Canadian Reproducibility Network (CaRN)

Terms of Reference

Version 1.0

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This document has been adapted from Version 3.3 of the [UKRN Terms of Reference](#)

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.

Definition of terms

There are several terms that have been used to refer to the broad issues that the Canadian Reproducibility Network aims to address, and these are often used interchangeably. Our focus is on ensuring Canada produces robust, rigorous research. Below we list various terms and definitions that are widely used. When terms are used, it is important to be clear which meaning is intended by that word. In the context of the Canadian Reproducibility Network, the definition of reproducibility closest to our meaning is "results reproducibility" as defined by Goodman et al. (2016), but this is not to suggest that it is the "correct" definition. We provide a more complete definition of terms at Annex 1. We use the title of "Reproducibility Network" to highlight our alignment and coordination with the well-branded UKRN and other Reproducibility Networks. Our interests extend beyond reproducibility to research improvement broadly, including Open Scholarship, research rigour, and research culture.
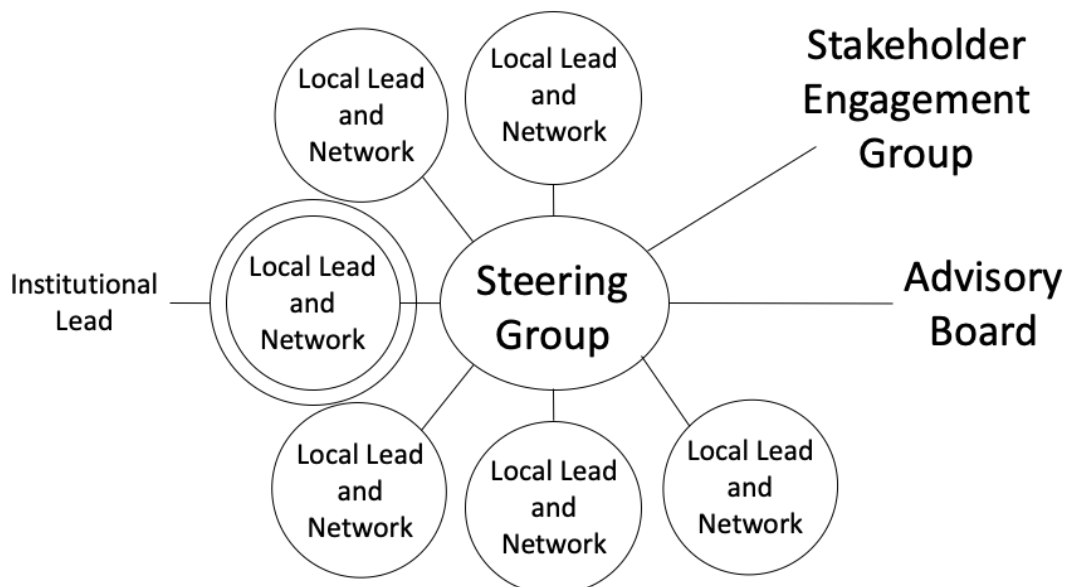
Organization and membership

CaRN will consist of a Steering Group, Local Networks (led by Local Network Leads), Institutions (represented by Institutional Leads) and a Stakeholder Engagement Group. The Steering Group will be advised by an external Advisory Board comprising academics from the international research community. A schematic of the structure of CaRN is shown below, and is intended to reflect the mutually supporting elements of the Network.

The Steering Group, which currently comprises Robert Thibault, Clare Ardern, Kelly Cobey, Karim Khan, and David Moher is responsible for the overall coordination and direction of CaRN activity and strategy.

Local Networks provide a mechanism through which the aims of CaRN can be promoted within that institution (e.g., by establishing open research working groups, running training workshops, advocating for the wider adoption of best practice within the institution, etc.). A Local Network Lead provides the point of contact for CaRN,

and represents the grass-roots network of researchers at that institution. It is intended that these Local Networks will grow, both in number and size, over time, as researchers elect to participate in CaRN activity. Local Networks are self-organising, but we encourage them to ensure their membership is open to academic and research staff (at all levels) and professional services staff.

Institutions can join CaRN by formally committing to supporting the aims of the Network, creating a formal role within the senior management team (an Academic Lead for Research Improvement or similar), and supporting the delivery of CaRN activities (training, workshops etc.) within the institution (e.g., via undergraduate, postgraduate, postdoctoral and senior training programmes). This Institutional Lead is independent of the Local Network Lead, and is the institutional point of contact for CaRN, representing that institution's senior management team. The criteria for joining CaRN are provided at Annex 2 and a model role description for the Local Network Lead at Annex 3. External stakeholders (e.g., funders, publishers, learned societies) who support CaRN (either directly or via access to resources and other forms of support in kind) form the Stakeholder Engagement Group. This ensures that CaRN activity is aligned with the strategy and activity of the external stakeholders, and allows the exchange of ideas. In addition, the relationship between the Stakeholder Engagement Group and CaRN provides stakeholders with a mechanism for obtaining feedback on new initiatives from the research community. Detailed descriptions for the Institutional Leads, Stakeholder Engagement Group, and Advisory Board will be developed at a later date and are likely to resemble those described in Annex 4-6 of the UK Reproducibility Network Terms of Reference.

