International Research Software Engineering Research Initiative

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RSSE Africa Community Meetup, 13th December 2023

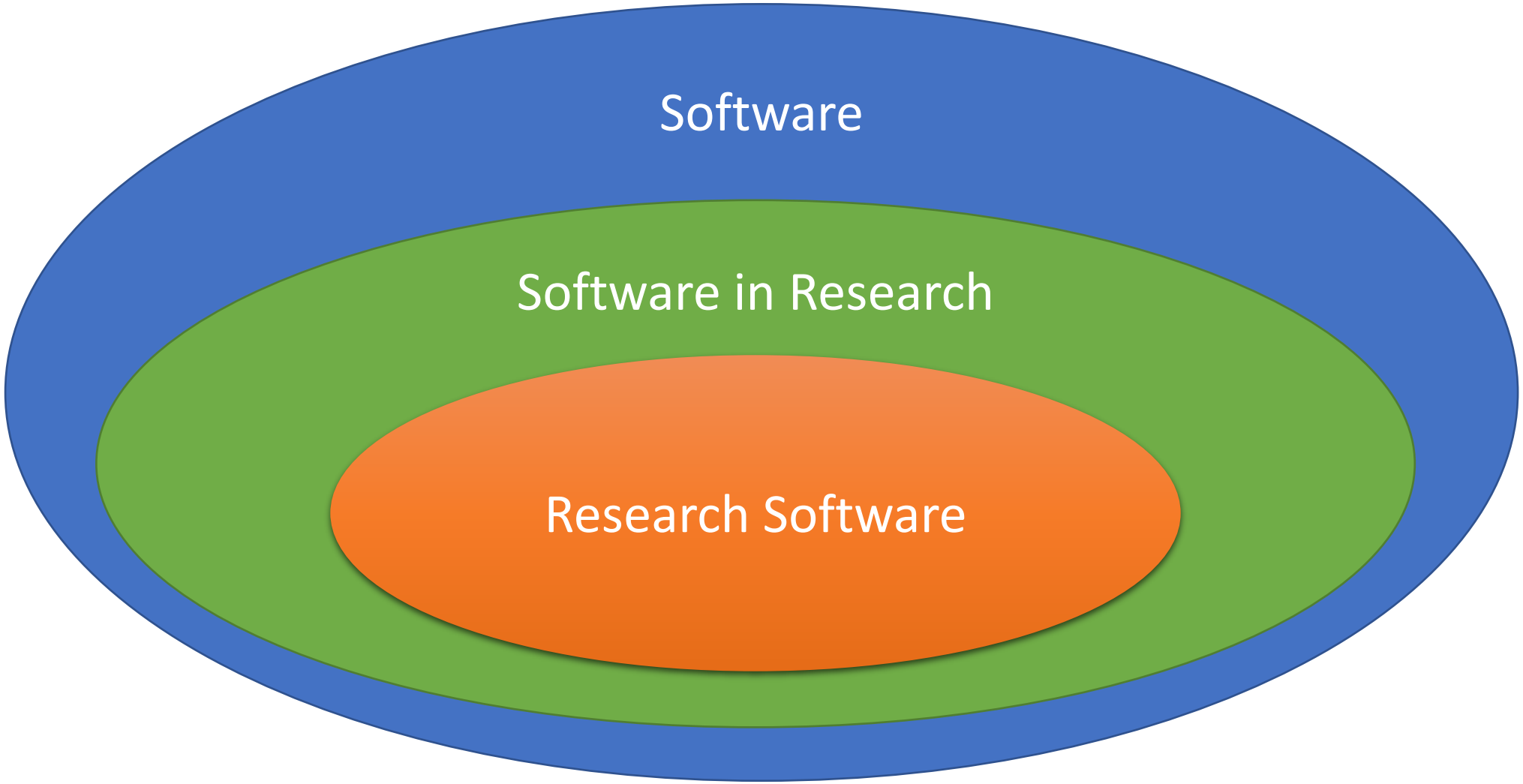
Research Software

RDA FAIR for Research Software (FAIR4RS) WG [Chue Hong et al. 2022] :

