Swiss Reproducibility Network (SwissRN)

Strategy Framework

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Aim of the SwissRN Strategy Framework

The SwissRN strategy framework determines the long-term goals and objectives and provides the strategic direction and priorities of the SwissRN. Key steps in the implementation process are outlined to allow for future planning and monitoring of the translation of the long-term goals and objectives into courses of action at the operational level. As a living document, it will assist in prioritizing actions and in determining the necessary resources.

1. Situation Analysis
a. Background: Open Science vs. Reproducible Research

Science is evolving, with two major movements currently ongoing, both aiming to change research culture: (1) Open Science, and (2) Reproducible Research[1]. **Open Science** is defined in the Swiss National Open Science Strategy of swissuniversities[2] as follows:

> *"Open science is about the way research, education and innovation are carried out, disseminated, deployed and transformed by digital tools, networks and media. It relies on the combined effects of technological development and cultural change towards collaboration and openness throughout the spectrum of scientific activities. Open science makes scientific processes more efficient, transparent and effective by offering new tools for scientific collaboration, experiments and analysis and by making scientific knowledge as openly findable, accessible, interoperable and reusable (FAIR) as possible."*

This definition goes beyond what is often understood to be "standard" Open Science such as open access, open data, open materials, and the tools and infrastructure that facilitate these practices. However, an even broader perspective of Open Science is increasingly taken, with the aims to advance science by increasing openness and transparency of research, with practices such as citizen science, publication of null results, promotion of replication studies, preregistration, and registered reports. For example, the LERU document "Open Science and its role in universities: a roadmap for cultural change"[3] and the Open Science Policy of the University of Zurich[4] take this broader view of Open Science.

While this broader view of Open Science includes many aspects of **Reproducible Research**, we argue that the two terms and concepts are in fact complementary. The Directorate-General for Research and Innovation of the European Commission[5] writes

> *"The reproducibility of scientific results has become today a proxy term for many desirable attributes of science, including good quality, reliability and efficiency. In a rather general sense, reproducibility refers to the possibility for scientists, and by extension for the scientific community at large, to obtain the same results as the originators of some specific scientific findings."*

Reproducible Research therefore builds upon an increased level of knowledge and skills related to methodology and data science, the availability of detailed methodological and analytical decisions in the research pipeline, and systematic evidence-based assessment and reporting of scientific results.

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[1] The term reproducibility is used in this document as an umbrella term and refers to both reproducibility and replicability as defined in https://nap.nationalacademies.org/catalog/25303/reproducibility-and-replicability-in-science

[2] https://www.swissuniversities.ch/fileadmin/swissuniversities/Dokumente/Organisation/SUK-P/SUK_P-2/OpenScience_Strategy_v2.5_clean.pdf

[3] https://www.leru.org/publications/open-science-and-its-role-in-universities-a-roadmap-for-cultural-change

[4] https://www.openscience.uzh.ch/en/definition/policy.html

[5] https://op.europa.eu/en/publication-detail/-/publication/6bc538ad-344f-11eb-b27b-01aa75ed71a1

Open data and open code are important parts of this endeavor because they allow quality control by other researchers. A call for more methodological training and support, for more collaborative research and its recognition for academic careers, and for shifting the incentives for scientists to reflect quality and rigor, as opposed to novelty, has been recently put forward in "A Manifesto for Reproducible Research"[6]:

> "Here we propose a series of measures that we believe will improve research efficiency and robustness of scientific findings by directly targeting specific threats to reproducible science. We argue for the adoption, evaluation and ongoing improvement of these measures to optimize the pace and efficiency of knowledge accumulation. The measures are organized into the following categories: methods, reporting and dissemination, reproducibility, evaluation and incentives."