CaRN structure, with Local Network Leads (coordinating local network activity), Institutional Leads (working in partnership with Local Network Leads), Steering Group, Stakeholder Engagement Group and Advisory Board.

Elections

The CaRN Steering Group was formed in order to establish CaRN, and current members of the Steering Group are therefore unelected. As CaRN develops, we intend to transition to a model whereby Steering Group members are elected by Local Network Leads and Institutional Leads. We will also develop a process for electing the Steering Group chair.

Local Network Leads will initially comprise individuals who volunteer to establish local networks within their institutions, and are therefore also currently unelected.

Institutional Leads are nominated by their institution, or appointed via an internal process, as part of the process of formally joining CaRN. We ultimately hope that all partner institutions will have both Institutional Leads and Local Network Leads, and in time will develop internal processes for the appointment of these.

Accountability

CaRN Local Network Leads will work with and through the Steering Group, which will be advised by the Advisory Board and the Stakeholder Engagement Group. Individual members report to their Local Network Leads, and Local Networks are responsible for their internal governance (which may vary depending on the size of the Local Network, geographical distribution of the institution, etc.). The Steering Group and the Local Network Leads operate with the consent of the individual members.

Institutional Leads are independent of Local Networks, but are expected to work in partnership at an institutional level, to ensure coordination of activity and that any local initiatives are developed with the input of Local Network Leads and members. Conceptually, the intention is that Local Network Leads represent researchers directly and organise activity within the local network, whilst Institutional Leads represent the institution and organise institutional efforts. Both liaise independently with the Steering Group.

We have a Code of Conduct, which is available at Annex 4.

Ways of working

CaRN coordinates activity across Local Networks in three broad areas: 1) meta-research (including evaluation of innovations intended to improve research quality); 2) promoting training (e.g., delivery of short courses to early career researchers, preparation of online materials; coordination of virtual seminars and journals clubs); and 3) engagement with relevant external stakeholders (e.g., funders, publishers, learned societies, policymakers, etc.) to align and coordinate strategy and activity.

CaRN follows a distributed model, where Local Networks can be supported by individuals acting as advocates for the work of CaRN, or formally by their institution following a commitment of support for the aims of CaRN by that institution (as described in Annex 2). CaRN is currently seeking funding to support its initiatives. Information about the Network is presented on the CaRN website at www.carn-recar.ca. While the focus of CaRN is on improving Canadian research, an important role is to work with those in other countries who share our objectives of improving research.

Sharing of information

The primary means of communication between the Steering Group and Local Network Leads, Institutional Leads and external stakeholder representatives will be email, supplemented by meetings. The primary means of communication between Local Network Leads and members of Local Networks varies depending on the size of the Local Network, geographical distribution of the institution, etc.

Annex 1: Definition of Terms

There are several terms used to refer to the broad issues that the Canadian Reproducibility Network aims to address, and these are often used interchangeably. Our focus is on ensuring Canada produces robust, rigorous research. Below we list various terms and definitions that are widely used. When terms are used, it is important to be clear which meaning is intended by that word. In the context of the Canadian Reproducibility Network, the definition closest to our meaning is "results reproducibility" as defined by Goodman et al. (2016), but this is not to suggest that it is the "correct" definition.

The Concordat to Support Research Integrity (Hale et al., 2019)

Honesty in all aspects of research, including in the presentation of research goals, intentions and findings; in reporting on research methods and procedures; in gathering data; in using and acknowledging the work of other researchers; and in conveying valid interpretations and making justifiable claims based on research findings.

Rigour, in line with prevailing disciplinary norms and standards: in performing research and using appropriate methods; in adhering to an agreed protocol where appropriate; in drawing interpretations and conclusions from the research; and in communicating the results.

Transparency and open communication in declaring potential competing interests; in the reporting of research data collection methods; in the analysis and interpretation of data; in making research findings widely available, which includes publishing or otherwise sharing negative or null results to recognise their value as part of the research process; and in presenting the work to other researchers and to the public.

Care and respect for all participants in, and subjects, users and beneficiaries of research, including humans, animals, the environment and cultural objects. Those engaged with research must also show care and respect for the integrity of the research record.

Accountability of funders, employers and researchers to collectively create a research environment where individuals and organisations are empowered and enabled to own the research process. Those engaged with research must also ensure that individuals and organisations are held to account when behaviour falls short of the standards set by this concordat.