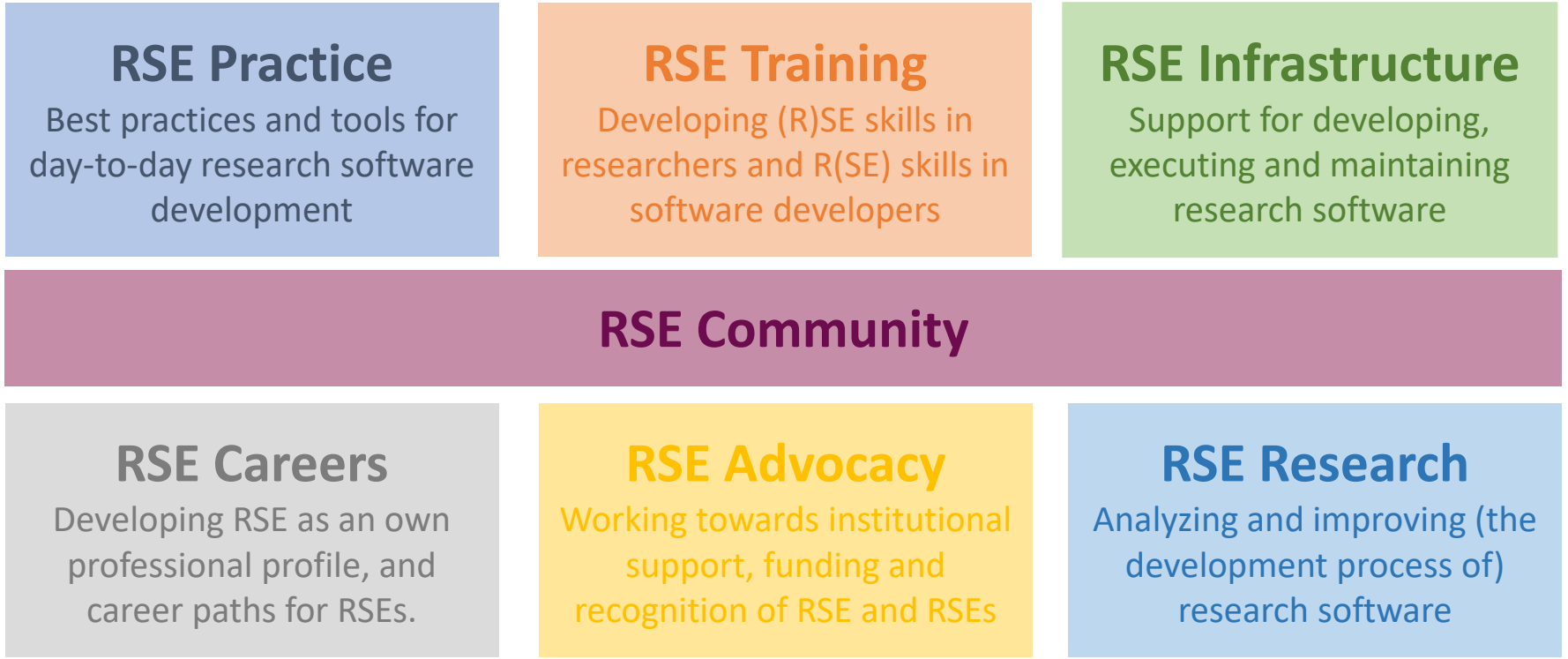
- Research software includes source code files, algorithms, scripts, computational workflows, and executables that are created **during** the research process or **for** a research purpose.
- Software components (e.g., operating systems, programming languages, libraries, etc.) that are used for research but were not created during or with a clear research intent should be considered `**software in research**´ and not `research software´.
- Thus, research software is a separate metaphor of software in research.

