Helmholtz Open Science Briefing

# 6th Helmholtz Open Science Forum: Software Quality Assurance at Helmholtz

February 2025

Report

# Imprint

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# Contents

# 1 Introduction

As expressed in the Helmholtz Open Science Policy,[1] the Helmholtz Association aim is to achieve research software policies at all the Helmholtz Centers by 2025. To support this endeavor, the Task Group Research Software of the Working Group Open Science[2] and the Helmholtz Open Science Office[3] offers the Helmholtz Open Science Forum on Research Software to bring together the community and streamline efforts within the Association to support the development and maintenance of research software.

Software Quality Assurance plays a crucial role within the Helmholtz Association to ensure the long-term usability, reproducibility, and transparency of research software. A structured approach to quality assurance guarantees that software products are developed, documented, and maintained sustainably.

The 6th iteration of the Research Software Forum[4], on-site at Forschungszentrum Jülich from 12–13 February 2025, featured possibilities for how a structured approach to quality assurance may ensure that software products are developed, documented, and maintained sustainably. The 30 participants of the workshop represented 14 of the 18 Helmholtz Centers. The program covered key topics such as the introduction and implementation of quality indicators for research software, hands-on sessions for issue identification and resolution, and updates on Helmholtz-wide software projects like JuRSE and HiRSE. With contributions from various Helmholtz Centers, the forum provided a valuable platform for knowledge exchange and the development of joint strategies to enhance research software quality across the Association.

Previous Helmholtz Open Science Fora on Research Software event were held in May 2021,[5] April 2022,[6] November 2022,[7] May 2023,[8] and February 2024.[9]

[1] https://os.helmholtz.de/en/open-science-in-helmholtz/open-science-policy/
[2] https://os.helmholtz.de/en/open-science-in-helmholtz/working-group-open-science/task-group-research-software/
[3] https://os.helmholtz.de
[4] https://os.helmholtz.de/veranstaltungen/foren/6-forum-forschungssoftware/
[5] https://os.helmholtz.de/veranstaltungen/foren/1-forum-forschungssoftware/
[6] https://os.helmholtz.de/veranstaltungen/foren/2-forum-forschungssoftware/
[7] https://os.helmholtz.de/en/events/fora/3rd-forum-research-software/
[8] https://os.helmholtz.de/en/events/fora/4th-forum-research-software/
[9] https://os.helmholtz.de/en/events/fora/5th-forum-research-software/

# 2 Program

Table 1: Program on Wednesday, February 12, 2025

| Time | Program | Speaker |
|---|---|---|
| 12:45 | Welcome | Christoph Bruch and Lea Maria Ferguson, Helmholtz Open Science Office |
| | Organizational Matters | Michael Denker, FZJ |
| 13:00 | Session 1: Software Indicator I | Guido Juckeland, HZDR |
| | 1. Introduction of Quality Indicator for Research Software Publications | |
| | 2. Role of Helmholtz Research Software Directory in Collection Information for the Quality Indicator for Research Software Publications | |
| | Feedback from the Centers | |
| 14:30 | Break | |
| 15:00 | Session 2: Software Indicator II | Guido Juckeland and Katja Linnemann, HZDR |
| | 3. Implementing the quality indicator for research software publication: Reports from the Centers | |
| | 4. Hands-on Issue Identification and Solving | |
| 16:30 | Socializing and Dinner | |

Table 2: Program on Thursday, February 13, 2025

| Time | Program | Speaker |
|---|---|---|
| 09:00 | Session 3: Software Projects | |
| | 5. JuRSE: A Jülich Community of RSE Practice | Claire Wyatt (FZJ) |
| | 6. Joint Lab: Helmholtz Information - Research Software Engineering | René Caspart (KIT) |
| | 7. Towards Establishing Formal RSE Support in EU and Germany: Looking at One Year of EVERSE and Other National Activities | Guido Juckeland, HZDR |
| 10:30 | Break | |
| 11:00 | Session 4: Outlook and Strategy | Christoph Bruch and Lea Maria Ferguson, Helmholtz Open Science Office |

# 3 Presentations: Overview

## 3.1 Introduction of Quality Indicator for Research Software Publications[10]

In this session, Guido Juckeland (HZDR) presented the current status of the Quality Indicator for Research Software Publications at Helmholtz. He outlined the background developments as the Helmholtz Association is adding a new indicator for research data and research software publications to its reporting. The Task Group Helmholtz Quality Indicators for Data and Software Products[11] with members from all Helmholtz Centers has been working on defining this new indicator and the Helmholtz general assembly has approved its suggestion in its fall meeting of 2024. In this talk, the indicator as well as the ideas behind it and the methods to collect the information were introduced: The indicator is based on a maturity model looking at various aspects of a research software publication, thus also providing value to the authors of the software and research software researchers as it makes multiple aspects of research software as a scientific publication itself visible.

## 3.2 Role of Helmholtz Research Software Directory in Collection Information for the Quality Indicator for Research Software Publications[12]

In this session, Guido Juckeland (HZDR) presented the current status the Helmholtz Research Software Directory (Helmholtz RSD).[13] The RSD has been established as a central marketplace for research software within the Helmholtz Association, fostering visibility and reuse of software assets. The talk provided an overview of the current status of the Helmholtz RSD and highlighted key achievements from the year 2024. The newly developed License Consultation service,[14] that has been designed to establish a framework for tailored license consultation processes at individual Helmholtz Centers, was introduced. Additionally, advancements in the federation of individual RSD instances were presented. In this context, insight into the associated project nfdi.software[15] and its role in the RSD ecosystem was provided. Lastly, the contribution of the RSD to the Helmholtz Software Indicator was

[10] Please find the slides of this presentation in the appendix.
[11] https://os.helmholtz.de/en/open-science-in-helmholtz/working-group-open-science/task-group-quality-indicators/
[12] Please find the slides of this presentation in the appendix.
[13] https://helmholtz.software
[14] https://helmholtz.software/software/hifis-rsd
[15] https://www.gfz.de/en/sektion/escience-zentrum/projekte/nfdisoftware-nfdi-research-software-marketplace

outlined by indicating potential use cases that can aid software developers in assessing their research software for the upcoming PoF period[16].

## 3.3 Feedback from the Participating Centers' Representatives

The discussion with the participants presented insightful feedback from the Helmholtz Centers. Especially the definition of a software publication was discussed, emphasizing that it must be a citable artifact documented at a specific time and place. The evaluation of the polygon (particularly when viewed in the context of potential gaming of the evaluation mechanisms) was considered; it was noted that while some dimensions are easier to reach than others, the setup aims to raise the minimum standard. While concerns were raised about incentivizing the bare minimum, parallels were drawn to the measurement of paper publications. The discussion addressed whether minimum requirements incentivize exceeding the baseline, with scientific embedding considered in funding contexts rather than for individual evaluation. Further, quality assessment was discussed, with a focus on avoiding harmful quantitative metrics. Finally, fundamental questions about the reliability of aggregated numbers, including duplication removal, were raised. These topics are ongoing, with further discussions needed to refine evaluation methods, address quality concerns, and improve coordination across the Centers.

## 3.4 Implementing the Quality Indicator for Research Software Publication: Reports from the Centers and Hands-on Issue Identification and Solving

In this session, Katja Linnemann (HZDR) and Guido Juckeland (HZDR) organized an interactive and hands-on workshop on issue identification and problem-solving concerning the quality indicator for research software publications. To refine the quality dimensions, the "1, 2, 4, all Method"[17] was applied during brainstorming. This structured approach encouraged participants to first reflect individually, then discuss in pairs, and finally expand the conversation in larger groups to ensure diverse perspectives. The collected results are currently being analyzed using the Helmholtz Codebase[18] (a GitLab ticket system), allowing for systematic tracking, discussion, and refinement of the proposed quality dimensions. The numerous comments that were produced are being evaluated by the "Task Group Helmholtz Quality Indicators for Data and Software Products" to further refine the indicators and the methods for collecting the corresponding key figures.

[16] https://www.helmholtz.de/en/about-us/structure-and-governance/program-oriented-funding/
[17] https://www.liberatingstructures.com/1-1-2-4-all/
[18] https://codebase.helmholtz.cloud

## 3.5 Software Projects

### 3.5.1 JuRSE: A Jülich Community of RSE Practice[19]

Kicking off the project presentations, Claire Wyatt (FZJ) presented JuRSE (Jülich Research Software Engineering).[20] JuRSE is a FZJ-wide initiative working to raise awareness and increase visibility for scientists who code as well as to advertize best practice in coding. JuRSE aims to promote the impact on research, highlighting the increasingly critical and valuable role of research software and coding. In her talk, Claire updated the attendees on the progress of the JuRSE community of practice at FZJ and the provided initiatives that are available to everyone who codes and develops software in their academic role. The discussion covered the active participation in JuRSE – with a core team of 5 and around 200 people involved via Rocket Chat and mailing lists. The community follows a four-stage involvement process, with a gradual shift towards collaboration. Community Building includes an online community space to network and exchange knowledge with peers, training courses based on the FZJ Software Guidelines and dedicated workshops focusing on specific challenges, RSE support with weekly 'Open Hours', travel grants to attend RSE Conferences around the world, a seminar series hosted by HiRSE and JuRSE, raising awareness and visibility of research software code through 'Code of the Month' and disseminating information via a regular internal newsletter. The JuRSE team provides resources and knowledge for easier adoption of the FZJ Software Guidelines.

### 3.5.2 Joint Lab HiRSE: Helmholtz Information – Research Software Engineering[21]

René Caspart (KIT) outlined the HiRSE project[22] within Helmholtz Information transitioning from a preliminary study (HiRSE_PS) to the new project stage JL HiRSE, with a focus on community aspects and openness. Key goals include shifting the mindset towards understanding the relevance of research software and working towards PoF-V[23]. The project includes two main work packages: community software infrastructure groups and consulting/networking. Earlier activities include the HiRSE seminar series held virtually with recordings on YouTube, for example with an episode on the Helmholtz software quality indicator, and the HiRSE Code Promotion, a low-barrier, nation-wide awareness campaign for research software. Other activities started in the scope of the project include the first RSE

[19] Please find the slides of this presentation in the appendix.
[20] https://www.fz-juelich.de/en/rse
[21] Please find the slides of this presentation in the appendix.
[22] https://www.helmholtz-hirse.de/
[23] See also: https://www.helmholtz.de/en/about-us/structure-and-governance/program-oriented-funding/

Summer School in Germany hosted at KIT in 2024 with over 45 participants, as well as further workshops.

