Canadian Reproducibility Network (CaRN) Strategy Framework

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This document provides an overview of the Canadian Reproducibility Network (CaRN) and outlines our strategy . Following our vision and purpose, this document is organized into two main sections. First, we discuss the need for CaRN and the role it can play in positioning Canada as a global leader in research quality, transparency, and reproducibility. Second, we present our strategy framework outlining CaRN's long-term goals, which encompass securing sustainable funding, expanding a nationwide reproducibility network, and fostering a collaborative research culture across Canada.

We adopted the *Reproducibility Network* name to join the [international community of Reproducibility Networks](#) and to signify our aligned interests and approach with these organizations, such as the [UK Reproducibility Network (UKRN)](#). Although our name centers on Reproducibility, our network recognizes that reproducibility will not be achieved through changes in research methods alone. Research culture and context plays a critical role in supporting reproducibility. Our goal is to improve research broadly, regarding research culture, research quality, reproducibility, replicability, rigour, robustness, research integrity, transparency, trustworthiness, and open research/science/scholarship.

Background
The need for a Canadian Reproducibility Network
For research to have maximum benefit for society, how research is done (the methods) and what researchers find (the results) must be available without restrictions, be interpretable, and trustworthy. Unfortunately, research often remains unpublished, and results nonreproducible and potentially false. Open science, which supports transparency, is far from the status quo. This state of affairs entails a waste of resources and can lead to useless or even harmful applications of research findings (e.g., in policy development and health care). Canadian research is no exception. A [report from the](#) [Office of the Chief Science Advisor of Canada](#) states that "*Canada is not an international leader in Open Science but could catch up if actions are taken now.*"

While researchers have identified several practices that lead to research waste and low reproducibility over the past few decades, these problems largely remain unresolved and have been documented across disciplines as diverse as clinical trials, psychology, cancer biology, economics, and environmental management. In a largely publicly funded research environment, such as Canada's, this waste is all the more problematic. A coordinated effort among researchers, institutions, funders, publishers, learned societies, and regulators may be the most effective way of tackling these issues. The UKRN has led such effort by fostering collaboration across various stakeholders in the research ecosystem and creating the infrastructure necessary to advance rigorous and reproducible research practices across the United Kingdom. Other countries have established their own Reproducibility Networks

including Australia, Brazil, Finland, Germany, Italy, Norway, Portugal, Slovakia, Sweden, and Switzerland.

[An initial meeting to discuss the development of CaRN](#) was held on March 10th, 2022 and met with enthusiasm by over 30 attendees across various disciplines, career stages, and stakeholder groups. CaRN will synergize the various efforts towards open research that already exist in the Canadian research ecosystem.

A tried and tested model

We are developing CaRN using the tried-and-tested model established by the UKRN. In only 3 years, they built a Reproducibility Network that comprises more than 50 local networks at universities, over 20 institutions that formally joined by creating a senior academic lead role focused on research improvement, and external stakeholders including funders (e.g., UK Research and Innovation, Research England, Wellcome), learned societies (e.g., British Psychological Society), and publishers (e.g., Nature Publishing Group, Wiley). They have developed and delivered training programs on open research across the United Kingdom and have worked with researchers, institutions, and stakeholders to coordinate efforts to improve research quality. Their unified voice for reproducibility led to the award of £4.5M by Research England—a "major strategic investment" intended to drive the uptake of open research practices. These achievements speak to the power of a coordinated approach that provides a voice for researchers themselves.

By adapting the UKRN example to the Canadian context, we can accelerate our progress towards more rigorous and reproducible research. We can improve Canadians' return on investment and increase our attractiveness for international collaborations and international funding competitions. We can create a research culture that aligns stakeholders in the Canadian research ecosystem towards the common good of available, interpretable, and trustworthy research. The Canadian public, including patients and other end-users of research findings, would surely welcome such advances.

Strategy Framework

The CaRN strategy framework describes the long-term goals and objectives and provides the strategic direction and priorities of the CaRN to support and guide the Open Science and Reproducible Research movements in Canada.

Vision

A healthy and vigorous Canadian research ecosystem where all outputs are trustworthy, accessible, rigorous, transparent, and reproducible.

Purpose.