Research software should be **FAIR** [Hasselbring et al. 2020b, Lamprecht et al. 2020] and **open** [Hasselbring et al. 2020a].

Software Segmentation



Research Software Engineering Themes

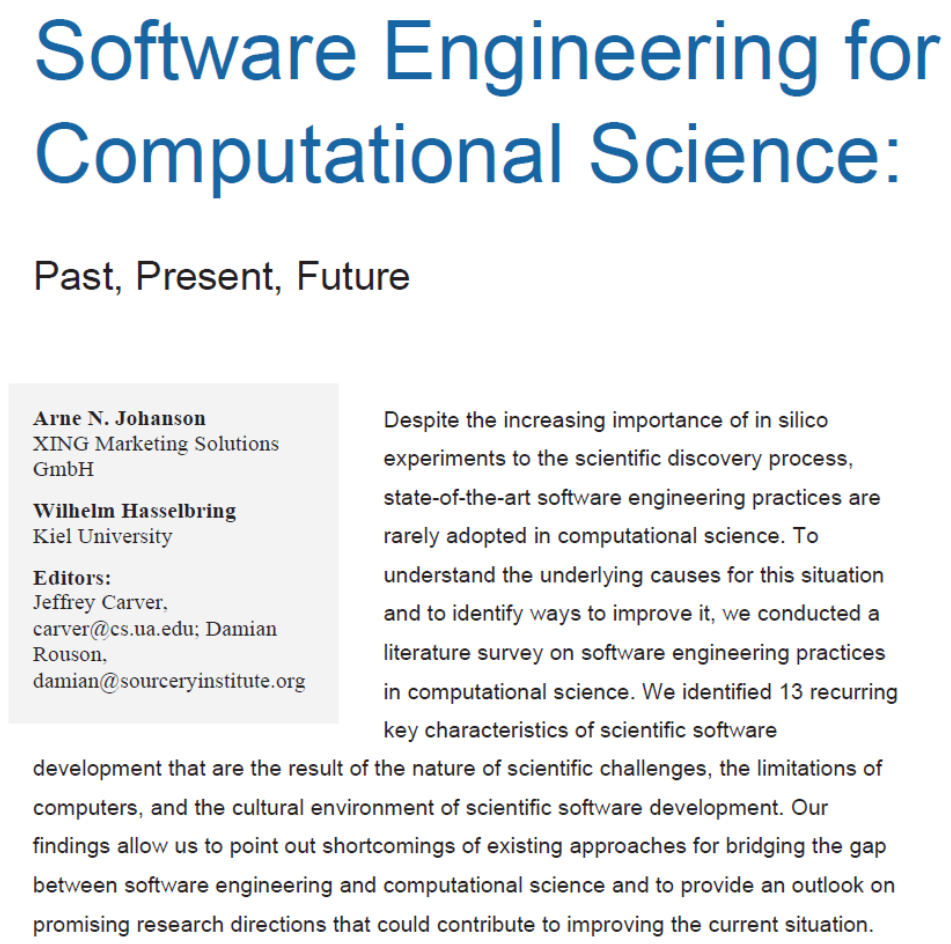


Source: Anna-Lena Lamprecht, University of Potsdam, Germany

Software Engineering for Computational Science

[Johanson & Hasselbring 2018]:

- Among the methods and techniques that software engineering can offer to computational science are
  - **testing without test oracles,**
  - **modular software architectures, and**
  - **model-driven software engineering with domain-specific languages.**
- This way, computational science may achieve **maintainable**, long-living software [Goltz et al., 2015; Reussner et al. 2019],
  - in particular for community software.