While often operating in parallel with limited interaction (but see the Social Sciences and specifically Psychology for an exception[7]), both movements therefore aim to improve research: **From good to better research**.

b. Background: Reproducibility Crisis

The so-called Reproducibility Crisis was the motivation for the Reproducible Research movement[8], although its existence and the use of the term "crisis" are debated[9,10]. A prominent survey among scientists on the reproducibility of their respective fields shows stark differences between disciplines and the need to adapt good research practices and to provide the corresponding tools[11]. There is a common understanding that the crisis has arisen partly as a result of a lack of research transparency at various stages of the research pipeline and a lack of incentives at both individual researcher and institutional level to adopt open and transparent practices[12].

The tools and practices that were proposed by the community as a reaction to the crisis show an increasing overlap between the movement for Open Science and for Reproducible Research.

c. History, structure and governance of SwissRN

SwissRN was founded in July 2020. It is part of a growing international movement with the first network in the United Kingdom, and subsequent initiatives in Australia, Belgium, Brazil, Canada, Finland, Germany, Italy, Norway, Portugal, Slovakia, and Sweden[13] at the time of writing. In Switzerland, the network was launched on the initiative of researchers from the Universities of Bern, Geneva and Zurich (L. Held, E. Vergauwe, H. Würbel). The University of Zurich was the first institution to formally join the network and provides the coordinating body. The Swiss National Science Foundation and the Swiss Academies of Arts and Sciences have been supporting SwissRN since the launch of the network.

SwissRN is a peer-led consortium of researchers across Switzerland. It is headed by a **Steering Committee** aiming for broad disciplinary representation and an intensive interdisciplinary dialogue to improve reproducibility among all empirical disciplines. The core of SwissRN activities happens at the **Local Nodes,** the working groups and the academy (see below) of the network, i.e. within and across the participating research institutions. Local nodes are self-organizing groups of researchers and staff interested in issues of research reproducibility and improvement. Local node activities include cross-disciplinary journal clubs (e.g., ReproducibiliTea), Open Science working groups, and peer groups for research proposal review. Each local node has a leader who is the point of contact for SwissRN.

Research institutions can join the SwissRN as **Institutional Members** to formally support the aims of the network. Institutional members are expected to invest in research improvement, e.g. through the support of training programs in Good Research Practice. Institutional members have an appointed contact in the senior management. The corresponding local node leader is the primary SwissRN

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[6] https://dx.doi.org/10.1038/s41562-016-0021
[7] https://dx.doi.org/10.1126/science.1245317
[8] https://doi.org/10.1038/d41586-019-01307-2
[9] https://doi.org/10.1073/pnas.1708272114
[10] https://doi.org/10.1186/s13104-022-05942-3
[11] https://doi.org/10.1038/533452a
[12] https://doi.org/10.1186/s13104-021-05883-3
[13] See also here: https://www.ukrn.org/international-networks/

contact person for the responsible member of the senior management. Institutional members are expected to support the activities of their local nodes (either in-kind or financially). Currently, the Universities of Basel, Bern, Fribourg, Geneva and Zurich, the Università della Svizzera italiana, the Zurich University of Applied Sciences and the UniDistance Suisse are institutional members of SwissRN.

As of 2023 the organizational development related to institutional membership will be one key strategic goal. New membership models have been discussed at the Annual Meeting on 13.1.2023, and the possibility of requiring financial contributions from institutional members will be revised. In the near future, institutional members will be required to pay a membership fee.

SwissRN is supported by stakeholders through the **Stakeholder Engagement Group**. This ensures that SwissRN activities are aligned with the strategy and activities of the stakeholders, and allows the exchange of ideas on new initiatives from the research community. Potential stakeholders include funders (both governmental and charity), learned societies and other non-profit organizations that are part of the academic environment. To become a member of the Stakeholder Engagement Group an organization has to provide direct financial or in-kind support to SwissRN and is required to agree to the mission and values of SwissRN. Currently, the Swiss National Science Foundation (SNSF), the Swiss Academies of Arts and Sciences, the Swiss Centre of Expertise in the Social Sciences (FORS), and the Swiss Psychological Society (SPS) are stakeholders of SwissRN.

