Canadian Reproducibility Network (CaRN)
One-year plan

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Several sections of this document have been adapted from [Thibault, Munafò, and Moher (2022)](.)

This document provides an overview of the Canadian Reproducibility Network (CaRN) and outlines our trajectory. After stating our vision and purpose, this document contains three sections. First, we outline the need for CaRN and how it can help Canada become a world leader in research quality and transparency. Second, we propose a one-year plan for CaRN, which includes three parallel activities: securing initial funding, building the network, and performing a needs assessment. Third, we explore what CaRN could achieve in the longer-term future.

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 goal is to improve research broadly, including in regards to research culture, research quality, reproducibility, replicability, rigour, robustness, research integrity, transparency, trustworthiness, and open research/science/scholarship.

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

Purpose. Investigate the factors that contribute to trustworthy, rigorous, 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](.)]

Structure. 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]
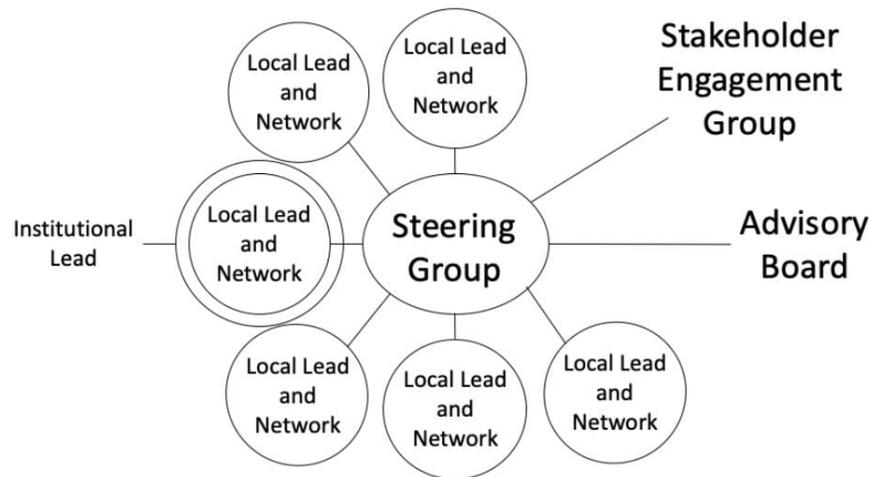
1. The need for a Canadian Reproducibility Network

For research to have maximum benefit for society, how research is done (the methods) and what researchers find (the results) must be available, interpretable, and trustworthy. Unfortunately, research often remains unpublished, and results nonreproducible and potentially false. 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 an 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.

2. One-year plan

Goal 1. Secure Initial Funding

We seek to secure seed funding from several Canadian funders, societies, and/or institutions, including national, provincial, and non-government organizations. With this funding, we will hire someone to serve as the CaRN project coordinator and administrator. This funding will also provide a basis of support to apply for more substantial long term funding and to help achieve *Goal 2* and *Goal 3* outlined below.

Goal 2. Develop the Network

We will take several parallel actions to develop the network. We will
- Establish local networks, or "nodes", at institutions across Canada. We will invite any institution to create their local network and will actively reach out to research-intensive universities, such as those comprising the U15.
- Support grassroots initiatives to encourage rigorous and reproducible research, including expanding the reach of the Canadian [ReproducibiliTea Journal Clubs](#).
- Map the organizations, opportunities, individuals, and other stakeholders in the research improvement space in Canada. This includes research, training, and policies regarding Open Science, meta-research, and rigorous research practice.
- Establish a Steering Committee, Advisory Committee, website, and Terms of Reference.

Goal 3. Needs Assessment

The needs assessment will be informed by the network (*Goal 2*). We will:
- Distribute a survey and run focus groups or brainstorming sessions with researchers and other stakeholders to identify pressing issues that CaRN can help address.
- Assess the adaptability of initiatives that already exist in other countries to the Canadian context. These could include [Open Research Primers](#) and workshops, [dashboards to assess research transparency](#), research policies adopted in other countries, and [various other initiatives](#).
- Develop the role description for Institutional Leads and Local Network Leads.

3. Future CaRN initiatives (beyond one year)
We have longer term goals that will be informed by the needs assessment and subject to funding. For example, CaRN could:
- Serve as a forum for organized discussion between stakeholders and researchers, including for policy development.
- Develop and implement national training standards in research methods and open research. These would promote interoperability of skills between institutions as well as between academia and other organizations engaged in research. This goal could include accreditation of Data Champions and the dissemination of training activities across the country.
- Monitor the Canadian research landscape and guide meta-research efforts to track and improve research in Canada.
- Create live automated dashboards to monitor Canada's performance on open and rigorous science indicators.
- Work with stakeholders to establish funding streams for training in Open Scholarship, monitoring of research quality, and meta-research.
- Support grassroots efforts to improve research in Canada and foster an open research culture across the nation—for example through open research events and prizes.

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.

Successful outcomes for the first year of CaRN would include to:
- Acquire seed funding.
- Establish at least 15 local networks that cover a wide-range of disciplines and include researchers across career stages.

- Foster a research culture that values rigour and reproducibility—e.g., by creating a publicly available database of Canadian researchers involved in rigour and reproducibility and managing an active CaRN Twitter account that promotes relevant activities.
- Report the results of a needs assessment.
- Host a formal launch of CaRN.

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.