### 3.5.3 Towards Establishing Formal RSE Support in EU and Germany: Looking at One Year of EVERSE and Other National Activities

In this presentation, Guido Juckeland (HZDR) discussed efforts towards establishing formal RSE support in the EU and Germany, focusing on the European Virtual Institute for Research Software Excellence (EVERSE)[24]. In its first year, EVERSE developed the "RSQ-kit," a model of good practice for recognizing research software, and conducted interviews to highlight the use of research software. The initiative also worked on including Southern European communities that lack national RSE structures. EVERSE is exploring the possibility of becoming an EOSC-NODE in the research software domain. On the national level, strong ties exist between the existing RSE network and organizations like GI[25], HIFIS[26], and HiRSE[27].

# 4 Outlook

The meeting was concluded with a general discussion on future activities within Helmholtz supporting research software development. One key outcome of this conversation was the proposal for Helmholtz to have a more centralized presence at major open-source conferences, such as FrOSCon[28] and FOSDEM[29], to better connect with the open-source community, and to attract talent to the Assciation. Additionally, the participants discussed ways to improve strategic community engagement through improved branding and increased participation in relevant initiatives. The importance of enhancing policy adoption across Helmholtz Centers was also emphasized, with suggestions for events to encourage new policy creation and dissemination, including integrating the software quality indicator into this framework.

[24] https://eosc.eu/eu-project/everse/
[25] https://gi.de
[26] https://www.helmholtz.de/forschung/im-fokus/information-data-science/helmholtz-federated-it-services-hifis/
[27] https://www.helmholtz-hirse.de
[28] https://froscon.org
[29] https://fosdem.org/2025/

# 5 Annex: Presentation Slides

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# Helmholtz Quality Indicators for Software– & Data Products

Marcel Meistring
Helmholtz Association
Helmholtz Open Science Office

Guido Juckeland
Helmholtz-Zentrum Dresden Rossendorf

Helmholtz Research Software Forum
21. February 2025

Helmholtz

# Program-Oriented Funding – Quality Indicator

Mandate of the Helmholtz Members Assembly (2022):

- Development of a multidimensional quality indicator for data products

Goals:

- Broadening / Improvement of the evaluation of science within Helmholtz
- Improving the visibility and recognition of diverse research outputs beyond text publications.
- Improving the quality and reusability of published research data
- Promotion of Open Science Practices

Expansion of the mandate to include the aspect of research software

# Helmholtz Quality Indicators for Data and Software Products

- The [Task Group Helmholtz Quality Indicators for Data and Software Products] of the Working Group Open Science of the Helmholtz Association is dedicated to the development of Helmholtz Quality Indicators for Data and Software Products.
- Duration of TG: From March 2022 onwards;
- Inclusive approach: Representatives of all Helmholtz Centers
- Work in 3 groups: 1. Whole group ; 2. Sub-group research data ; 3. Sub-group research software
- Since reporting year 2023 (pub=2022): basic indicator for the presentation of citable research data publications was established as an incentive  within the framework of the PoF
- Development of “Quality indicator”

# Consensus and approach: multidimensional indicators

- Make the indicator valuable for all involved
- Cover all aspects of research data and software (tiers, types, research field)
- Focus on the quality of the processes
- Rely indicator on generic well-established concepts
- Align the indicator with intended objectives not technical conditions

Iterative and inclusive process with all people involved

1. Definition of suitable dimensions for assessing the quality of RD- & RSW-publications
2. Collection of specific attributes for each dimension
3. Application of a generic maturity model to the attributes to be able to assign numerical values for maturity levels in each attribute
4. Determining the maturity level for each dimension, based on weighted average values of the dimension's attributes
5. Summarized quality assessment

# Define quality dimensions and attributes
## Adapting/Modifying FAIR-Principles


Wilkinson, M. et al. (2016). https://doi.org/10.1038/sdata.2016.18


RDA FAIR Data Maturity Mod el Working Group (2020). https://doi.org/10.15497/rda00050


Chue Hong, N. P. et al. (2021). FAIR Principles for Research Software (FAIR4RS Principles). Research Data Alliance. https://doi.org/10.15497/RDA00065

# Defined quality dimensions – based on FAIR/FAIR4RS

**FAIR-C (Data)**

- Findable
- Accessible
- Interoperable
- Reusable
- Curation

**FAIR-ST (Software)**

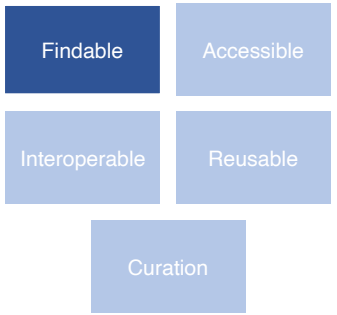
- Findable
- Accessible
- Interoperable
- Reusable
- Scientific embedding
- Technical grounded

# Defined attributes & how to measure them

Attributes = relevant aspects of quality in this one dimension

Example dimension „Findable“ (Software)

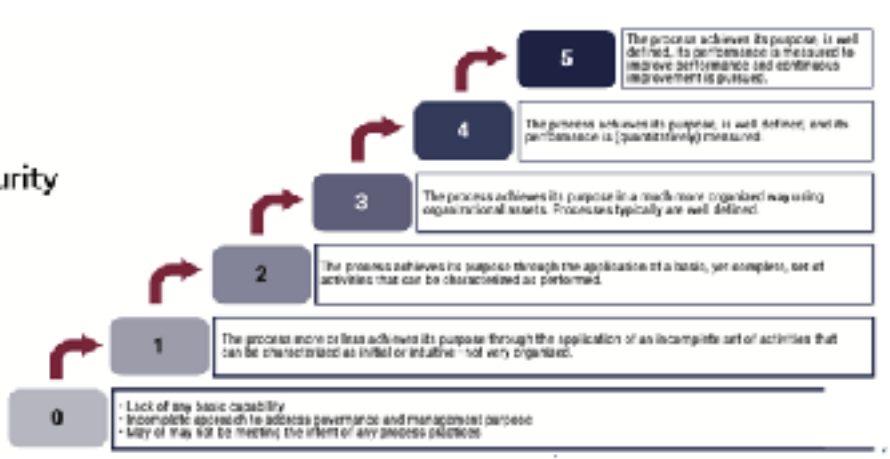
- Open Publication Repository
- Versioning
- Published with identifier
- Rich Metadata




## Measuring attributes:

Using the COBIT maturity model

- generic international recognized framework to assess the maturity level of IT processes
- adapted and modified for indicator
- definition of maturity levels for each attribute



# Maturity levels

Example data publication, dimension „Findable“

- **Maturity levels for attribute** „Open Publication Repository“

(0) There is no information available on where to find the software.

(1) The software is contained in an online repository.

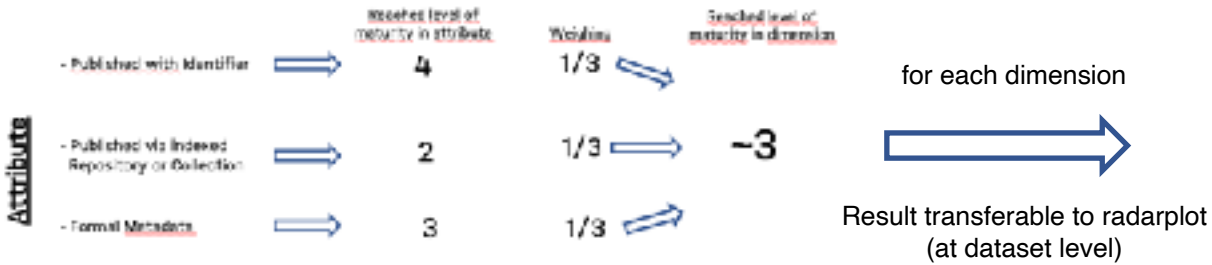
(2) Some kind of description is available giving further information on the software in this repository (e.g. readme file).

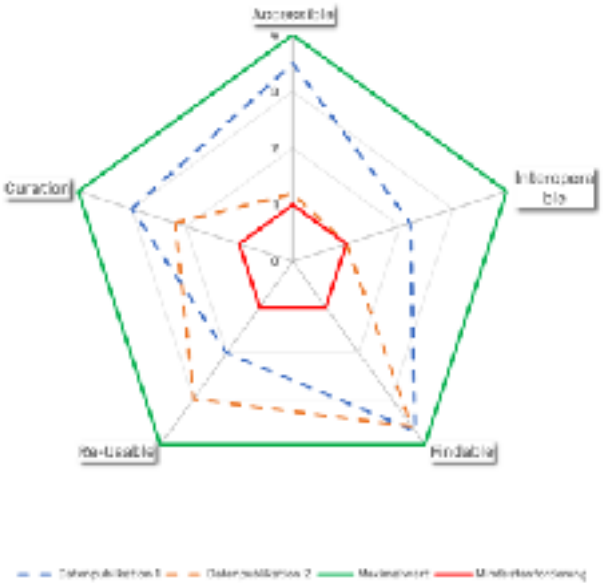
(3) A structured meta data description (e.g. following DataCite) given for software is in this repository.

(4) The repository is listed in some overarching meta-repository (e.g. Helmholtz Research Software Directory (RSD), re3data).

# Aggregation

Aggregating per Dimension by weighted attributes, Example: dimension „Findable“



**How to aggregate at Center-level?**

- Defintion of a „minimum polygon“ for data/sw publications (Red line, illustration exemplary)
- If data publication meets the minimum: count as „1“

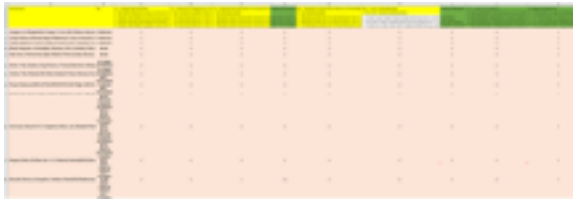
**Incentive to improve quality?**

- The minimum polygon can be raised over time to incentivize the improvement of data publications

# How (Specific to reserach data publications)

Paper and Pencil-exercise with actual software and data publications

- by groups from different research areas / centers
- Results/ insight:
  - the concept generally works
  - there are currently limited possibilities of automation
  - data publications within a single repository usually receive a similar results (Helmholtz/domain/insititional)
- Conclusion for sub-group data:
  - evaluation of some attributes postponed; to be implemented later
  - first implementation step via looking at repository level: assumption from P&P
  - Automatisation at dataset-level is adressed at later point to keep it feasable



