be aware of their own capacity to manage data, as well as the current and possible future data storage needs. Assessing the existing service provision will help institutions have a better understanding of their capacity to support good data management practices. The aim is to determine what are the current data management services on campus (or through external providers such as Portage and domain-based services) and what are the gaps. Some information gathering for this activity could be done in conjunction with the survey of institutional data assets. We suggest that institutions focus on assessing the following four areas that are fundamental for good RDM:

Data management plans (DMPs): DMPs are formal documents that state what data will be created and how, and outline the plans for sharing and preservation, noting what is appropriate given the nature of the data and any restrictions that may need to be applied. DMPs are a way of improving data management practices and are increasingly expected by funders. DMPs are considered best practice for managing research data and institutions are encouraged to assess the current level of awareness and use of DMPs by researchers on campus.

Institutional support and training: Local support and training for researchers on campus is important, as RDM needs and requirements are very diverse based on the nature of the research project. RDM services on campus often spread across departments and are a shared responsibility. In general they involve consulting with researchers on topics such as:

- Advocacy and outreach
- Data management plans
- Data and metadata standards
- Reference support for finding and citing data
- Finding aids for data, datasets, or data repositories
- Preparing data or datasets for deposit into a repository
- Privacy, ethical and IP issues

Data repositories and archiving: Research data need to be managed over the long term, so that they can be accessed and reused (when appropriate) in the context of a formal data repository. There are a variety of repositories available for researchers, including domain repositories, and shared national (e.g. FRDR) and regional repositories. It is important to understand whether the research community is served through existing resources or there is a need for local repository services on campus.

Institutional policies, guidelines and/or procedures: Most research institutions have some type of procedures, guidelines, or policies that touch on RDM issues, such as those dealing with ethics, data retention, and intellectual property. In addition, there may be external policies or requirements related to data management that impact researchers, such as funder or project-related policies. Documenting all the internal and external policies, guidelines, or procedures that are related RDM practices will help the institution gain an understanding of existing requirements for affiliated researchers.

Resources:

- Collaborative Assessment of Research Data Infrastructure and Objectives. DCC: http://www.dcc.ac.uk/resources/tools/cardio
  A tool for institutions to assess their data management support and infrastructure and to collaboratively plan for improvement.

- The Portage DMP Assistant. Portage: https://assistant.portagenetwork.ca/
  A bilingual tool for preparing data management plans (DMPs). The tool follows best practices in data stewardship and walks researchers step-by-step through key questions about RDM, and will include specific templates related to funders' requirements, as they are adopted.

- Canadian RDM Survey Consortium. Portage: https://portagenetwork.ca/working-with-portage/network-of-expertise/rdm-survey-consortium/
  Consult reports and data associated with surveys of researchers on their needs and practices related to RDM

- Research Data Repositories. Portage: https://portagenetwork.ca/planning-managing-data/research-data-repositories/
  A brief guide to discipline-based, institutional and national repository platforms existing or in development for storing research data produced within Canadian research institutions.

2.4 Identify gaps in the existing RDM environment

This involves assessing the current environment against the ideal state as defined in 3.1. This will help the institution identify areas where RDM needs are already being well served, and areas where more resources and support are required.

3. Formalize RDM practices

Formalizing the expected practices around research data management through the adoption of guidelines, procedures or policies is an important step in establishing an effective and sustainable approach to RDM at the institution. This will set the tone and underscore the institutional commitment and expectations. Depending on the institution, this could be implemented through a set of coherent guidelines or procedures, or through the implementation of a cohesive policy. Community engagement and consultation is a key aspect for getting buy-in for any new requirements.

3.1 Adopt policies, guidelines or procedures that advance good practices and assign responsibilities

These may address a variety of aspects of RDM such as:

- Data quality and standards
- Data access and sharing
- Data retention
- Long-term data preservation
- Data management plans
- Privacy, ethical issues and intellectual property
- Other aspects: principles, scope, and monitoring and rewarding compliance

Resources:

- UK Institutional Data Policies. DCC: http://www.dcc.ac.uk/resources/policy-and-legal/institutional-data-policies
- Model Language for Research Data Management Policies. ASERL/SURA Research Data Coordinating Committee (2013): https://www.fosteropenscience.eu/node/243
- Five Steps to Developing a Research Data Policy. Digital Curation Centre (2014): www.dcc.ac.uk/resources/policy-and-legal/five-steps-developing-research-data-policy/five-steps-developing-research
- Starting the Conversation: University-wide Research Data Management Policy. OCLC (2013): http://www.oclc.org/content/dam/research/publications/library/2013/2013-08.pdf
- Guidance for Developing a RDM Policy. In LEARN Toolkit of Best Practice for Research Data Management (pp. 137-140). LEARN (2017): http://dx.doi.org/10.14324/000.learn.27

4. Define a roadmap

Based on the information gathered in the previous components of the strategy, a roadmap should include information such as:

4.1 What are our current practices and what support we have in place?
4.2 What are the gaps?
4.3 What must we do to meet any identified gaps?
4.4 When will we do it?
4.5 Who will take responsibility?
4.6 What resources are needed for each item, how will we secure those resources?
4.7 How will the roadmap be assessed over time and success be measured?