An external **Advisory Board** comprising academics from the international research community with expertise related to the goals of the network supports the steering committee regarding strategy and direction.

Working Groups, in which members from different local nodes, some of the stakeholders, and members of the advisory board work together, are proposing and carrying out concrete projects on specific topics. The current topics are:

- Preregistration and Registered Reports (holds workshops on preregistration)
- Research Assessment and Incentives (plans a survey on researcher engagement)
- Replication Studies
- Research Methodology
- Training (published a paper in PLOS Comp Biol: Ten simple rules for good research practice)
- Computational Reproducibility
- Open Research Data (currently being created)

Finally, PhDs, Postdocs and students can join the **Academy**, which is a group of early career researchers from Swiss universities who are interested in reproducibility, metascience, good research practices, and transparency. Their goal is to create a national network among young researchers from various fields and backgrounds, that enables interdisciplinary dialogue and collaboration in order to improve the quality of science by sharing knowledge of reproducible research.
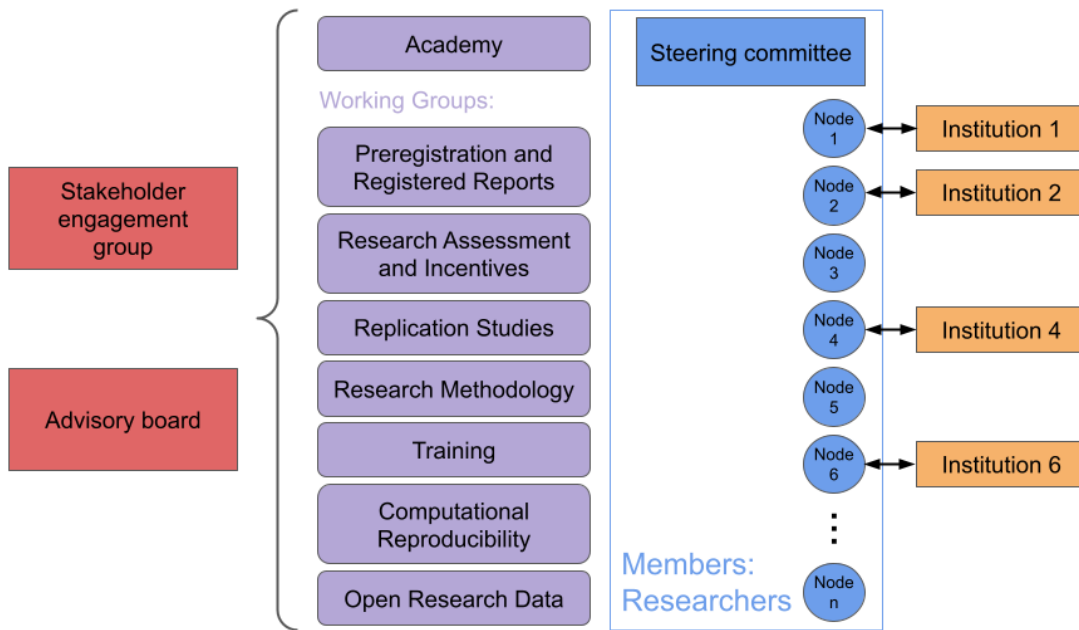
Figure 2: Schematic overview of the structure of SwissRN.

2. Strategy Framework

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

a. Vision, Mission and Values

Vision
To ensure that research in Switzerland is excellent and trustworthy.

Mission
To engage and empower researchers across Switzerland to make their research rigorous, transparent and reproducible (RTR) and to connect the community with national and international stakeholders to facilitate RTR research practices.

