

Open Science & Reproducibility

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The Helmholtz Open Science Office

- **Our Mission:** Enabling Open Science practices in Helmholtz!
- The Helmholtz Open Science Office
 - is a service provider for the Association for the cultural change “from closed to open”.
 - promotes dialogue and provides impulses within the Association.
 - offers training and support concerning all aspects of open science.
 - represents Helmholtz positions on open science on a national and international level.

Team

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- Christoph Bruch
- Lea Maria Ferguson
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Open Science

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Open Science

- “Open Science, the **unrestricted access to scientific publications and cultural heritage**, is an ongoing and future trend in the scientific landscape worldwide.”
[Helmholtz Open Science Office](#)
- “**Open Science** (...) make[s] multilingual scientific knowledge openly available, accessible and reusable for everyone, increase[s] scientific collaborations and sharing of information (...), and open[s] the processes of scientific knowledge creation (...) to societal actors beyond the traditional scientific community.”
[UNESCO Recommendation on Open Science](#)
- **Key aspects** of Open Science
 - Open Access
 - Open Research Data
 - Open Research Software

Advantages

- There are manifold advantages resulting from open science, and some of the main benefits include:
- Important: Openness as “intelligent openness”, i.e., “as open as possible and as closed as necessary”.



Open Science in the Helmholtz Association

Core themes

- Open Access Quota
- Open Software Forum, Spotlights and Policies
- Open Data Policies and Forum
- Open Science Policy

Resources on Open Research Data

- [Position paper](#) "Making information resources more usable"
- [Recommendations](#) for guidelines of the Helmholtz Centers for handling research data (in German only: „Empfehlungen für Richtlinien der Helmholtz-Zentren zum Umgang mit Forschungsdaten“)
- [Research Data Policies](#) of the Helmholtz Centers
- [Resources on Open Research Software](#)
- [Position paper](#) "Access to and re-use of research software" (German only)
- [Model guideline](#) "Model guideline for sustainable research software at the Helmholtz Centers" (German only)
- [Recommendations](#) "Recommendations for the implementation of guidelines and policies for handling research software at the Helmholtz Centers" (German only)

Definitions of Reproducibility

Reproducibility is the ability to recalculate a figure from data, parameters and programs
(Schwab M, et al., 2000)

Reproducibility is the ability of independent investigators to draw the same conclusions from an
experiment by following the documentation shared by the original investigators.
(Gundersen, O.E., 2021)

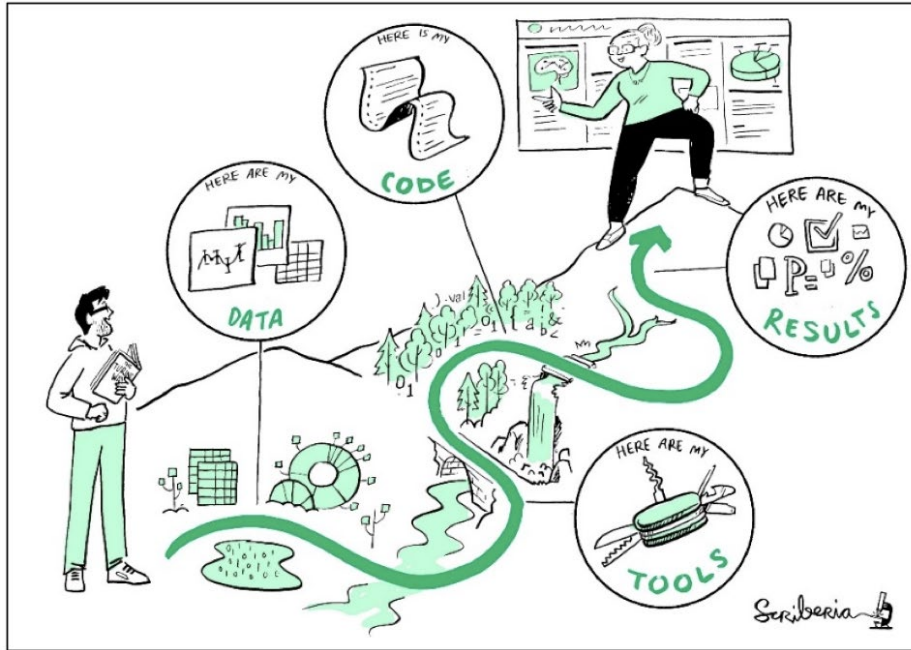
Repeatability (same team, same experimental setup)

Replicability (different team, same experimental setup)

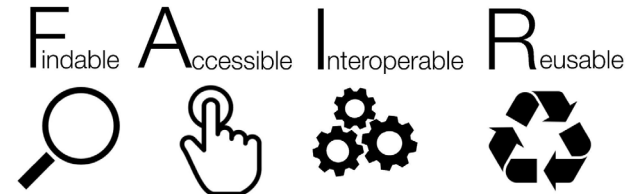
Reproducibility (different team, different experimental setup)

(ACM, 2016, <https://www.acm.org/publications/policies/artifact-review-badging>)