Resources

- How to Develop RDM Services - a guide for HEIs. DCC (2015): http://www.dcc.ac.uk/resources/how-guides/how-develop-rdm-services
- University of Edinburgh RDM Roadmap: Version 3, 2017-2020. University of Edinburgh (2017): https://www.ed.ac.uk/information-services/about/strategy-planning/rdm-roadmap

Data Management Plan Pillar

Pillar

Submission of research data management plans, that highlight how a researcher will respond to the need for effective data management in the context of a specific funded project.

What It Means

1. Institutions will provide researchers with access to resources to facilitate the creation of a data management plan.
2. Researchers will have an opportunity to have a conversation with the appropriate units at the institution, typically a combination of the offices of the heads of research, computing, and the library.
3. Researchers create a data management plan (if appropriate) using available tools, and according to best practices for their discipline.

Response

1. Offices of the heads of research, computing, and the library create a context (ie. an institutional committee or working group) to engage with researchers (and industry partners if appropriate) around the context of a DMP.
2. Researchers create and maintain a DMP using one of the available tools.
3. When appropriate, researchers will create a data management plan for each new research project, and do one or more of the following:
    a. maintain/update the DMP as an internal guideline, and as their project progresses;
    b. deposit a version of the DMP with the research office;
    c. include a version of the DMP with a Tri-Council grant application when requested;
    d. publish a copy of the DMP in an open repository.

Resources & Examples

1. Example of a DMP from Michelle Levy, SFU Professor and Graduate Chair, Department of English, and Co-Director Digital Humanities Innovation Lab.[10]
2. Information on the *University of Queensland Research Data Manager*.[11]

[10] Michelle Levy, personal communication, March 4, 2018.
[11] Sandrine Kingston-Ducrot and Andrew Janke, personal communication, March 29, 2018.

DMP title

Project Name My plan (Portage Template)
Grant Title 31-R639951
Principal Investigator / **Researcher** Michelle Levy
Project Data Contact Michelle Levy
Institution Portage

Data Collection

What types of data will you collect, create, link to, acquire and/or record?

Bibliographical metatdata about titles, persons and firms.

What file formats will your data be collected in? Will these formats allow for data re-use, sharing and long-term access to the data?

All data is saved in a MYSQL database. The data can be outputed as csv files.

What conventions and procedures will you use to structure, name and version-control your files to help you and others better understand how your data are organized?

The project team has developed a set of tables within our MySQL database. Each record as a unique identifier and tables are linked through these keys.

Documentation and Metadata

What documentation will be needed for the data to be read and interpreted correctly in the future?

We will need a data map structure with details about data for each field. This documention has been/is being prepared.

How will you make sure that documentation is created or captured consistently throughout your project?

We have regular team meetings to ensure that consistent standards are applied. We also have a 'final check' mechanism to ensure our data standards are met.

If you are using a metadata standard and/or tools to document and describe your data, please list here.

The link to our metadata standards are:

https://docs.google.com/document/d/1b4xCQROtBUnj95X5_cjtk6tRwxG4aONkSlQIlmn9eko/edit?usp=sharing

Storage and Backup

What are the anticipated storage requirements for your project, in terms of storage space (in megabytes, gigabytes, terabytes, etc.) and the length of time you will be storing it?

Currently, our project programmer is maintaining the server space we have with SFU Dean of Arts. The plan is to migrate the server to SFU Library, though we are waiting for them to add server capacity.

The current codebase of the WPHP project is approximately 1.285GB of disk space, this includes copies source data files contributed by ESTC, Osborne...

The database requires just under 1GB of disk space.

The system resources of the current server:

CPU: 2x Intel(R) Xeon(R) CPU E5-4650 0 @ 2.70GHz
RAM: 4GB
Disk: > 250GB

How and where will your data be stored and backed up during your research project?

See above.

How will the research team and other collaborators access, modify, and contribute data throughout the project?

Our programmer has built a data-entry web interface on a LAMP platform.

As the server access is controlled by a SFU-administered access list, people may be added or removed on request. There is no need to share server administration passwords as full access is available to anyone on the list. The major barrier is Linux administration knowledge. Website access passwords (wphp/WPHP...) may be regenerated on the commandline if lost or forgotten. Passwords may also be stored in previous emails to you and others in the course of discussing the website.

For general storage of administrative information, a private Google Doc with multiple adminstrators would ensure complete redundancy, as would a shared version-controlled file updated and distributed to a list of people on a regular basis.

Preservation

Where will you deposit your data for long-term preservation and access at the end of your research project?