Reproducibility and Replicability in Science (National Academies of Sciences, Engineering and Medicine, 2019)

Reproducibility is defined as obtaining consistent computational results using the same input data, computational steps, methods, code, and conditions of analysis.

Replicability is defined as obtaining consistent results across studies aimed at answering the same scientific question, each of which has obtained its own data

Generalizability refers to the extent that results of a study apply in other contexts or populations that differ from the original one.

Goodman et al. (2016)

Goodman and colleagues propose a new terminology to distinguish between the various interpretations of reproducibility. Rather than offer new technical meanings for words whose common language interpretations are nearly identical (such as reproducibility, replicability, and repeatability), they propose to ally the word reproducibility—currently the most widely used single term in this domain—with descriptors for the underlying construct. This yields three terms: methods reproducibility, results reproducibility, and inferential reproducibility.

Results Reproducibility refers to obtaining the same results from the conduct of an independent study whose methods are as closely matched to the original as possible.

Methods Reproducibility refers to the provision of enough detail about study procedures and data so the same procedures could, in principle or actuality, be exactly repeated.

Inferential Reproducibility refers to the drawing of qualitatively similar conclusions from either an independent replication of a study or a re-analysis of the original study.

References

Goodman S., Fanelli D., Ioannidis J. (2016). What does research reproducibility mean? Translational Medicine doi:10.1126/scitranslmed.aaf5027

Hale et al. (2019). The Concordat to Support Research Integrity.

National Academies of Sciences, Engineering and Medicine (2019). Reproducibility and Replicability in Science.

Annex 2. Criteria for Joining CaRN

Overview

CaRN aims to understand the factors that contribute to poor research reproducibility and replicability, and to develop approaches to counter these and improve the quality of the research we produce. These issues affect all disciplines, so CaRN aims for broad disciplinary representation. CaRN's position is that ongoing efforts to address these issues represent an opportunity to improve our research by reforming culture and practice.

Membership

CaRN members will form Local Networks at individual institutions (consisting of individual researchers who come together informally and are represented by a Local Network Lead) and external stakeholders (funders, publishers and other elements of the academic ecosystem such as learned societies and service providers). We further aim to engage in patient and public involvement (PPI).

For CaRN, this structure will complement the activities of our Local Networks and external stakeholders, and allow greater coordination of activity across these. For institutions, this structure will provide peer support from colleagues across a community of institutions who are engaged with efforts to improve the quality of Canadian research.

Criteria for institutional membership

The primary criterion for membership is that the institution creates a senior academic role with responsibility for research improvement and research integrity (e.g., promoting adoption of open research practices and other relevant initiatives), reporting to the PVC (Research) or their equivalent, with an appropriate level of support. We expect this role will require a minimum commitment of 1 day per week.

Importantly, the role should be structured in such a way as to enable the role holder to provide critical input to the senior management team on these issues, and therefore should be independent from other responsibilities that may conflict with this.

We expect that institutions seeking membership of CaRN will want to develop capacity to deliver a research improvement strategy, and to work with CaRN to develop a strategy for ensuring the sustainability of the Network in the medium- and long-term, and to build a community of institutions focused on research improvement (for example, through sharing examples of best practice).

Annex 3: Model Role Description – Local Network Lead

Note: We particularly encourage local network leads that capture the diversity of the researchers that we represent (e.g., gender, ethnicity, etc.), and we would ask that institutions bear this in mind when identifying local network leads.

The role of the CaRN Local Network Lead is to build an informal group of multidisciplinary researchers at all career stages interested in issues of research reproducibility and improvement. This includes facilitating communication on reproducibility-related issues between teams within the institution, and linking the institution to the wider CaRN community, partly through engagement in CaRN activities and partly through communication with the CaRN steering group.

The Local Network Lead at each institution should be motivated towards improving reproducibility and Open Research within their institution. In order to achieve this, they should have a good level of understanding (or a willingness to learn) about the institution's processes and how various teams within the institution work and interact. Where an institution is a formal member of CaRN, the Local Network Lead will work closely with the Institutional Lead where one exists.

As the structure and function of different local networks is likely to differ considerably between institutions, activities performed by the Local Network Lead will be context dependent. However, specific responsibilities may include:

- Disseminating information from CaRN to its members on events, new initiatives, etc.
- Gathering information and views from local network members to feed back to CaRN
- Sending regular updates to the CaRN Steering Group with any news from the local network
- Initiating or coordinating local initiatives to promote reproducibility (e.g., ReproducibiliTea Journal Club, Open Research Working Group)
- Communicating regularly (either via meetings, email or teleconference) with other CaRN representatives and Local Network Leads to share knowledge on what works/doesn't work at other CaRN-affiliated institutions
- Maintaining dialogue with other key groups within their institution that may promote Open Research (e.g., Institutional Lead, Library Services, Research Governance Teams, Data Repository Teams)