Values
SwissRN expects its members to remain inclusive, transparent, collaborative, respectful, scientific, reliable and committed. These values are at the core of the movement towards Open Science and Reproducible Research.

b. Long-term goals

The long-term goals that SwissRN pursues are:
  A. **Promotion and Communication:** To increase the visibility, improve the understanding, and promote the advantages of RTR research practices across all empirical disciplines in Switzerland.
  B. **Knowledge Development and Application:** To ensure that RTR research practices are used appropriately and as widely as possible across all disciplines in Switzerland.
  C. **Research Culture:** To promote a positive and collaborative research culture through exchange and community-building across research institutions and stakeholders fostering the conduct of RTR research.

c. Types of activities

SwissRN has identified six types of activities that will play key roles in achieving the long-term goals:
  1. Promoting and disseminating RTR research practices.
  2. Teaching RTR research practices.
  3. Monitoring the knowledge and use of RTR research practices.
  4. Identifying new approaches, techniques and practices to improve research quality, and evaluating their effectiveness.
  5. Monitoring research culture and incentives.
  6. Facilitating exchange and community-building across research institutions and stakeholders.

d.   Objectives

To achieve the long-term goals A-C, the SwissRN steering committee agreed on 15 short- to mid-term objectives. These will be updated based on future developments and input from local nodes and the advisory board. The objectives are not ranked since for most of them their realization depends on funding and it is not predictable for which objective appropriate funding may be obtained.

A. Promotion and communication

  A1. Promote ReproducibiliTea journal clubs (cf. https://reproducibilitea.org/) as a means to offer critical reflection and networking within institutions on issues regarding RTR practices

  A2. Establish a Swiss Reproducibility Award in Switzerland

  A3. Actively support the SwissRN Academy in extending their network of early career researchers across disciplines on the national level

A4. Promote the benefits of RTR practices to the national scientific community

A5. Coordinate RTR activities with the Open Research Data (ORD) ecosystem

B. Knowledge development and application

B1. Monitor and improve ORD practices in Switzerland

B2. Promote and facilitate pre-registration of study protocols in Switzerland

B3. Promote Bachelor and Master level training in RTR practices

B4. Develop and provide training on RTR practices for PhD students (e.g. by establishing a Summer School)

B5. Address the funding gap for resources that RTR practices require

C. Research Culture

C1. Establish SwissRN as the national think tank on reproducibility with specific expertise represented in targeted working groups

C2. Connect researchers in SwissRN working groups to create synergies across different scientific fields

C3. Build and enable collaboration across the network

C4. Work with stakeholders to ensure coordination of efforts

C5. Align efforts with international networks

3. Implementation

Key steps in the implementation process of the SwissRN strategy described above are outlined in the table below. The actual implementation plan at operational level will depend on the type and extent of funding SwissRN will be able to secure.

	Type of activity	Objective	Current state and next steps
A1.	1, 2	Promote ReproducibiliTea journal clubs as a means to offer critical reflection and networking within institutions on issues regarding RTR practices	- Four Universities have already established a ReproducibiliTea: Zurich, Geneva, Basel, Bern - Intensify advertising for the journal club - Provide merchandise (e.g. tea cups and stickers)
A2.	1, 5	Establish a Swiss Reproducibility Award in Switzerland	- First round in 2022, to be continued every other year - Intensify advertising - Secure funding - The Working group on Research Assessment and Incentives and the Steering committee will prepare funding applications
A3.	1, 6	Actively support the SwissRN Academy in extending their network of early career researchers across disciplines on the national level	- Academy was established in 2021 - Academy organized a ReproHack in 2022, may become a regular activity - SwissRN intensifies advertising for the Academy and their events
A4.	1	Promote the benefits of RTR practices to the national scientific community	- Increase the number of institutional members of SwissRN - Establishment of National Swiss Reproducibility Conference - Establishment of the SwissRN Annual Meeting to reach a wider audience, raising awareness for Reproducible Research and Open Science
A5.	1, 6	Coordinate RTR activities with the ORD ecosystem	- The Working group on Computational Reproducibility will monitor potential synergies
B1.	3	Monitor and improve Open Research Data practices in Switzerland	- SwissRN submitted the project "Strengthen the Interoperability and Reusability of Research Outputs (SIRRO)" to the ORD call by swissuniversities (Action Line A, Track A), several Working groups are involved.