At the end of the project we will deposit our data in SFU radar as csv files with a data map to show our table structure. We are also planning to make all of our data public via a web interface currently being developed by SFU's DHIL.

Indicate how you will ensure your data is preservation ready. Consider preservation-friendly file formats, ensuring file integrity, anonymization and de-identification, inclusion of supporting documentation.

We will use best standards, ie. csv files plus data map as it appears radar does not take mysql databases.

Sharing and Reuse

What data will you be sharing and in what form? (e.g. raw, processed, analyzed, final).

We will be sharing final data, according to your descriptions, ie. regularized data that users can convert to csv.

Have you considered what type of end-user license to include with your data?

We have acknowledged the source providers of our bibliographical metadata, which we will make freely available. Sources are included/acknowledged in our data model.

What steps will be taken to help the research community know that your data exists?

There will be a public-facing website, we will present the project at conferences, will cite our data in published analyses, and will send email announcements upon release.

Responsibilities and Resources

Identify who will be responsible for managing this project's data during and after the project and the major data management tasks for which they will be responsible.

Jenn Ross our programmer is managing our data. After the project development stage concludes it is anticipated that SFU will manage the data according to the terms of a hosting agreement currently being formulated.

How will responsibilities for managing data activities be handled if substantive changes happen in the personnel overseeing the project's data, including a change of Principal Investigator?

My project manager and PhD student will handle the project's data when I, as the current PI, am no longer able to do so.

What resources will you require to implement your data management plan? What do you estimate the overall cost for data management to be?

Currently updating and maintaining our data costs about $100.month (two developer hours). I expect these costs to continue, and to be borne by SFU Library if a hosting agreement is reached. I am also investigating other sources of ongoing funding.

Ethics and Legal Compliance

If your research project includes sensitive data, how will you ensure that it is securely managed and accessible only to approved members of the project?

Not applicable.

If applicable, what strategies will you undertake to address secondary uses of sensitive data?

Not applicable.

How will you manage legal, ethical, and intellectual property issues?

Not applicable to my data.

This document was generated by DMP Assistant (https://assistant.portagenetwork.ca)

Closing the loop with UQRDM:

A Research Data Management service at The University of Queensland

2018-03-28

Sandrine Kingston-Ducrot, Andrew Janke and Rebecca Deuble

The University of Queensland (UQ) is committed to adopting the highest standards of excellence in research data management and has embarked upon the implementation of an innovative, robust, world-leading research data management service at UQ. In the past 18 months, UQ has built the UQ Research Data Manager (UQRDM) via a series of integrated pilot projects that were sponsored and funded by the UQ Office of the Deputy-Vice Chancellor-Research.

IDMP-I Metadata Harvesting delivered a minimal DMP-type interface.

IDMP-II Shared Storage Allocation successfully piloted auto-provisioning of research storage from multiple providers based on the metadata collected in the iDMP-I interface.

iDMP-III Migrating Data to Managed Collections is developing a mechanism to create permanent collections of data from working repositories, curated long term and integrated into library-based repository services. This process makes possible the long-term retrieval of data for compliance or reuse. This project is still in progress.

i**DMP-IV** is establishing a **UQ research data management service**, called the UQ Research Data Manager (UQRDM). iDMP-IV started in September 2017 and is focussed on the rollout of the UQRDM to the UQ Research community (approx. 2700 Academics and 5,000 HDR Students). The service was launched in January 2018 and the uptake was swift amongst the UQ research community with more than 1,000 unique users in less than 10 weeks of rollout.

How does UQRDM work?

Capturing minimal metadata

At any time of the lifecycle of the project, UQ Researchers enter a minimal amount of metadata describing their project in a Project Record. The metadata is entered via a web form that integrates with other management systems at the University via Application Program Interfaces (APIs). This approach minimises the needs for re-entering data previously provided. For example, the UQRDM relies upon an API to auto-populate information regarding funding details of a project, ethical clearance or a HDR student's project supervisory team. UQ Researchers also list the collaborators who need access to the project data on the record, by simply adding their name and institutional email address.

No technical or compliance questions regarding how long the research data should be kept are asked. All fields that the researcher is required to complete are descriptive in nature and capture sufficient information to make decisions on storage location, security and curation.

It takes 2-5 minutes for researchers to complete the form.

Storage allocated

Once the minimal metadata is provided, a project receives a **fit-for-purpose storage allocation**. In most cases, storage allocation is auto-provisioned within 15 minutes. Decisions as to where to store the data and how long for are based upon the metadata that was entered in the Project Record.

Accessing the research data

When the storage is provisioned, UQ researchers and their collaborators can store and access their project's research data via different ways;

A single share drive accessible in all UQ Schools, Institutes and campuses. (Available to UQ researchers only)

A **user-friendly cloud interface** based on NextCloud, and associated cross platform desktop sync clients (Available to UQ researchers and external collaborators). The cloud interface allows UQ researchers to further control how they wish to share the data with other researchers (read only, upload only, read/write).