# How (Specific for research software publications)

Check if research software publication qualifies

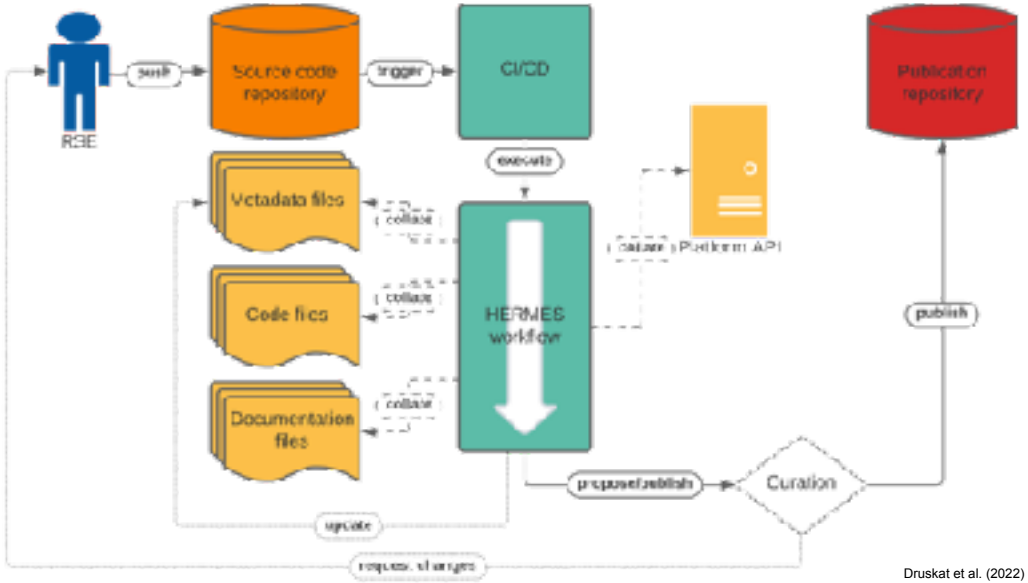
- Has author from the reporting center
- Qualifies as research software (in contrast to infrastructure software → can be counted as transfer)
- Max. one software release per year (as software is a living object with constant updates)

Evaluation of each individual publication

- Automated through tools
  - Either via the authors themselves by entering the software into the Helmholtz Research Software Directory (RSD)
  - Or via a center specific process that can use the provided tools for evaluation (published as open-source)
- Not all attributes and maturity can currently be covered by automated tools → skipped in evaluation until tools are available

# HERMES: Helmholtz Rich Metadata Software Publication
(HMC project ZT-I-PF-3-006, 7/21-12/23, DLR + FZJ + HZDR)

- Automated software publication for all platform combinations
- Use existing metadata to enrich records/improve FAIRness
- Enable:
  - closed source publication,
  - curation & sign-off processes,
  - updating metadata records



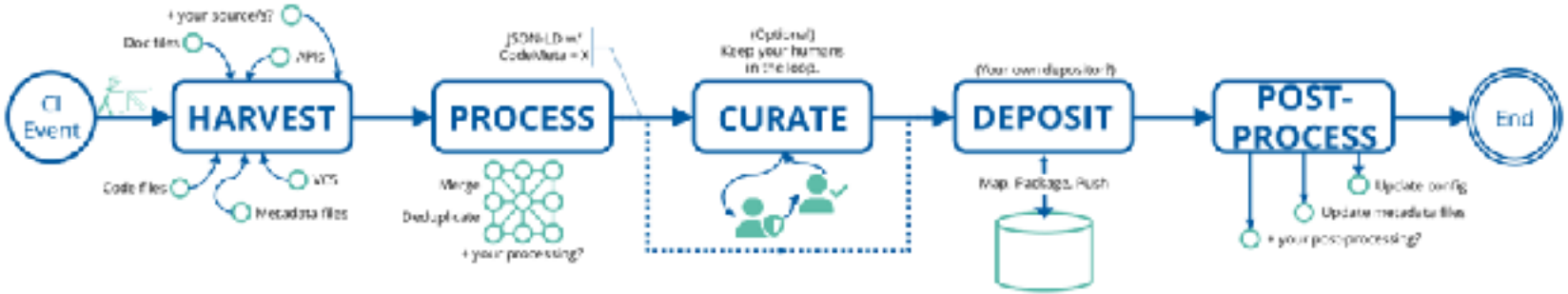

Druskat et al. (2022)

- [software-metadata.pub](software-metadata.pub)

Taken from https://doi.org/10.5281/zenodo.14164978

# HERMES: Implementation

- Continuous integration workflow: on <event> run hermes as configured
- Tutorials for GitHub/GitLab: [docs.software-metadata.pub](docs.software-metadata.pub)




- hermes Python package (Meinel et al. 2024) + CI templates (GitHub, GitLab)
- Plugins via Python Extension Point mechanism for each step
- Details: Kernchen et al. (2024)

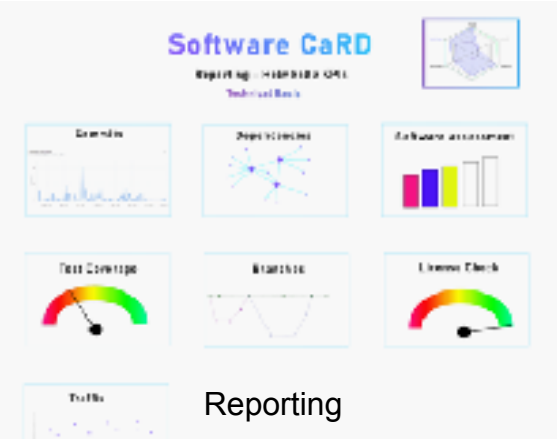


Taken from https://doi.org/10.5281/zenodo.14164978

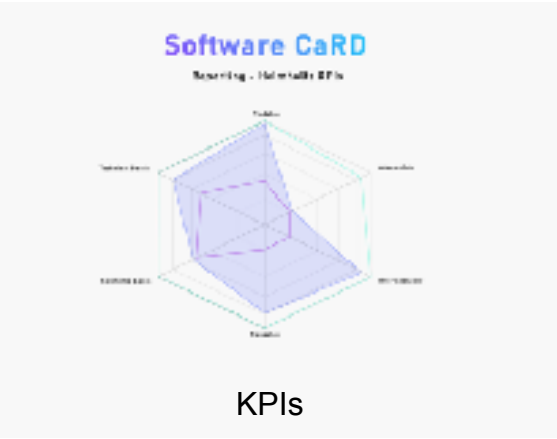
# Helmholtz RSD as one place for all the metadata

# Current work: hermes 1.0.0, Software CaRD

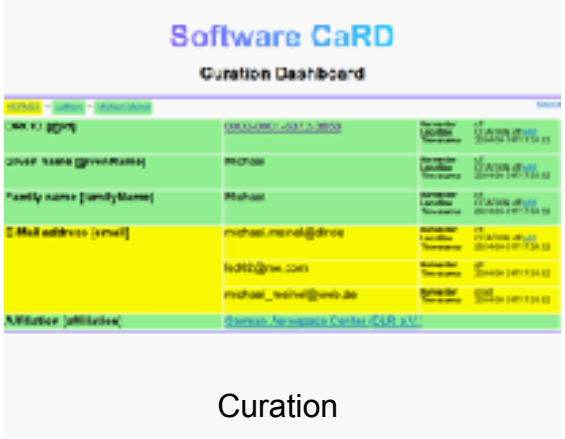
- hermes 1.0.0
- Software Curation and Reporting Dashboard (Software CaRD)
  - Input: Consistent knowledge graph produced by HERMES
  - Compliance checks against configurable policies (KPIs, curation)
  - HMC project (2023 cohort; DLR + HZDR + GFZ + FZJ)




Reporting




KPIs




Curation

Taken from https://doi.org/10.5281/zenodo.14164978

# What to report?

Research data publications

All research data publications with authors from your center published in the reporting year

Published in a listed and evaluated data repository

Repository fulfills min. criteria

A = Sum(all research data publications fulfilling the chain)

Research software publications

All research software publications with authors from your center published in the reporting year (max. 1 release)

Evaluated by tools or center process using the published criteria

Software publication fulfills min. criteria

B = Sum(all research softeware publications fulfilling the chain)

Indicator = **( A ; B )**

# Status quo and next steps for implementation 1/2

Assembly of members

- pre-approval of concept by directors working group in 7-8/2024
- adoption by assembly of members in 9/2024
  - positive reception of concept
  - praise for scientific approach

Proposed time horizon of the TG:

- introduction at the beginning of POF V for reporting year 2028 (data collection Q1/2029)
- reporting years (publication year) 2025 - 2027 test introduction (first test collection Q1/2026 = publication year 2025); [→ last use of basic indicator for reporting year 2024]

Work level TG

- optimize criteria catalogs by the end of 2024
- clarification overarching questions (versions/granularity, „authorship“, etc.)
- Definition of minimal-polygon
- prepare test introduction

Sub-group meetings every two weeks since September 2024

# Status quo and next steps for implementation 2/2

Initial training and feedback opportunities

- TG develops a handout for the application of the Indicator (Early Jan ‘25)
- virtual Q&A possibility for the level of „controllers“ (End of Jan ’25; date will be announced asap)
- hands-on software for operational level (Mid Feb ‘25 @Research Software Forum)
- hands-on data for operational level (Apr/May ’25 Workshop format, tba)

Work level TG 2025

- conzeptualizing workflow for repository assessment (data)
- collecting information on repositories used at Helmholtz (data)
- identifying tools for automation and integrate them to a „toolbox“ (software)
- set-up of a centralized feedback possibility (both)

**Goal: Mid 2025, to best prepare Centers in 2nd half 2025**

**The TG will accompany the test phase and will continuously incorporate lessons learned and collect best/good -practices to have established processes by start of POF V**

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# Keep in touch

open-science@helmholtz.de

https://os.helmholtz.de

Open Science Newsletter

Social Media: LinkedIn | Mastodon

Publications and recommended readings: Zotero

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# JuRSE: A Jülich Community of RSE Practice