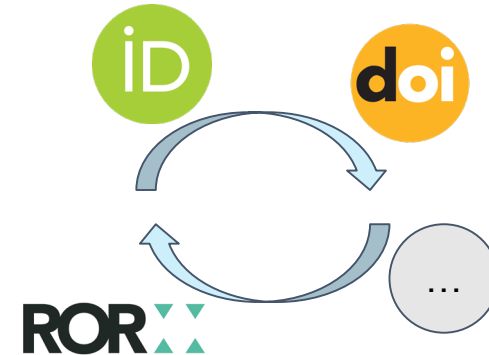
Hand in Hand: Open Science and Reproducibility



The Turing Way Community, & Scriberia. (2020). Illustrations from the Turing Way book dashes. Zenodo. <https://doi.org/10.5281/zenodo.3695300>



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More information: www.go-fair.org/fair-principles/



More information: <https://pidforum.org/>

Evaluating and Reforming Open Science Incentives

Background and Challenges

- Helmholtz: [Program-Oriented Funding \(PoF\)](#) indicators.
- Different research fields: different publication practices, places and platforms.
- Not all incentives, indicators, and KPIs are suitable for the different research fields; there is a need for more incentives for Open Science practices.
- **Aim:** Creating indicators that incentivize Open Science practices, and enable appreciation of the work involved.

Activities and Initiatives

- Helmholtz Open Science Forum "[Indicators for Open Science](#)"
- Task group "Helmholtz Quality Indicators for Data and Software Products" of the Working Group Open Science
- [Process towards an agreement on reforming research assessment](#) - Core Group of the EU Commission



You are not alone:

German Reproducibility Network (GRN)

- a cross-disciplinary consortium, which promotes reproducible and robust research on a national level.
- [Website](#) | Twitter: [@GermanRepro](#)
- Part of the founding members are Helmholtz AI and the Helmholtz Open Science Office
- [Bernadette Fritzsich](#) (AWI), [Peter Steinbach](#) (Helmholtz AI), [Tobias Schlauch](#) (HIFIS) & [Antonia Schrader](#) (Helmholtz Open Science Office) are members of the steering committee.
- Please feel free to share your reproducibility related content!



Become a member of the GRN!

[How to join](#)

Helpful resources

Reproducibility in practice



ReproHack Hub

Host a hackathon doing live peer reviews trying to reproduce your publication



Turing Way Project

The place-to-go for all things reproducibility



The Carpentries

Managing Open and Reproducible Computational Projects training material

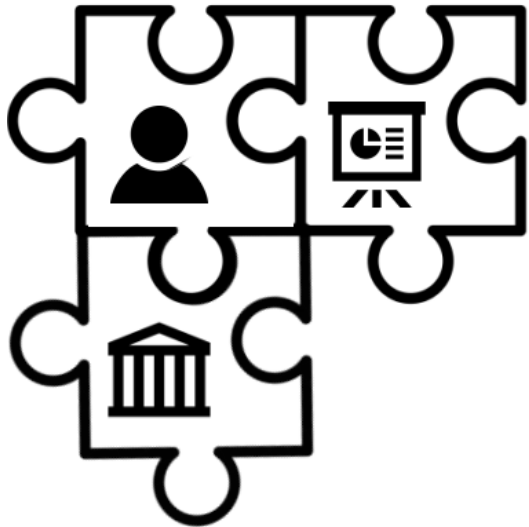
Publications

- Ferguson, L. M., Schrader, A. C., Seibold, H., Weisweiler, N. L. (2021): Open Science Factsheet No. 2: [] Practical Steps Towards Open and Reproducible Research, Potsdam: Helmholtz Open Science Office. <https://doi.org/10.48440/os.helmholtz.025>
- Messerschmidt, R., Schrader, A. C. (2021): Offene Forschungssoftware als integraler Bestandteil von Open Science und guter wissenschaftlicher Praxis, CampusSource Tagung 2021 am 26. Mai 2021. Online. https://gfzpublic.gfz-potsdam.de/pubman/item/item_5006432
- Fritzsche, B. (2022). Reproduzierbarkeit - Viele kleine Schritte zu einem großen Ziel. RDA Germany Conference 2022. [Link](#)
- Bertuch, O. (2022): Reproducibility in Practice. Tools and Methods for every step. RDA Germany Conference 2022. [Link](#)

Synergies and Collaboration

Open Science and Reproducibility

- Open Science and Reproducibility go hand in hand.



- Open Science - Cultural change in the scientific way of working, organization, and communication
- Achieve reproducibility - make science open, comprehensible, reusable, and easily accessible to everyone by employing fitting infrastructures and tools (PIDs, FAIR, etc.)
- Adjustments of incentives and rewards system needed - Change process

How can we work together to further promote the “Open Science Culture” within the Association?

Discussion Questions

1. What role do Open Science and Reproducibility play in your own research?
2. Do you rather see synergies or challenges in combining the aims of openness and reproducibility?
3. What do you experience as the greatest obstacles to Open Science and Reproducibility in your daily work?
How might these be overcome or ameliorated?
4. Do you have case studies or examples to share of your own engagement with Open Science and Reproducibility practices that could be inspirational for other researchers?
5. Which resources, events, or infrastructures could support your Open Science and Reproducibility activities further?

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Keep in touch

- Email - open-science@helmholtz.de
- Twitter - [@helmholtz_os](https://twitter.com/helmholtz_os)
- Website - www.os.helmholtz.de
- Mailing list for members of Helmholtz - [Helmholtz Open Science Professionals](#)
- [Open Science Newsletter](#)

Thank you for your attention!

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