Main UQRDM features

Collaboration made easy

With the UQRDM, UQ researchers can easily give access to the research data to international collaborators, by adding their name and email address to the Project Record. The UQRDM facilitates this access via both the AAF (Australian Access Federation) and eduGAIN. This means that International Researchers invited to join a UQ led project can log in in the UQRDM cloud interface **using their own institutional credentials.**

Downloadable DMPs

UQ Researchers can **update their Project Record at any time** by adding additional metadata to describe their project. The researcher fills out this information in the UQRDM using the additional fields displayed in the Project Record. This simple **DMP can then be downloaded** as a PDF at any time and used to complete a grant or ethics application.

Future features of the UQRDM

Additional features will be released in phases throughout 2018. Development work will further facilitate collaboration with industry partners (governmental agencies, health organisation, NGOs, private business, etc.) via integration with LinkedIn. Archiving datasets from the working data repository will be available by the end of 2018. UQ also plans to provision Digital Research Notebooks via the UQRDM.

Coming soon

Code for the UQRDM will soon be released under an amended GNU GPLv3 license, as per best practice for software in this field. In the meantime, the code is already available for evaluation, under a Memorandum of Understanding.

For more information about the UQRDM system,
or to obtain the code, please contact rdm-team@uq.edu.au.

R • •
• D •
• • M

Research
Data
Manager

Designed at The University of Queensland

Data Deposit Pillar

Pillar

Deposit of research data, code and other appropriate outputs, that supports the dissemination efforts from a funded project, if appropriate.

What It Means

1. Institutions will provide researchers with access to resources (including funding sources) to facilitate the deposit of appropriate outputs, including: code, algorithms, methodological guides, data dictionaries, datasets.
2. Researchers will ensure that the data from their funded research is stored for an appropriate length of time, ideally in a domain context, or using a national, regional or institutional service.
3. Researchers will consider options for making their data more openly accessible.

Response

1. Offices of the heads of research, computing, and the library ensure that researchers understand options for funding the preparation of research data for sharing, and options for deposit of appropriate outputs.
2. Encourage all researchers to work with their "community of practice" to define best practices and respond accordingly.
3. Researchers add a suitable Data Availability Statement to the metadata describing their data.
4. Researchers submit their data to a domain repository when available, or if not, to an international/national/regional/institutional data repository.