13th February 2025 I CLAIRE WYATT

Member of the Helmholtz Association

JÜLICH
Forschungszentrum
Shaping Change

# ABOUT ME

## My role: *Community Manager for Research Software Engineering (RSE)*

SOFTWARE SUSTAINABILITY INSTITUTE

RSE
SOCIETY OF RESEARCH SOFTWARE ENGINEERING

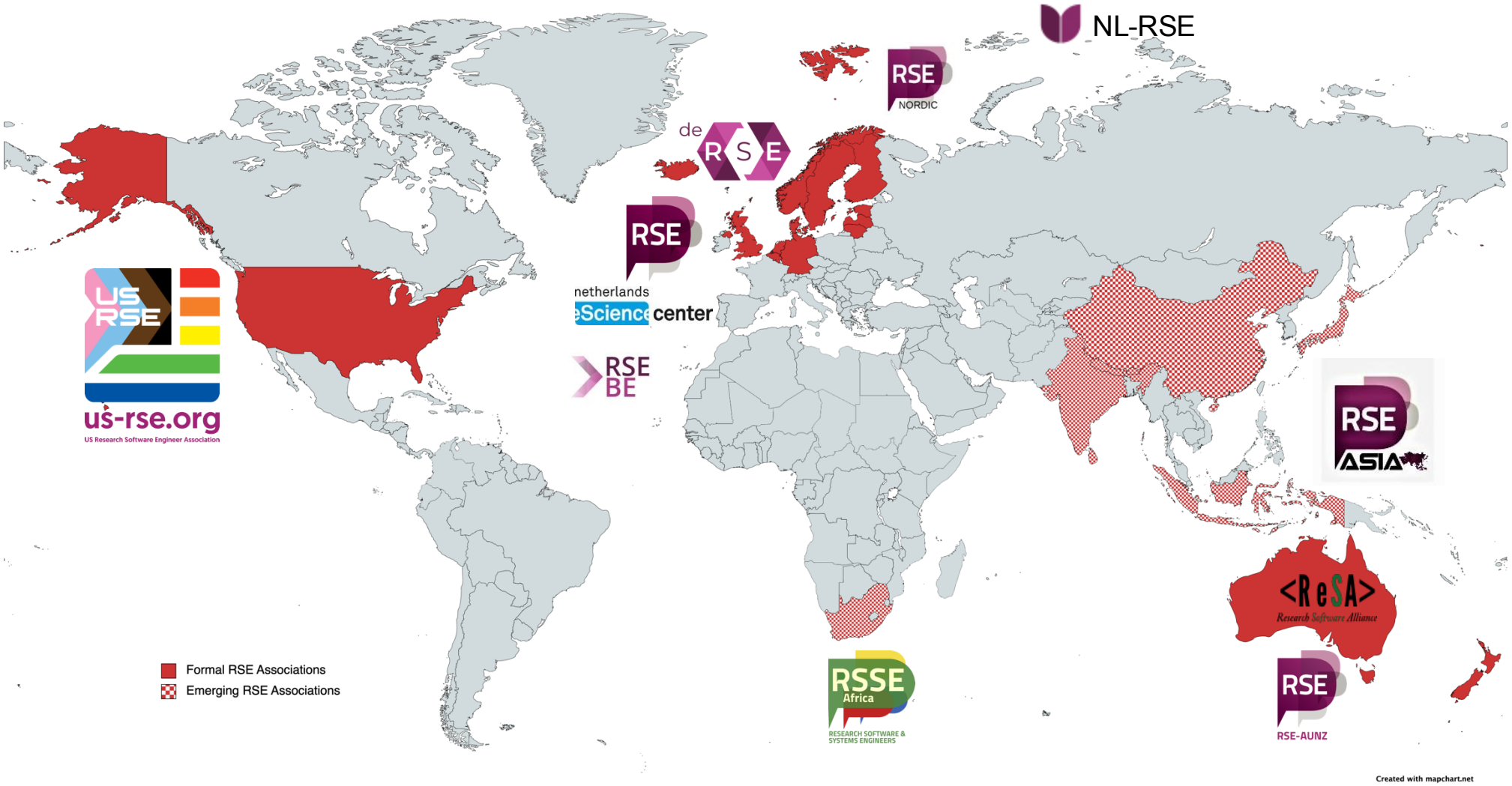
JÜLICH Forschungszentrum
*Shaping Change*

THE UNIVERSITY of EDINBURGH
UNIVERSITY OF Southampton
UNIVERSITY OF OXFORD
MANCHESTER 1824 The University of Manchester

UKRI Arts and Humanities Research Council
UKRI Medical Research Council
UKRI Biotechnology and Biological Sciences Research Council
UKRI Natural Environment Research Council
UKRI Economic and Social Research Council
UKRI Science and Technology Facilities Council
UKRI Engineering and Physical Sciences Research Council

# THE WORLDWIDE RSE MOVEMENT

intl RSE | INTERNATIONAL COUNCIL OF RSE ASSOCIATIONS




Code for thought
RSE

JÜLICH Forschungszentrum

# A SCIENTIFIC COMMUNITY OF PRACTICE

**A group of people** who share

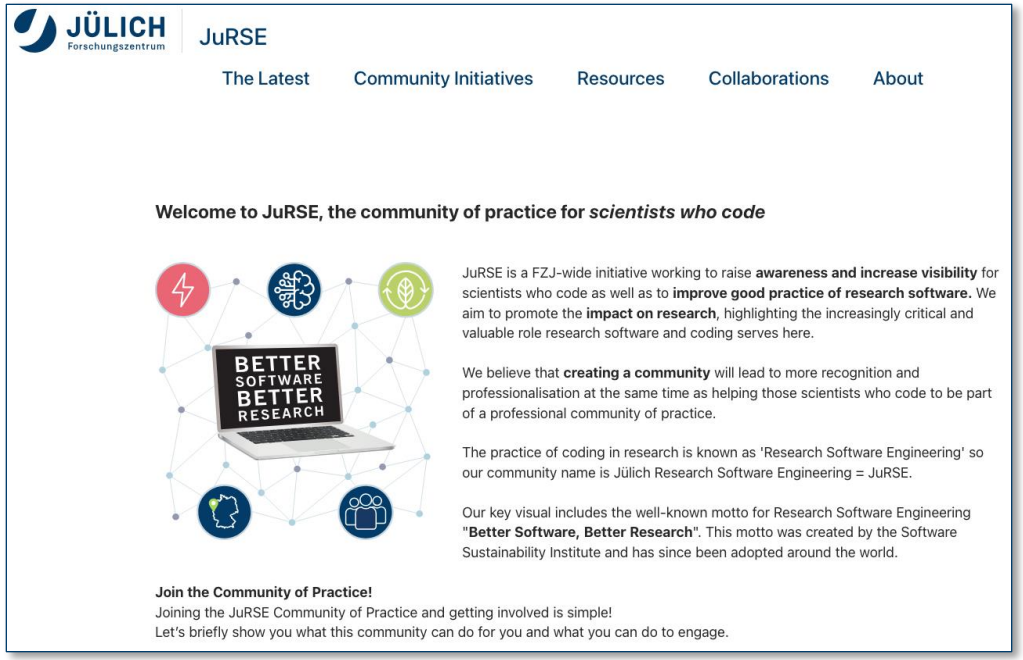
**common concerns** **common challenges** **interest in a topic**

**come together to fulfil both individual and group goals**

They focus on **sharing best practice** **creating new knowledge**

to **advance a domain of professional practice.**

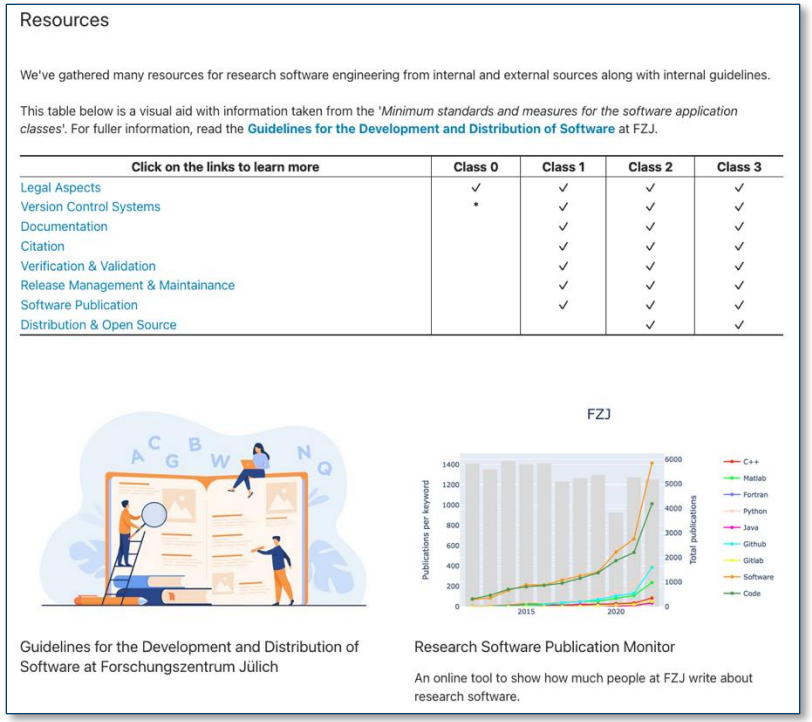
# JuRSE – Jülich RSE Community of Practice


- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**


# Software Guidelines

**GUIDELINES FOR THE DEVELOPMENT AND DISTRIBUTION OF SOFTWARE AT FORSCHUNGSZENTRUM JÜLICH**



Resources

We've gathered many resources for research software engineering from internal and external sources along with internal guidelines.

This table below is a visual aid with information taken from the '*Minimum standards and measures for the software application classes*'. For fuller information, read the **Guidelines for the Development and Distribution of Software** at FZJ.

| Click on the links to learn more | Class 0 | Class 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Legal Aspects | ✓ | ✓ | ✓ | ✓ |
| Version Control Systems | * | ✓ | ✓ | ✓ |
| Documentation | | ✓ | ✓ | ✓ |
| Citation | | ✓ | ✓ | ✓ |
| Verification & Validation | | ✓ | ✓ | ✓ |
| Release Management & Maintainance | | ✓ | ✓ | ✓ |
| Software Publication | | ✓ | ✓ | ✓ |
| Distribution & Open Source | | | ✓ | ✓ |



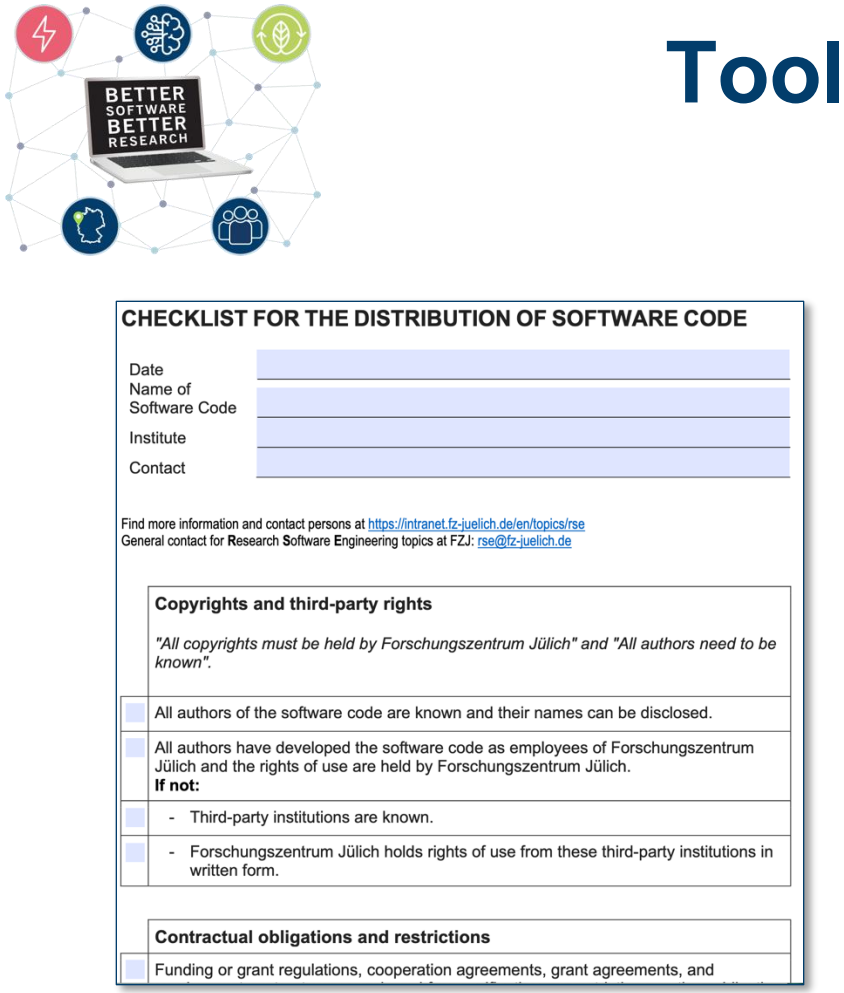
Guidelines for the Development and Distribution of Software at Forschungszentrum Jülich

Research Software Publication Monitor

An online tool to show how much people at FZJ write about research software.

- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**

# Tools - Software Guidelines



**CHECKLIST FOR THE DISTRIBUTION OF SOFTWARE CODE**

Date
Name of Software Code
Institute
Contact

Find more information and contact persons at https://intranet.fz-juelich.de/en/topics/rse
General contact for **R**esearch **S**oftware **E**ngineering topics at FZJ: rse@fz-juelich.de

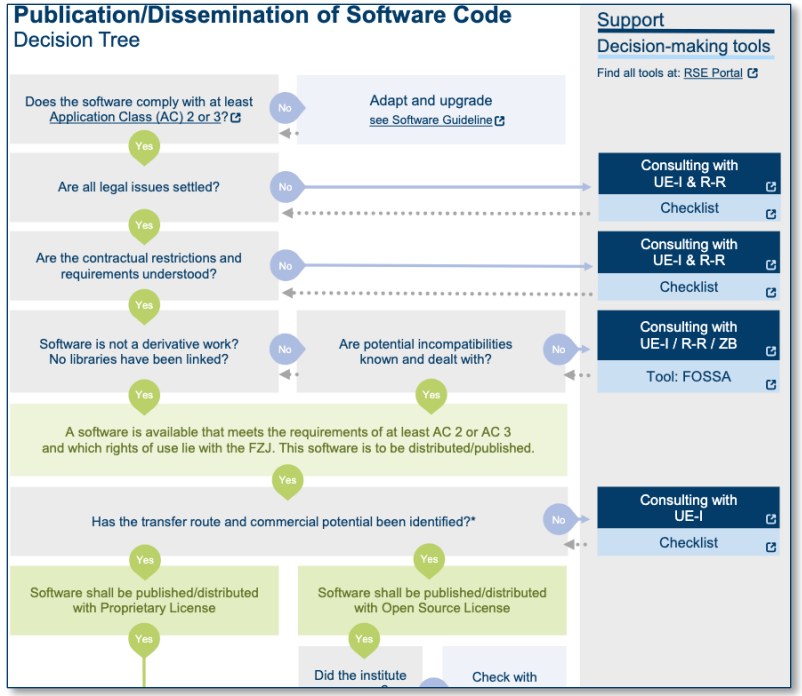
**Copyrights and third-party rights**

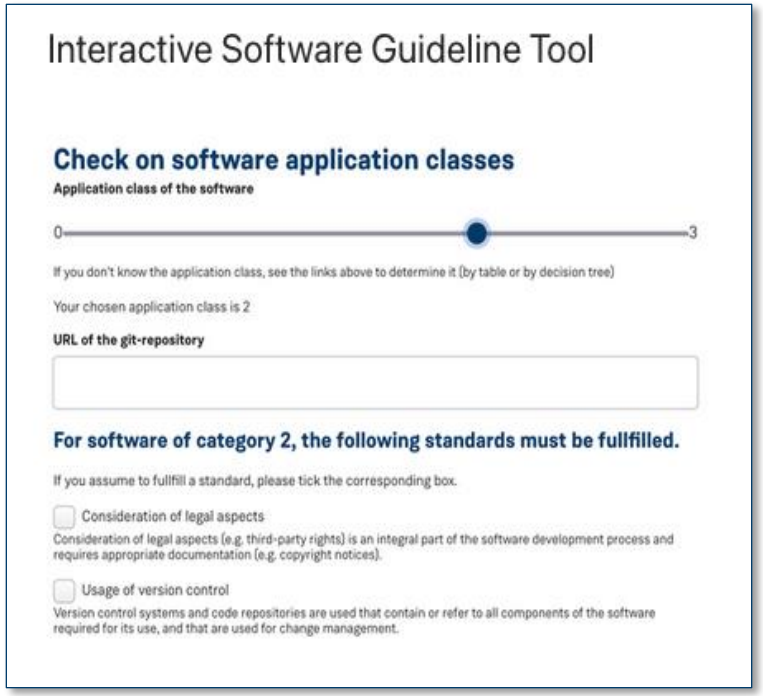
*"All copyrights must be held by Forschungszentrum Jülich" and "All authors need to be known".*

- All authors of the software code are known and their names can be disclosed.
- All authors have developed the software code as employees of Forschungszentrum Jülich and the rights of use are held by Forschungszentrum Jülich.
  **If not:**
  - Third-party institutions are known.
  - Forschungszentrum Jülich holds rights of use from these third-party institutions in written form.

**Contractual obligations and restrictions**

- Funding or grant regulations, cooperation agreements, grant agreements, and




- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**


# Publications Directive

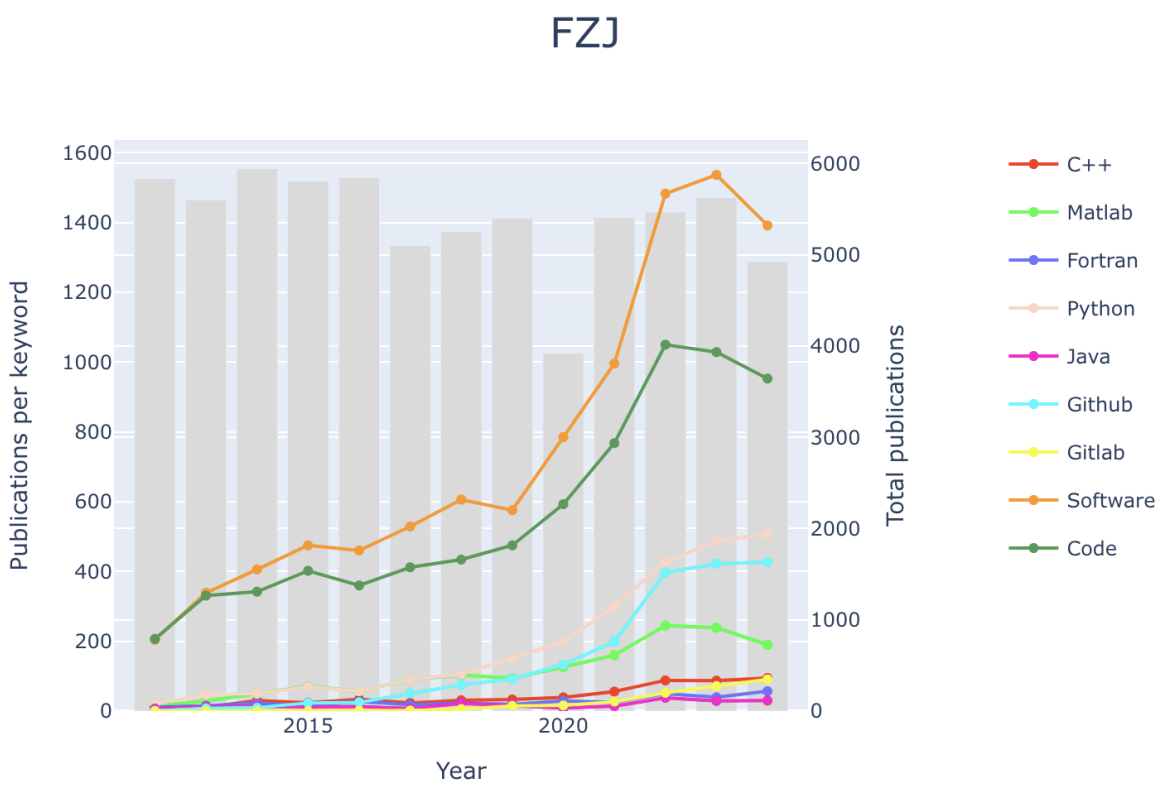
2.2 The procedure regulated subsequently in B. (Procedure) is applicable to all scientific publications according to A 2.1, especially in the form of:

- journal articles
- preprints
- Jül-Bericht or articles in a series of works published by Jülich's publishing house
- habilitations
- doctoral theses
- theses such as bachelor's and master's theses (insofar as they are to be published)
- books or book chapters
- conference papers
- research software
- research data

- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**

# Research Software Publication Monitor

Publications from the whole JuSER publication database.




https://go.fzj.de/rse-publication-monitor

- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**


# JuRSE – Jülich RSE Community of Practice

Join the community platform (online)

Meet other RSEs at FZJ and Germany!

Join us at JuRSE Open Hours

In-person and online, we're here to help!

JuRSE Code of the Month

A code in the spotlight

JuRSE Newsletters

Read about RSE News, events, blogs and podcasts


JuRSE Travel Grants

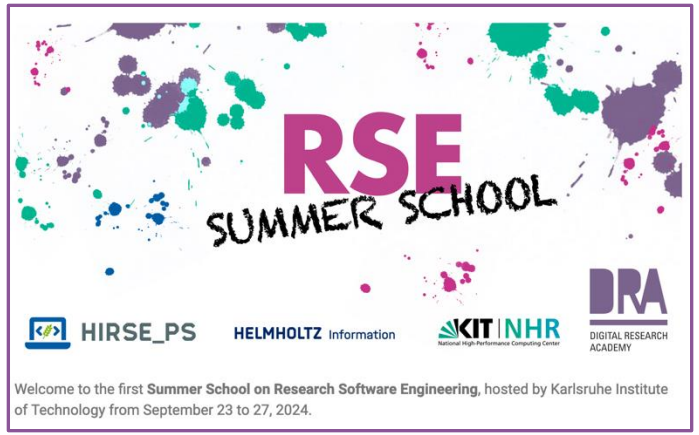
Go to an RSE Conference on us!