			Project has been approved and will be financed by swissuniversities and matching funds from UNIBE, UNIGE and UZH.
B2.	1, 3	Promote and facilitate pre-registration of study protocols in Switzerland	- SwissRN submitted the project "SIRRO" to the ORD call by swissuniversities (Action Line A, Track A), several Working groups are involved. Project has been approved and will be financed by swissuniversities and matching funds from UNIBE, UNIGE and UZH. - SwissRN will participate in a feasibility study on pre-registration of animal studies mandated by the FSVO - Contact with institutional repositories to motivate the inclusion of links to pre-registrations (e.g. Zurich, through the network of RDM managers, FORS) - Training sessions on pre-registrations in collaboration with the 3R coordinators (Zurich, Geneva)
B3.	2	Promote Bachelor and Master level training courses in RTR practices	- DISK4U project at the Center for Reproducible Science (CRS) at the University of Zurich, to be released as Open Educational Resource - The Working group on Training evaluated the RTR course offers in Switzerland and plans to provide systematic monitoring
B4.	2	Develop and provide training on RTR practices for PhD students (e.g. by establishing a Summer School)	- Participation in the summer school on Open Science organized by the University of Zurich - The Working group on Training is preparing a carpentries course that could be part of the basis.
B5.	1, 5	Address the funding gap for resources that RTR practices require	- SwissRN participated in an EU proposal (unfunded) - SwissRN participates in proposals for several EU calls
C1.	6	Establish SwissRN as the national think tank on reproducibility with specific expertise represented in the working groups	- Current and past interactions with the Academies, SNSF and swissuniversities - Members of the SwissRN steering committee are also members of the ORD sounding board and the ORD task force in Health and Life Science - SwissRN submitted the project "SIRRO" to the ORD call by swissuniversities (Action Line A, Track A), several Working groups are involved. Project has been approved and will be financed by swissuniversities and matching

			funds from UNIBE, UNIGE and UZH.
C2.	1, 6, 4	Connect researchers in SwissRN Working Groups to create synergies across different scientific fields	- Support the establishment of Working Groups on relevant topics, as well as the consolidation and strengthening of existing Working Groups - Regular discussion in quarterly local node meetings - Focus on one of the Working Groups at the Annual Meeting
C3.	1, 6, 4	Build and enable collaboration across the network	- Identify funding opportunities for collaborative projects (e.g. Synergia)
C4.	6	Work with stakeholders to ensure coordination of efforts	- Current and past interactions with the Academies, SNSF and swissuniversities
C5.	6	Align efforts with international networks	- SwissRN organized the 2021 first meeting of the international Reproducibility Networks - Regular meetings with international reproducibility networks - EU proposal initiated through the international reproducibility networks

4. Roadmap 2023 - 2025

Based on the above long-term goals and objectives SwissRN plans the following milestones for the timeframe of 2023 - 2025.

2023

- Annual Meeting 2022/23 to foster network and start strategic development process
- Development of memberships, financial models and network
- Monitoring the knowledge and use of RTR research practices (financed by swissuniversities P5 program and matching funds)
- Explore possibilities to provide expertise on RTR and ORD practices to SNSF (review and analysis of ORD practices in nationally funded research project)

2024

- Initiate and organize the First National Conference on Reproducibility in Switzerland with Swiss Reproducibility Award (partner: SNSF; to be held every other year)
- Increase number of institutional members
  (2022: 8 institutional members, target beginning 2024: 10)
- Monitoring the knowledge and use of RTR research practices (if financed by swissuniversities P5 program; decision pending, to be decided in March 2023)
- Provide expertise on RTR and ORD practices to SNSF (if financed by mandate)

2025

- Increase number of institutional members (target beginning 2025: 12)
- Provide expertise on RTR and ORD practices

Swiss Reproducibility Network (SwissRN), https://www.swissrn.org

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