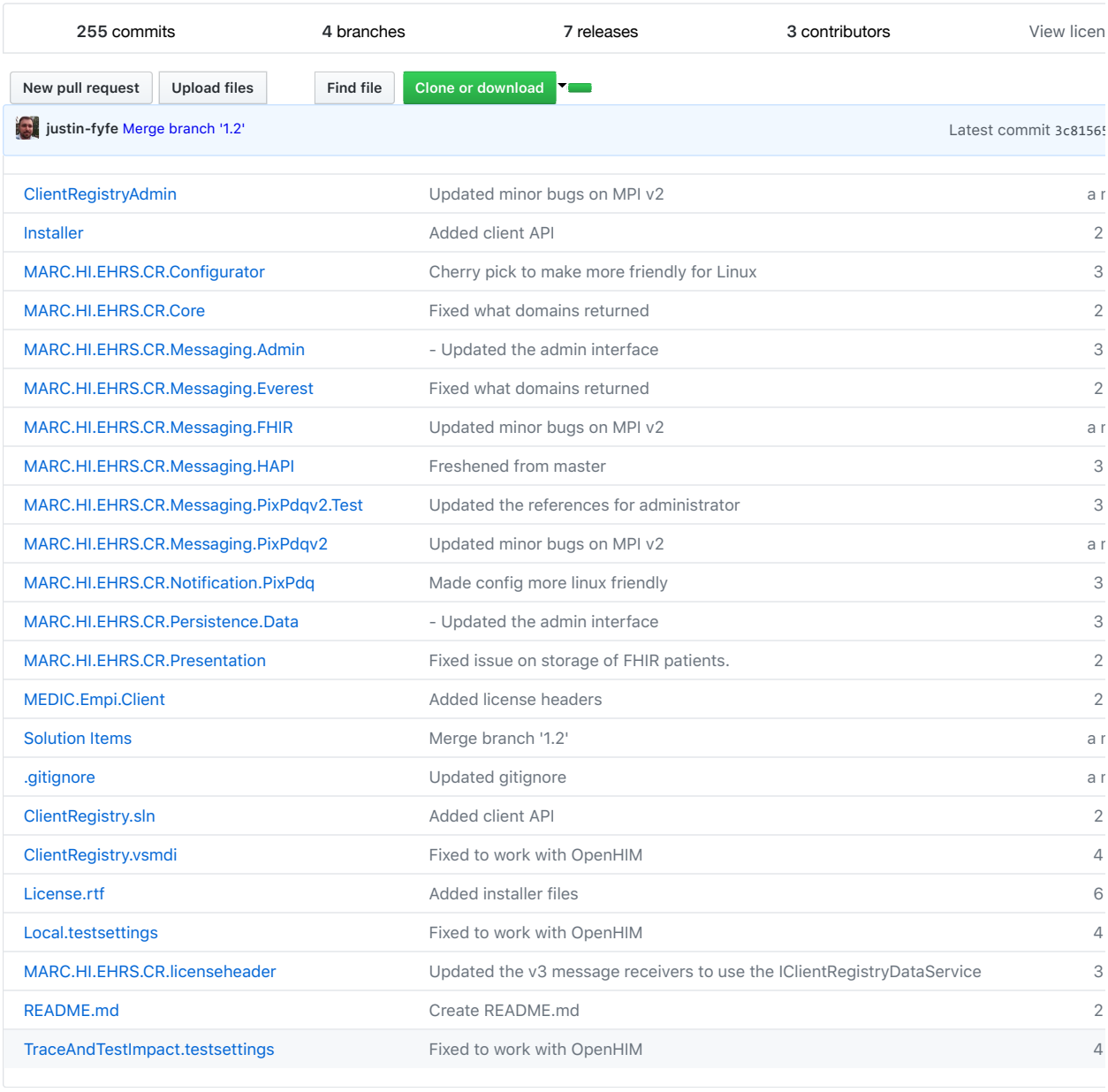
Resources & Examples

1. Example of a code repository record from Github: *MEDIC Client Registry*. Justin Fyfe and Duane Bender. Oct 21, 2018.[12]
2. *BIT instructor honoured for efforts to promote government transparency and public education*. Red River College News, June 27, 2017.[13]
3. Landing page for *Manitoba Election 2016*, Open Democracy Manitoba.[14]
4. Overview of best practices in RDM: *"Good Enough" Research Data Management*. CARL Portage.[15]
5. Overview of data submission support from a publisher: *Organise and Share Your Data Faster With Research Data Support.* Springer Nature, 2018.[16]
6. Example of a Data Availability statement from a publisher: *Data Availability Statements.* Springer Nature, 2018.[17]
7. Text extracted from: *Recommended Data Repositories.* Scientific Data*,* Springer Nature, 2018.[18]

[12] https://github.com/MohawkMEDIC/client-registry Downloaded Nov 21, 2018.
[13] https://www.rrc.ca/informationsystems/2017/06/27/bit-instructor-honoured-for-efforts-to-promote-government-transparency-and-public-education/ Downloaded Nov 21, 2018.
[14] http://www.manitobaelection.ca Downloaded Nov 21, 2018.
[15] https://portagenetwork.ca/wp-content/uploads/2017/11/Portage-RDM-Primer-Contact.pdf
[16] https://resource-cms.springernature.com/springer-cms/rest/v1/content/15403690/data/v1 Downloaded April 1, 2018.
[17] https://www.springernature.com/gp/authors/research-data-policy/data-availability-statements/12330880 Downloaded April 1, 2018.
[18] https://www.springernature.com/gp/authors/research-data-policy/repositories/12327124 Safari Reader version downloaded November 21, 2018.

MohawkMEDIC/client-registry

The Mohawk College MARC-HI/MEDIC Client Registry Reference Implementation represents the prototype Client Registry (Enterpı
Master Patient Index - EMPI) developed under our Natural Sciences and Engineering Research Council of Canada (NSERC) grant t
test version of the pan-Canadian Electronic Health Record System blueprint as prescrib...



README.md

MEDIC Client Registry

The Mohawk College MARC-HI/MEDIC Client Registry Reference Implementation represents the prototype Client Registry (Enterprise Master Patient Index - EMPI) developed under our Natural Sciences and Engineering Research Council of Canad (NSERC) grant to build a test version of the pan-Canadian Electronic Health Record System blueprint as prescribed by Cana Health Infoway.

The reference implementation software supports many standards based interfaces including:

- Support for pan-Canadian Messaging (HL7v3) R02.04.01
- IHE PIX Version 3
- IHE PDQ Version 3
- IHE PIX v2.x (HL7v2.3.1 ADT feed, verified IHE CAT NA2015)
- IHE PDQ v2.x (HL7v2.5,verified IHE CAT NA2015)
- IHE PDQm (verified IHE CAT NA2015)

In addition to these standards based interface, the client registry:

- Can act as a Patient Identity Feed (PIXv3) to other actors,
- Supports RFC-3881 (ATNA for IHE interfaces) auditing,
- Provides support for advanced matching/merging algorithms,
- Soundex Matching
- Pattern Matching
- Name Variant Matching
- Provides a custom management interface for merging duplicate patient information,
- Provides an easy-to-use configuration/deployment tool,
- Provides a highly scalable infrastructure via support for PostgreSQL synchronous streaming replication
- Supports query continuation, and persistence,
- Supports message logging and long-term execute-once detection,
- Provides a highly extensible platform for custom interfaces and modules.