- **Increase good practice, visibility and awareness**
- **Encourage adoption of the software and publication guidelines**

# JuRSE – Jülich RSE Community of Practice and HiRSE (Helmholtz RSE)

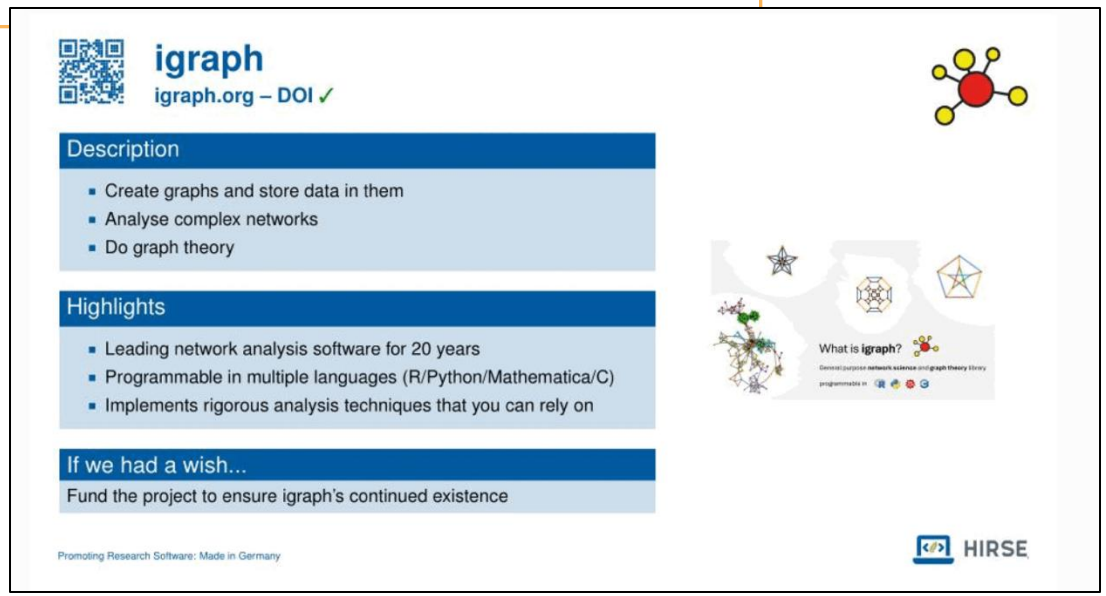
HIRSE

The HiRSE Seminar Series




The HiRSE Code Promotion

*shining a light on German RSEs' work*




# JuRSE – Jülich RSE Community of Practice

## Future Plans

- Hiring a team member to support our activities (also within FutuRSI)
- Planning our first JuRSE led training session on automated testing
- Giveaways
- Monthly Community Calls
- Building the community in all institutes
- Continue to give seminars around FZJ about the guidelines
- Support the adoption of the new software quality indicator

HELMHOLTZ

SPITZENFORSCHUNG FÜR
GROSSE HERAUSFORDERUNGEN

# Joint Lab
# Helmholtz Information – Research Software Engineering


René Caspart

Karlsruhe Institute of Technology


HIRSE


Together with Markus Diesmann, Stefan Blügel, Robert Speck (FZJ), Achim Streit, Markus Götz (KIT), Johannes Reuther (HZB), Christian Cyron, Regine Willumeit-Römer & Daniel Höche (Hereon)


March 13, 2025

JÜLICH Forschungszentrum

Karlsruher Institut für Technologie

HZB Helmholtz Zentrum Berlin

Helmholtz-Zentrum hereon

# Research Software Engineering (RSE) – Why?

HIRSE

**(Open Source) Software** =

- Key component of scientific work
- Software ≈ data ≈ devices
- Software = research infrastructure
- Valuable assets


**in all research fields of Helmholtz**







Sources: https://www.software.ac.uk/about, https://www.helmholtz.de/en/research/

# From HiRSE_PS to JL HiRSE

https://www.helmholtz-hirse.de

- **HiRSE_PS** = Preparatory study for HiRSE
  - Focus on software as an infrastructure (open, reliable, sustainable, reproduceable)
  - Testbed for structural RSE support within a research field
  - Human-centric view: enable RSEs to work best and together on their codes/project

- **JL HiRSE**
  - Very similar focus, but more open, more community-oriented
  - A vehicle to kick-start a change of mindset on software as as first-class citizen of science
  - A path toward PoF-V, integrating RSE into the portfolio
  - The seed for further actions on the national and center level

# WP 1: CSI groups (PI: Markus Diesmann)

## Community Software Infrastructure Groups

- **Goals of the WP**
  - Establish five CSI Gruppen (topical width across all 3 programs in the RF-Information and diversity of already established and young codes)
  - Fostering sustainability and long-term stability of specific codes
  - Supporting the community
  - Generates insights about the requirements for WP2
- **Structure and location of CSI groups**
  - Expert knowledge from a scientific domain
  - High community trust through in-person-responsibilities in the domain-institute
- **Tasks of the CSI groups**
  - Coordination of the development, e.g. doing code reviews, generating releases, monitoring of Cx-technologies
  - Taking over hard and longer-lasting development tasks (e.g. refactoring of existing codes)
  - Organization of trainings and Hackathons

# WP 2: Consulting & Networking (PI: Achim Streit)

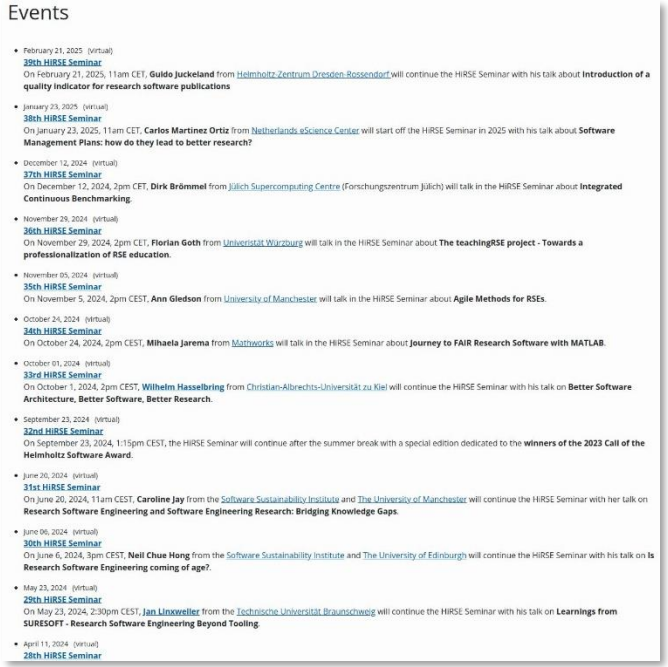
HIRSE

## Goals and structure

- **Goals:**
  - Establishing the technological basis for RSE, supporting established CSI-groups and codes in Cx-environment usage and software engineering
  - Taking young codes by the hand introducing modern RSE practices
  - Evaluate and support AI for RSE
- **Usage of modern Supercomputing infrastructures**
  - E.g., JUWELS (FZJ-JSC) or HoreKa (KIT-SCC)
  - Future Technologies Partition (FTP) at KIT-SCC for CI on different HPC resources and architectures
  - Cloud resources via OpenStack in the Helmholtz Data Federation (HDF)
- **2 sub-WPs**
  1. Technology and Networking
  2. AI for RSE

# Update on the HiRSE Seminar Series

- HiRSE Seminar started in April 2022
- Now at **39 talks**, more planned
- About 20-70 participants per talk
- Significantly broadened the outreach over time, well-established part of the RSE community
- Feedback form: 4.6/5 stars rating, very good feedback
- **YouTube Channel** + Zenodo Community
- 100 subscribers on YouTube, >350 views for (some) talks, >650 views of (some) slides