To investigate the factors that contribute to trustworthy, accessible, rigorous, transparent, and reproducible research across a wide range of disciplines; promote training activities; disseminate best practice; and work with researchers, institutions, and external stakeholders—organisations that are part of the wider research ecosystem—to ensure coordination of efforts to improve research quality and research culture. Our position is that research should serve society at large and that reducing research waste and improving research quality will advance this goal. [Adapted from [the UKRN Terms of](#) [Reference](#)]

Focus Areas
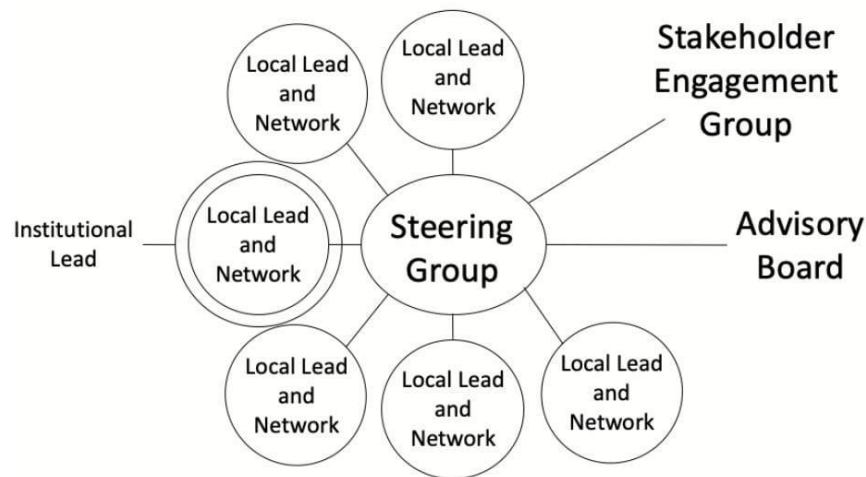
The CaRN currently is focused in four broad areas:

1. Data management, sharing, and reuse.
2. Responsible research assessment.
3. Research methods.
4. Patient and citizen science.

We welcome local leaders to suggest new focus areas and grow our network beyond these initial activities.

Structure and governance of CaRN

The structure of CaRN will follow that of the UKRN (see Figure below). This structure includes Local Network Leads (who represent researchers and coordinate activity within an institution), Institutional Leads (who represent an institution's management and work in partnership with Local Network Leads), a Stakeholder Engagement Group (including funders, publishers, learned societies, and regulators), a Steering Group, and an Advisory Board. [Adapted from the UKRN Terms of Reference]

Long-Term Goals and Objectives

The long-term goals pursued by the CaRN are outlined below. As the CaRN evolves and responds to emerging challenges and opportunities in the research landscape, our long-term goals may be updated to reflect these changes.

Goal A: Secure Long-Term Funding

To ensure sustainability, we aim to secure funding from various Canadian sources, including national, provincial, and non-government organizations, as well as academic societies and institutions. This funding will support our initiatives to build a strong network and foster a positive research culture across Canada.

Objectives for Goal A:

1. Secure funding from government agencies, private foundations, industry partnerships, and other non-government organizations.

2. Develop sponsorship and partnership programs
3. Engage with academic societies and research councils to secure endorsement and funding aligned with improved research practices.
4. Form a committee dedicated to strategizing public and private funding opportunities, setting both annual and multi-year funding targets.
5. Initiate a targeted campaign to secure initial funding for CaRN's operational setup, staffing, and infrastructure.

Goal B: Expand the Network

CaRN aims to promote reproducible research across Canada, through the development of local networks, supporting grassroots initiatives, and creating a centralized resource hub.

Objectives for Goal B:
1. Form local networks, or "nodes," at research-intensive institutions, especially within the U15 group, to ensure broad participation.
2. Support grassroots initiatives like ReproducibiliTea Journal Clubs that promote rigorous research practices.
3. Identify organizations, individuals, and resources in the research ecosystem to create a collaborative network.
4. Build an online hub featuring resources, events, and a directory of stakeholders across disciplines.
5. Set up a Steering Committee, Advisory Committee, and Terms of Reference to guide CaRN's growth.
6. Develop standardized training for reproducibility and open science, including accrediting "Data Champions" to lead local training.
7. Partner with national organizations on initiatives that broaden CaRN's impact on reproducibility and open science.
8. Build a sustainability model for CaRN tied to its mission, with a theory of change, periodic reviews, covering the financial, organizational and cultural aspects of sustainability.

C. Foster a Positive Research culture

CaRN will work to foster a positive and collaborative research environment in Canada through community-building and knowledge exchange among researchers, institutions, and stakeholders.

Objectives for Goal C:
9. Promote research transparency and integrity and maintain a public database of researchers dedicated to these values.
10. Organize national events and conferences to foster dialogue on reproducible research practices.
11. Develop awards for researchers and institutions committed to open science and reproducibility.
12. Engage with the public and research communities via social media to share updates and highlight reproducibility efforts.
13. Provide resources for community-led activities that encourage rigorous and collaborative research.
14. Regularly assess and report on the needs of researchers regarding reproducibility.

15. Use live dashboards to track Canada's performance on open science indicators, sharing progress publicly.
16. Support sector-wide reform of research assessment through sharing of best practices and collective action.
17. Organize a launch event to introduce CaRN, bring stakeholders together, and reinforce the commitment to reproducibility.

References

- [Thibault, Munafò, and Moher (2022)](#)
- [SwissRN Strategy Framework (2024)](#)
- [UKRN Terms of Reference (2024)](#)
- [UKRN Vision and Strategy (2024-2025)](#)