This reference implementation project is intended to assist developers in the development of Client Registry software, custo interfaces (as a test interface), in demonstration XDS infrastructures, or in staging environments.

For more information about this project please contact Duane Bender, Director of Applied Research in Digital Health, Mohaw College [duane.bender at mohawkcollege dot ca]

RED RIVER COLLEGE

News

BIT instructor honoured for efforts to promote government transparency and public education

June 27, 2017

BIT instructor Kyle Geske (shown above in front row, third from left) co-founded ODM with fellow BIT instructor Jody Gillis in 2010.

A Red River College instructor has received national recognition for his work creating online resources that promote government transparency and accountability.

Kyle Geske, a **Business Information Technology** instructor at RRC, was in Edmonton this week to pick up an Open Data for Democracy Award at the **Canadian Open Data Summit**.

He accepted the award on behalf of **Open Democracy Manitoba** (ODM), a citizen-run community organization that helps educate voters by empowering them to understand the roles and visions of their elected representatives, in order to create a more accountable and respectful democracy.

Geske (shown above in front row, third from left) co-founded ODM with fellow BIT instructor Jody Gillis in 2010; he now serves as its executive director and oversees operations alongside RRC grad Ken Harasym (**Digital Media Design**, 2006).

Since its inception, OMD has launched two election portals – **WinnipegElection.ca** and **ManitobaElection.ca** – that have allowed hundreds of thousands of voters to research their candidates and learn about local democratic processes.

The sites feature ward/constituency maps and statistics, historical information about past elections, candidate profiles and social media links, and links to media coverage of candidates and election issues.

ODM's latest project, **WinnipegElected.ca**, was launched last November to provide Winnipeg residents with easy access to city council decisions on reports, motions and bylaws.

WinnipegElected.ca was developed in partnership with the City Clerk's office; with only a few tweaks, ODM was able to update the city's existing record-keeping processes, allowing council decisions to be posted on the city's open data portal.

In addition to the Open Data for Democracy Award, ODM has been recognized previously by the Canadian Internet Registration Authority, the City of Winnipeg, Mayor Brian Bowman, and a host of national and local journalists and media outlets.

Photo credit: City of Edmonto

You might also be interested in:

Manitoba Election 2016

A Citizen Created Election Resource

St Boniface Votes 2018

See the candidates who ran in the 2018 St. Boniface By-Election.

2016 Election Results

PC Majority Government with **Brian Pallister** as Premier-designate.

Seat Breakdown

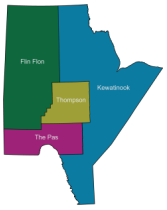
PC	40 Won
NDP	14 Won
Lib.	3 Won

More Results By Electoral Division

2016 MLA Candidates

Brandon

Northern Manitoba



Southern Manitoba

Winnipeg

ManitobaElection.ca

Research the parties and candidates of the 2016 Manitoba Election.

A voter resource maintained by Open Democracy Manitoba.

Join the Conversation

Join the conversation at #mbelxn.

Follow @mbelection 1,074 followers

Like Share 460 people like this. Sign Up to see what your friends like.

Latest Election News

April 19, 2016

'The sky is gonna be blue!' Conservatives win big majority in Manitoba election - Brandon Sun
Mentions: Ron Kostyshyn, Steven Fletcher

Wolseley race too close to call - Winnipeg Free Press
Mentions: Rob Altemeyer, David Nickarz, James Beddome, Melanie Wight

Rural Manitoba rejects NDP strongholds - Winnipeg Free Press
Mentions: Steve Ashton, Eric Robinson, Kelly Bindle, Amanda Lathlin, Alan Lagimodiere, Greg Dewar, Derek Johnson, Tom Nevakshonoff, Judy Klassen, Tom Lindsey

'Time for a change': Tory victor in Seine River - Winnipeg Free Press
Mentions: Janice Morley-Lecomte, Peter Chura, Lise Pinkos

Tory wins turn the city blue - Winnipeg Free Press
Mentions: Andrew Micklefield, Nic Curry

More News...

Details on our News Gathering Process.

The Political Parties

NDP

CPC-M

Manitoba Party

PC

Independent

Green

Liberal

These parties are registered with Elections Manitoba. Parties are displayed in random order.

"Good Enough" Research Data Management

(a brief guide for busy people)

This brief guide presents a set of good data management practices that researchers can adopt, regardless of their data management skills and levels of expertise.

1 Save your raw data in original format

1.1 Don't overwrite your original data with a cleaned version.

1.2 Protect your original data by locking them or making them read-only.

1.3 Refer to this original data if things go wrong (as they often do).

2 Backup your data

2.1 **Use the 3-2-1 rule:** Save three copies of your data, on two different storage mediums, and one copy off site.

2.2 Do not backup or store sensitive data on a commercial cloud (Dropbox, Google Drive, etc.).

3 Describe your data

3.1 **Machine Friendly:** Describe your dataset with a metadata standard for discovery.