Annex 4: CaRN Code of Conduct

Introduction

The Canadian Reproducibility Network (CaRN) is a peer-led consortium that aims to create a healthy and vigorous Canadian research ecosystem where all outputs are trustworthy, rigorous, and reproducible, by investigating the factors that contribute to robust research, providing training and disseminating best practice, and working with external stakeholders to ensure coordination of efforts across the sector. It is led by the CaRN Steering Group ("the Steering Group"), which currently comprises Robert Thibault (Stanford University), Clare Ardern (University of British Columbia), Kelly Cobey (University of Ottawa Heart Institute), Karim Khan (University of British Columbia), and David Moher (Ottawa Hospital Research Institute).

CaRN aims to understand the factors that contribute to poor research reproducibility and replicability, and to develop approaches to counter these and improve the quality of the research we produce. These issues affect all disciplines, so CaRN aims for broad disciplinary representation. CaRN's position is that ongoing efforts to address these issues represent an opportunity to improve our research by reforming culture and practice. Consistent with this, all participants in our activity, events and communications are expected to show respect and courtesy to others.

To this end, everyone participating in CaRN-related activity is required to adhere to the Code of Conduct. This Code of Conduct applies to all CaRN activity including, but not limited to, meetings, email, and online space. Meeting hosts are expected to assist with the enforcement of the Code of Conduct. By taking part, participants indicate their acceptance of the procedures by which the CaRN resolves any Code of Conduct incidents, which may include storage and processing of their personal information.

The CaRN Steering Group is responsible for enforcing the Code of Conduct. It can be contacted by emailing info@carn-recar.ca, or via an anonymous form available at the CaRN website www.carn-recar.ca/contact. All reports will be reviewed by the Steering Group and will be kept confidential.

CaRN Code of Conduct

CaRN is dedicated to providing a welcoming and supportive environment for all people, regardless of background or identity. As such, we do not tolerate behaviour that is disrespectful or that excludes or intimidates others. We do not tolerate discrimination or harassment based on characteristics that include, but are not limited to, sex, gender identity and expression, sexual orientation, disability, physical appearance, body size, citizenship, nationality, ethnic or social origin, pregnancy, familial status, veteran status, genetic information, religion or belief (or lack thereof), membership of a national minority, property, age, education, socio-economic status, technical choices, and experience level.

Expected Behaviour

All participants in our events and communications are expected to show respect and courtesy to others. All interactions should be professional regardless of platform (i.e., either online or in-person).

To foster a positive and professional environment we encourage the following kinds of behaviours in all CaRN events and communications:

- Use welcoming and inclusive language
- Be respectful of different viewpoints and experiences
- Gracefully accept constructive criticism
- Focus on what is best for the community
- Show courtesy and respect towards other community members

Unacceptable Behaviour

Examples of unacceptable behaviour by participants at any CaRN event/platform include:

- Written or verbal comments which have the effect of excluding people on the basis of membership of any specific group
- Causing someone to fear for their safety, such as through stalking, following, or intimidation
- Violent threats or language directed against another person
- The display of sexual or violent images
- Unwelcome sexual attention
- Non-consensual or unwelcome physical contact
- Sustained disruption of talks, events or communications
- Insults or put downs
- Sexist, racist, homophobic, transphobic, ableist, or exclusionary jokes
- Excessive swearing
- Incitement to violence, suicide, or self-harm
- Continuing to initiate interaction (including photography or recording) with someone after being asked to stop
- Publication of private communication without consent

Consequences of Unacceptable Behaviour

Participants who are asked to stop any inappropriate behaviour are expected to comply immediately. This applies to any CaRN events and platforms, either online or in-person. If a participant engages in behaviour that violates this Code of Conduct, the organizers may warn the offender, ask them to leave the event or platform (without refund, if applicable), or engage the Steering Group to investigate the Code of Conduct violation and impose appropriate sanctions if necessary.

Incident Reporting Guidelines Contact points

If someone violates the Code of Conduct during a CaRN-related event we ask that you report it to the event host, organiser, or a designated incident response person. The person you have talked to should make a report to CaRN about the incident by emailing the Steering Group at info@carn-recar.ca. If this is not possible for some reason, we would be very grateful if you could report the incident yourself.

If a violation occurs in an online space outside of organised events, please email the Steering Group at info@carn-recar.ca about the incident, or complete a report via the anonymous form available at the CaRN website www.carn-recar.ca/contact.

What to do if someone is in physical danger

If you believe someone is in physical danger, please ask a staff member or volunteer to contact appropriate emergency services. All event organizers should, before the event, determine who it would be appropriate to contact in case of an incident. Once the incident has been resolved, we ask that it be reported to the Steering Group in the same way as all other incidents.