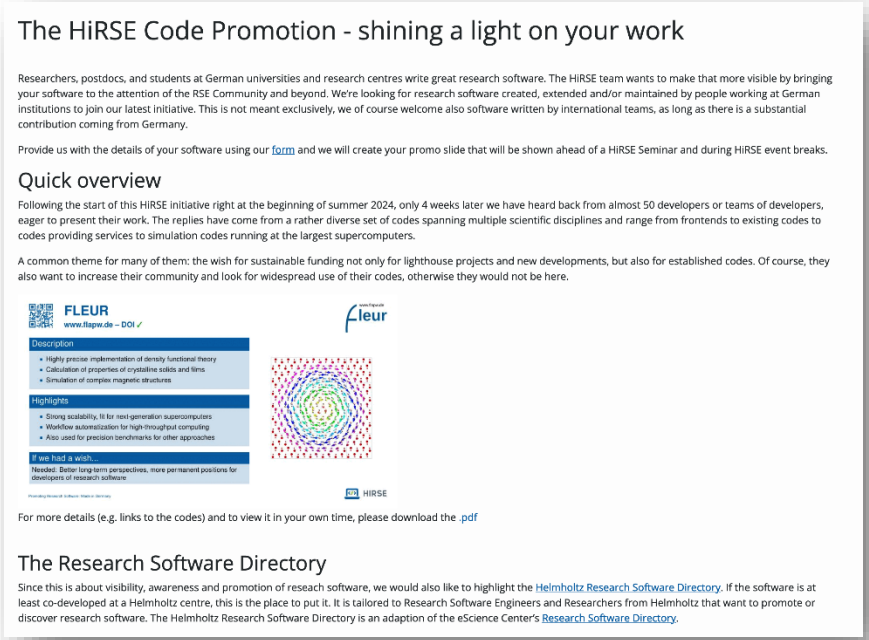


Events

- February 21, 2025 (Virtual)
  **39th HiRSE Seminar**
  On February 21, 2025, 11am CET, **Guido Juckeland** from Helmholtz-Zentrum Dresden-Rossendorf will continue the HiRSE Seminar with his talk about **Introduction of a quality indicator for research software publications**
- January 23, 2025 (Virtual)
  **38th HiRSE Seminar**
  On January 23, 2025, 11am CET, **Carlos Martinez Ortiz** from Netherlands eScience Center will start off the HiRSE Seminar in 2025 with his talk about **Software Management Plans: how do they lead to better research?**
- December 12, 2024 (Virtual)
  **37th HiRSE Seminar**
  On December 12, 2024, 2pm CET, **Dirk Brömmel** from Jülich Supercomputing Centre (Forschungszentrum Jülich) will talk in the HiRSE Seminar about **Integrated Continuous Benchmarking**.
- November 29, 2024 (Virtual)
  **36th HiRSE Seminar**
  On November 29, 2024, 2pm CET, **Florian Goth** from Universität Würzburg will talk in the HiRSE Seminar about **The teachingRSE project - Towards a professionalization of RSE education**.
- November 05, 2024 (Virtual)
  **35th HiRSE Seminar**
  On November 5, 2024, 2pm CEST, **Ann Gledson** from University of Manchester will talk in the HiRSE Seminar about **Agile Methods for RSEs**.
- October 24, 2024 (Virtual)
  **34th HiRSE Seminar**
  On October 24, 2024, 2pm CEST, **Mihaela Jarema** from Mathworks will talk in the HiRSE Seminar about **Journey to FAIR Research Software with MATLAB**.
- October 01, 2024 (Virtual)
  **33rd HiRSE Seminar**
  On October 1, 2024, 2pm CEST, **Wilhelm Hasselbring** from Christian-Albrechts-Universität zu Kiel will continue the HiRSE Seminar with his talk on **Better Software Architecture, Better Software, Better Research**.
- September 23, 2024 (Virtual)
  **32nd HiRSE Seminar**
  On September 23, 2024, 1:15pm CEST, the HiRSE Seminar will continue after the summer break with a special edition dedicated to the **winners of the 2023 Call of the Helmholtz Software Award**.
- June 20, 2024 (Virtual)
  **31st HiRSE Seminar**
  On June 20, 2024, 11am CEST, **Caroline Jay** from the Software Sustainability Institute and The University of Manchester will continue the HiRSE Seminar with her talk on **Research Software Engineering and Software Engineering Research: Bridging Knowledge Gaps**.
- June 06, 2024 (Virtual)
  **30th HiRSE Seminar**
  On June 6, 2024, 3pm CEST, **Neil Chue Hong** from the Software Sustainability Institute and The University of Edinburgh will continue the HiRSE Seminar with his talk on **Is Research Software Engineering coming of age?**.
- May 23, 2024 (Virtual)
  **29th HiRSE Seminar**
  On May 23, 2024, 2:30pm CEST, **Jan Linxweiler** from the Technische Universität Braunschweig will continue the HiRSE Seminar with his talk on **Learnings from SURESOFT - Research Software Engineering Beyond Tooling**.
- April 11, 2024 (Virtual)
  **28th HiRSE Seminar**

# HiRSE Code Promotion

- Gathering codes across Germany, currently over **70** and counting
- People fill in a simple(-ish) form, we create a single promo slide for their code
- Dissemination:
  - Before HiRSE seminars
  - During breaks of HiRSE Hackathons
  - On the HiRSE website
  - Here
- Database of codes made in Germany and wishes of the RSEs behind these codes
- **Collaboration with RSD**?



The HiRSE Code Promotion - shining a light on your work

Researchers, postdocs, and students at German universities and research centres write great research software. The HiRSE team wants to make that more visible by bringing your software to the attention of the RSE Community and beyond. We're looking for research software created, extended and/or maintained by people working at German institutions to join our latest initiative. This is not meant exclusively, we of course welcome also software written by international teams, as long as there is a substantial contribution coming from Germany.

Provide us with the details of your software using our form and we will create your promo slide that will be shown ahead of a HiRSE Seminar and during HiRSE event breaks.

Quick overview

Following the start of this HiRSE initiative right at the beginning of summer 2024, only 4 weeks later we have heard back from almost 50 developers or teams of developers, eager to present their work. The replies have come from a rather diverse set of codes spanning multiple scientific disciplines and range from frontends to existing codes to codes providing services to simulation codes running at the largest supercomputers.

A common theme for many of them: the wish for sustainable funding not only for lighthouse projects and new developments, but also for established codes. Of course, they also want to increase their community and look for widespread use of their codes, otherwise they would not be here.

FLEUR
www.flapw.de – DOI ✓

Description
- Highly precise implementation of density functional theory
- Calculation of properties of crystalline solids and films
- Simulation of complex magnetic structures

Highlights
- Strong scalability, fit for next-generation supercomputers
- Workflow automatization for high-throughput computing
- Also used for precision benchmarks for other approaches

If we had a wish...
Needed: Better long-term perspectives, more permanent positions for developers of research software

fleur

HIRSE

For more details (e.g. links to the codes) and to view it in your own time, please download the .pdf

The Research Software Directory

Since this is about visibility, awareness and promotion of reseach software, we would also like to highlight the Helmholtz Research Software Directory. If the software is at least co-developed at a Helmholtz centre, this is the place to put it. It is tailored to Research Software Engineers and Researchers from Helmholtz that want to promote or discover research software. The Helmholtz Research Software Directory is an adaption of the eScience Center's Research Software Directory.

# First RSE Summer School

- **September 23-27, 2024, at KIT**
- A week full of interesting lessons, hands-on and exchange
- Trainers, Tutors and Support from **HiRSE and beyond**
- **Over 45 participants** from all over Germany

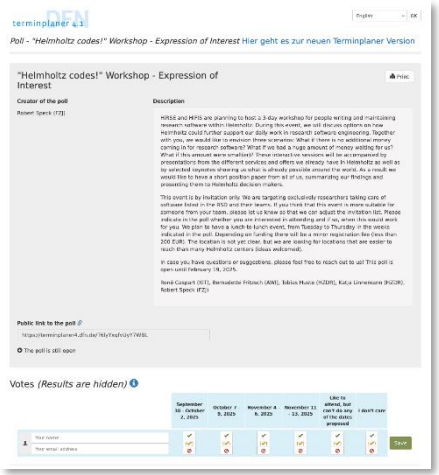

# Helmholtz codes!

Do people know we are writing awesome research software in Helmholtz? Do people care? **Does Helmholtz care?**

They should! And to make sure of it, **HiRSE and HIFIS** are planning the **“Helmholtz codes!” workshop**:

- 3 days in autumn
- By invitation only for people with codes in the Helmholtz RSD
- Three sessions:
  - **Moonshot:** What could we achieve with lots of funding?
  - **Orbital:** What could we achieve with a bit of funding?
  - **Down-to-earth:** What could we improve without any funding?
- Want to contribute?

  → **Express your interest** in the questionnaire (received via email) by Feb 19!



# RSEHPC@ISC25 Workshop

Workshop “Research Software Engineering in High-Performance Computing - Tools and Techniques for Continuous Integration and Benchmarking – RSEHPC@ISC25”

- HPC and RSE have a strong overlap, especially on the tools and techniques side
- Half day Workshop at ISC High Performance 2025, 13 June, Hamburg
- Aiming for a broad audience and perspectives
  - User Perspective
  - Operations perspective
  - Success stories and scary tales
  - …
- Contributions for 10 minute lightning talks, submission open till 28 February


RSEHPC@ISC25 Workshop

CONNECTING THE DOTS

ISC High Performance

JUNE 10 – 13, 2025 | HAMBURG, GERMANY

It has long been understood that there is a strong overlap between the fields of HPC and RSE. Although the two are not entirely congruent, the techniques used and the communities are closely interlinked. For the second time an RSEHPC workshop will be held at ISC.

When developing research software, it is often relevant to track its performance over time. It is even vital when targeting HPC architectures. Changes to the software itself, the used toolchains, or the system setup should not compromise how fast users obtain their results. Ideally, performance or scalability should only ever increase. Hence benchmarking should be an integral part of testing. In particular for HPC codes. At the same time, up-to-date benchmarks that are publicly available can advertise the code and the machines running them. Informing users how to set up the software in the most ideal way or whether they are achieving the expected performance. To limit the burden on developers, the aforementioned steps should be automated within continuous integration (CI) practices, introducing continuous benchmarking (CB) to it. For HPC, an added complexity is the requirement of more than the usual CI backends, with access to longer running steps, more resources than available on a single node, and a diverse range of architectures that the software needs to be tested on.

In this workshop, participants will be able to exchange ideas, approaches, good practices, but also obstacles on the way to continuous benchmarking on HPC systems. Driven by three keynote talks which will set the stage, participants are encouraged to share their own experiences, both from a users and from an operations perspective. To foster this exchange, we foresee the second part of the workshop to provide a stage for participants to contribute their expertise, and experience with lightning talks. For the lightning talks, a light-weight submission will be set up and reviewed by well-known international HPC and RSE experts. In addition, we foresee a part where open questions to the audience will be posed, helping everyone to add their thoughts to this event.

Topics include, but are not limited to:

- User's perspective: How do users experience the existing solutions? Is there something missing, from technological solutions to conventions?
- Operations perspective: What does it take for hosting sites to start and to maintain an CI/CB infrastructure? What are barriers, what are incentives?
- Success stories and scary tales: where did CI/CB help to identify problems? Where could it have helped? And what did hinder the adaptation of CI/CB?
- Past, present, future: what are lessons learned and what does a wishlist look like?

The RSEHPC@ISC25 will be held in person on 13th June 2025 in Hamburg.

Contribution submissions:

To present a lightning talks at RSEHPC@ISC25 use this submission form.

RSEHPC@ISC25 will emphasize an open and inclusive atmosphere and we encourage proposals from a diverse range of views and backgrounds.

The deadline for submissions is 28 Feb 2025.

Organising committee:

- René Caspart (Karlsruhe Institute of Technology)
- Robert Speck (Forschungszentrum Jülich)
- Stefano Nuster (CSCS/ETH)
- Matthew Archer (University of Cambridge)
- Andy Turner (EPCC)
- Daniel S. Katz (National Center for Supercomputing Applications, University of Illinois Urbana-Champaign)
- Jayesh Badwaik (Jülich Supercomputing Centre at Forschungszentrum Jülich)
- Weronika Filinger (FFCC, University of Edinburgh)
- Sarah Neuwirth (Johannes Gutenberg University of Mainz)

eosc | EVERSE

HZDR
HELMHOLTZ ZENTRUM
DRESDEN ROSSENDORF

# Towards establishing formal RSE support in EU and D

## Looking at one year of EVERSE and other national activities

Department for Information Services and Computing | Computational Science Department | Guido Juckeland | g.juckeland@hzdr.de | www.hzdr.de/fwcc