3.2 **Human Friendly:** Describe your variables, so your colleagues will understand what you meant. Data without good metadata is useless. Give your variables clear names.

3.3 Do not leave cells blank - use numeric values clearly out of range to define missing (e.g. '99999') or not applicable (e.g. '88888') data, and describe these in your data dictionary.

3.4 Convert your data to open, non-proprietary formats.

3.5 Name your files well with basic metadata in file names.

4 Process your data

4.1 Make each column a variable.

4.2 Make each row an observation.

4.3 Store units (e.g. kg or cm) as metadata (in their own column).

4.4 Document each step processing your data in a README file.

5 Archive and preserve your data

5.1 Submit final data files to a repository assigning a persistent identifier (e.g. handles or DOIs).

5.2 Provide good metadata for your study so others could find it (use your discipline's metadata standard, e.g. Darwin Core, DDI, etc.).

ORGANISE AND SHARE YOUR DATA FASTER WITH RESEARCH DATA SUPPORT

Helping you make your data more findable, accessible, understandable and citeable

What you need to know before submitting your data

Can you share your data?

You need to know if you have permission to openly share the data. If you are acting on behalf of the data owner, make sure you have their agreement before submitting.

Are your data ready to share?

You need to have your data files ready for uploading, along with a short description of your data. Data cannot contain any identifiable human or sensitive data.

Who is the owner of the data?

When using this service the data owner (whether that is you, your institute, or someone else) retains full ownership and copyright for all files submitted.

Submission

How Research Data Support Editors will improve your data

Generate persistent, citeable identifiers for datasets

A DOI (Digital Object Identifier) is generated for each dataset, enhancing accessibility and providing a persistent link for citation.

Increase findability by improving metadata and keywords

Metadata are checked and copy-edited so that they are clear, readable, and free from spelling and grammatical errors. Relevant keywords are added to enhance searchability.

Create clear, understandable descriptions of datasets

A comprehensive description of datasets and the underlying research method is created based on metadata, any associated manuscript(s) and input from the data owner.

Add relevant funder information

To ensure compliance with any funder requirements, funder information and acknowledgments are added to datasets information and metadata.

Link datasets to related research

Whenever possible, datasets are linked to associated publication(s) - allowing research that built on datasets to be identified and accessed.

☆ The benefits to you and your data ☆

An enhanced and fully citeable dataset

Upon completion, data can be made available at any time - for example in conjunction with a publication.

A complete metadata record

Completely machine- and human-readable record, which enables greater understandability, findability and reusability of your data.

Enhancement report

Detailed report outlining the enhancements made to your data and confirming it has been through the service.

Data availability statement

A complete data availability statement for your dataset will also be provided. This can be used to inform others of where and how to access your data, including in articles, books and other publications.

Research Data Support

Submitting to Research Data Support

Who can use Research Data Support

Pricing for Research Data Support

Benefits of Research Data Support

Help & FAQs

Research Data Policies

Data policy types

Data availability statements

Data policy FAQs

Research Data Helpdesk

Recommended Repositories

Journal policies & services

Data Availability Statements

Guidance for authors and editors

Data availability statements provide a statement about where data supporting the results reported in a published article can be found - including, where applicable, hyperlinks to publicly archived datasets analysed or generated during the study.

The Springer Nature research data policy types 2, 3 and 4 encourage or require the provision of data availability statements.

Some research funders, such as the Research Councils UK, require data availability statements to be included in publications and the Springer Nature research data policies support compliance with these requirements. Publicly available datasets referred to in data availability statements can also be cited in reference lists – and this is particularly encouraged when datasets have digital object identifiers (DOIs). Data availability statements commonly take one of the following forms:

1. The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].
2. The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.
3. All data generated or analysed during this study are included in this published article (and its supplementary information files).
4. The datasets generated during and/or analysed during the current study are not publicly available due to [REASON(S) WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.
5. Data sharing not applicable to this article as no datasets were generated or analysed during the current study.
6. The data that support the findings of this study are available from [THIRD PARTY NAME] but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of [THIRD PARTY NAME].

Recommended Data Repositories

Scientific Data mandates the release of datasets accompanying our Data Descriptors, but we do not ourselves host data. Instead, we ask authors to submit datasets to an appropriate public data repository. Data should be submitted to discipline-specific, community-recognized repositories where possible, or to generalist repositories if no suitable community resource is available.

Repositories included on this page have been evaluated to ensure that they meet our requirements for data access, preservation and stability. Please be aware, however, that some repositories on this page may only accept data from those funded by specific sources, or may charge for hosting data. Please ensure you are aware of any deposition policies for your chosen repository. If your repository of choice is not listed please see our guidelines for suggesting additional repositories.

Authors must deposit their data to a recommended data repository as part of the manuscript submission process; manuscripts will not otherwise be sent for review. If data have not been deposited to a repository prior to manuscript submission, authors can upload their data to figshare or the Dryad Digital Repository during the submission process. Data may also be deposited to these resources temporarily, if the main host repository does not support confidential peer review.

We provide a date-stamped archive of our recommended repository list, which is available for use under the CC-BY licence. Recommended repositories and standards that are indexed by FAIRsharing, can be also be viewed and filtered via the *Scientific Data* FAIRsharing collection.

View data repositories

- Biological sciences:
  - Nucleic acid sequence; Protein sequence; Molecular & supramolecular structure; Neuroscience; Omics; Taxonomy & species diversity; Mathematical & modelling resources; Cytometry & immunology; Imaging; Organism-focused resources
- Health sciences
- Chemistry & chemical biology
- Earth & environmental sciences
- Physics, astrophysics & astronomy
- Materials science
- Social sciences
- Generalist repositories
- Other repositories

Biological sciences

Nucleic acid sequence

Sequence information should be deposited following the MIxS guidelines.

Simple genetic polymorphisms or structural variations should be submitted to dbSNP or dbVar (please note that these repositories cannot accept sensitive data derived from human subjects); the NCBI Trace Archive may be used for capillary electrophoresis data, while SRA accepts NGS data only.

Protein sequence

Molecular & supramolecular structure

These repositories accept structural data for small molecules (COD); peptides and proteins (all); and larger assemblies (EMDB).

Small molecule crystallographic data should be uploaded to Dryad or figshare before manuscript submission, and should include a .cif file, a structural figure with probability ellipsoids, and structure factors for each structure. Both the structure factors and the structural output must have been checked using the IUCR's CheckCIF routine, and a copy of the output must be included at submission, together with a justification for any alerts reported.

Neuroscience

These data repositories all accept human-derived data (NeuroMorpho.org and G-Node also accept data from other organisms). Please note that human-subject data submitted to OpenfMRI must be de-identified, while FCP/INDI can handle sensitive patient data.

Omics

Functional genomics

Functional genomics is a broad experimental category, and *Scientific Data*'s recommendations in this discipline likewise bridge disparate research disciplines. Data should be deposited following the relevant community requirements where possible.

Please refer to the MIAME standard for microarray data. Molecular interaction data should be deposited with a member of the International Molecular Exchange Consortium (IMEx), following the MIMIx recommendations.

For data linking genotyping and phenotyping information in human subjects,

we strongly recommend submission to dbGAP, EGA or JGA, which have mechanisms in place to handle sensitive data.

Metabolomics & Proteomics

Metabolomics data should be submitted following the MSI guidelines.

We ask authors to submit proteomics data to members of the ProteomeXchange consortium (listed below), following the MIAPE recommendations.

Taxonomy & species diversity

Mathematical & modelling resources

Cytometry & immunology

Imaging

Organism-focused resources

These resources provide information specific to a particular organism or disease pathogen. They may accept phenotype information, sequences, genome annotations and gene expression patterns, among other types of data. Incorporating data into these resources can be very valuable for promoting reuse within these specific communities; however, where applicable, we ask that data records be submitted both to a community repository and to one suitable for the type of data (e.g. transcriptome profiling; please see above).

Health sciences

Some of the repositories in this section are suitable for datasets requiring restricted data access, which may be required for the preservation of study participant anonymity in clinical datasets. We suggest contacting repositories directly to determine those with data access controls best suited to the specific requirements of your study.

Chemistry & chemical biology

Earth & environmental sciences

Physics, astrophysics & astronomy

Materials science

Social sciences

Generalist repositories

Scientific Data encourages authors to archive data to one of the above data-type specific repositories where possible. Where a data-type specific repository is not available, we recommend the following generalist repositories, which can handle a wide variety of data. Generalist repositories may also be appropriate for archiving associated analyses, or experimental-control data, supplementing the primary data in a data-type specific repository.

Other repositories

In areas where well-established subject or data-type specific repositories exist, we ask authors to submit their data to the

appropriate resources. If none of the discipline-specific repositories listed above are suitable, *Scientific Data* is glad to support the use of other repositories, if they are able to mint DataCite DOIs for hosted data, and share data under open terms of use (for example the CC0 waiver). These might include institutional, project-specific or national archives, which only accept data deposition from researchers associated with a specific institution, project, or nation respectively.

Prospective authors can use re3data.org to browse lists of data repositories certified by World Data Systems or Data Seal of Approval that may meet these requirements. These lists include a number of high-quality institutional, national and project-specific data repositories.

To use one of these other repositories, select 'DataCite DOI' as the repository name during manuscript submission. Please note that if your chosen repository is unable to support confidential peer-review, you will be asked to temporarily deposit a copy of the dataset to one of our integrated generalist repositories to facilitate review of your article. Upon completion of peer review, the temporary copy will be erased.

* Curated resource which may not accept direct submission of data. Contact the database directly for further information.