# EVERSE

## Paving the way towards a **E**uropean **V**irtual Institut**e** for **R**esearch **S**oftware **E**xcellence

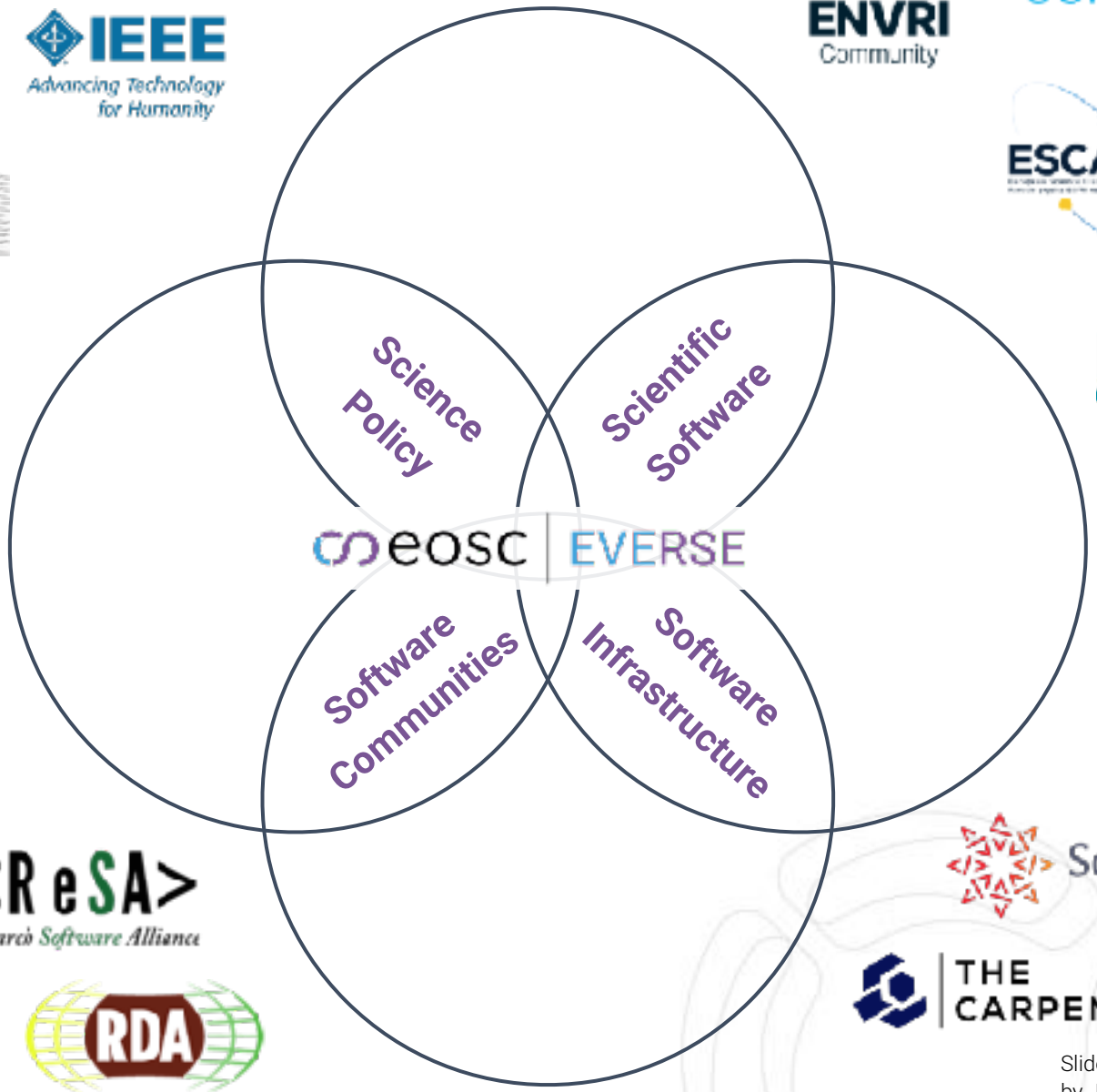
**EVERSE** aims to create a framework for research software and code excellence, collaboratively designed and championed by the research communities, in pursuit of building a European network of Research Software Quality and setting the foundations of a future Virtual Institute for Research Software Excellence

- ✔ ensure research software curation, quality, preservation and adoption of best practices, by the Communities, for the Communities, build on collaboration with the five EOSC Science Clusters
- ✔ adopt a three-tier model for research software, i.e., analysis code, prototype tools and research software infrastructure, which captures the varying complexity of research software and its development, and can be used as a basis for research software excellence
- ✔ credit and recognition for both developers and software are essential components of our strategy to promote sustainable software practices

Mar/2024 → Feb/2027 (36 months)

15 Beneficiaries, 1 Associated partner & 2 Affiliated entities

Coordinated by CERTH and BSC




EVERSE: European Virtual Institute for Research Software Excellence

Slides adapted from the "OrgMycology - eResearch NZ 2024" by Jonah Duckles (orgmycology)

# Partners, associates, and affiliated entities


















# What has happened in year 1?

- First version of a model of good enough practices and components for research software
- Structured interviews with all pilots from the research clusters
- Collection and curation of tools, training and recognition mechanisms
- **Lauch of RSQkit to serve the knowledge and also ask for input from the community**

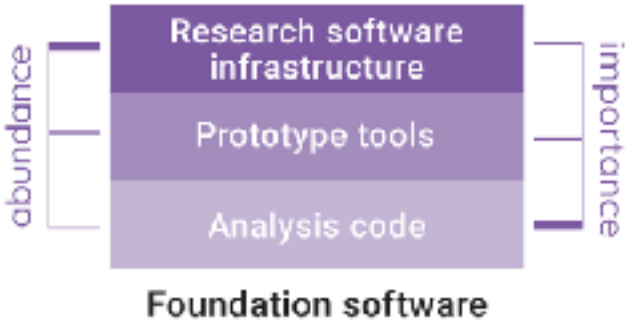
eosc | EVERSE

# Establishing a Community

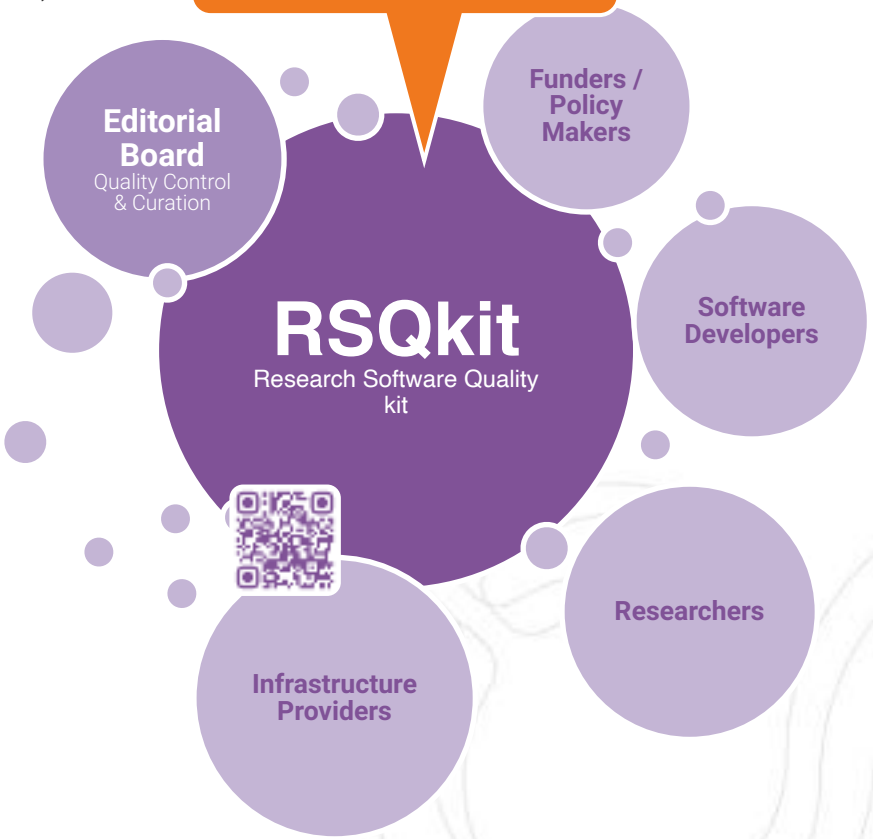
How to contribute to, and engage with EVERSE

## Elements of EVERSE

- The Network (https://everse.software/network/)
- RSQkit (https://everse.software/RSQKit/)
- Software Reference model
- Training
- Recognition framework




RSQkit contentathon @deRSE25 Tue, Feb 25, 10:00-12:00




EVERSE RESEARCH SOFTWARE QUALITY NETWORK

Launch event on Tue, Feb 18, 10:00-11:30

**Join Us**

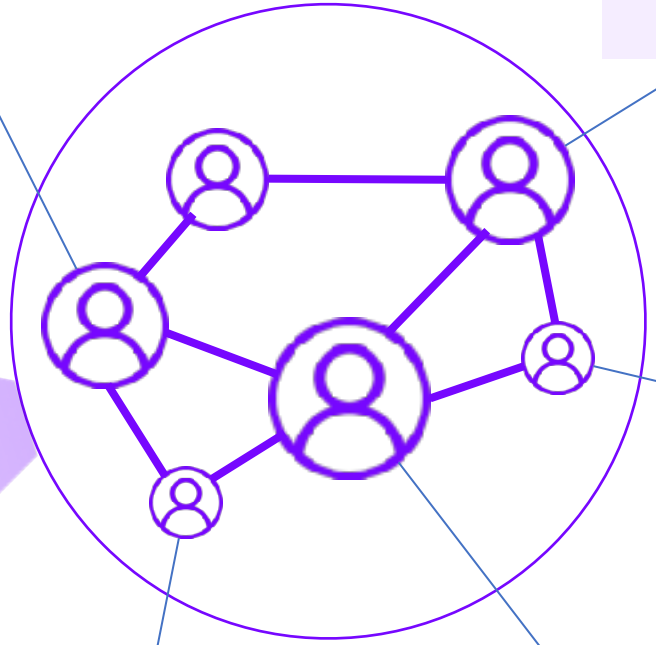
Any individual or organization that agrees with our vision statement is welcome to join the network

# Our Ambition


Thematic community nodes

eosc

National nodes



Other data infrastructure nodes

Reference EOSC EU Node

European e-infrastructures

# EOSC OA 7: Research Software

eosc | OA Expert Group: Research Software

The primary objective of this Expert Group is to address the challenges and opportunities around research software in the context of the EOSC framework.

- specifically target the research software created for research purposes or during the research process
- aims to promote all aspects of research software, including metadata, quality, preservation, registries, reproducibility and recognition
- will closely work with global initiatives and efforts on this domain

RDA RESEARCH DATA ALLIANCE

<ReSA> Research Software Alliance

HELMHOLTZ ZENTRUM
DRESDEN ROSSENDORF

# But what on the national level?

# Current RSE landscape in Germany

In general:

- With de-RSE we have an own national RSE community and network
- Also strong connection connection to the German CS association (GI)

Within Helmholtz

- HIFIS research software cluster (from the Information & Data Science Platforms)
- HIRSE (from the RF Information)

Elsewhere:

- Various local RSE groups (e.g. SUB Göttingen, U Jena, U Heidelberg,…)

# FutuRSI: Concept and first stage of a German RS Institute

- Funded by Klaus Tschira Stiftung
- Runs from 01.04.2025-31.03.2028

- Goals:
  - Build a network of existing RSE organizations
  - Build and develop a portfolio of RSE services
  - Propose a model for a federated RS institute and work towards its implementation