Software Engineering for Computational Science:

Past, Present, Future

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Despite the increasing importance of in silico experiments to the scientific discovery process, state-of-the-art software engineering practices are rarely adopted in computational science. To understand the underlying causes for this situation and to identify ways to improve it, we conducted a literature survey on software engineering practices in computational science. We identified 13 recurring key characteristics of scientific software development that are the result of the nature of scientific challenges, the limitations of computers, and the cultural environment of scientific software development. Our findings allow us to point out shortcomings of existing approaches for bridging the gap between software engineering and computational science and to provide an outlook on promising research directions that could contribute to improving the current situation.

Research Software Engineering Communities

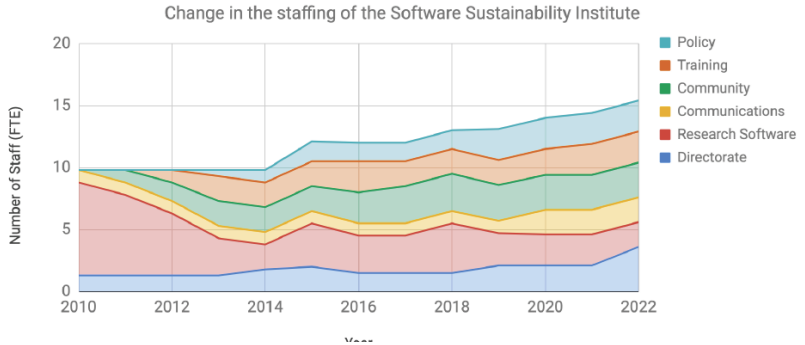
- Term coined ~2012, SSI since 2010.
- Emerging, cross-cutting discipline.
- Diverse, international community.
- Organized in national networks and an international council.

SOFTWARE SUSTAINABILITY INSTITUTE

Initially funded by the Engineering and Physical Sciences Research Council (EPSRC), the SSI now receives funding from all seven UK research councils. This has come in three main tranches:

- **Phase 1** (2010-2015): EPSRC, £4.4m, five years, 9.8 FTE[1]
- **Phase 2** (2015-2018): EPSRC, ESRC, BBSRC, £3.5m, 3.5 years, 12.1 FTE
- **Phase 3** (2018-2023): AHRC, BBSRC, EPSRC, ESRC, MRC, NERC, STFC , £6.6m, five years, 13.6 FTE

The aims of the SSI have evolved with each new tranche of funding. In Phase 1, we focused on identifying the software shortcomings that hold back research, trialled solutions to some of the issues we had identified, and worked to establish our credibility within the research community. In Phase 2, we conducted analyses of the software being used in research and cultivated communities within the burgeoning research software field. In Phase 3, we helped the communities that we had created to become independent, scaled up our successful activities, and campaigned for software to be regarded as an integral component of effective research.



RSE US RSE RSSE Africa RESEARCH SOFTWARE & SYSTEMS ENGINEERS

https://researchsoftware.org/

[Chue Hong et al. 2023]

German Special Interest Group “Research Software Engineering”

Interdisciplinary forum for:

- Software Engineering Researchers
- Research Software Engineers

https://fg-rse.gi.de/ (German)

Task Forces:

- Categories of Research Software
- RSE Advocacy Strategy
- RSE Community Events
- RSE Online Community
- RSE Research
- RSE Software Development Guidelines
- RSE State of Nation Report

RSE Research

Research Software Engineering

Software Engineering Research

Research Software Engineering Research
aims at understanding and improving how software is developed for research.

RSE Research, in short.

See also: [Felderer et al. 2023, Lamprecht et al. 2022]

International Research Software Engineering Research (IRSER) Community Meetup

- The aim of this online community meetup on 16./17. January 2024 is to bring together those whose research attention is directed towards RSE Research.
- Its goal is to prepare the ground for an international in-person symposium on RSE Research.
- Please find the web page with the program for the meetup at

  https://fg-rse.gi.de/veranstaltung/international-research-software-engineering-research-community-meetup

- Registration required, free of charge ☺

International Research Software Engineering Research (IRSER) Symposium

- In-Person Event
- Co-located with RSE Con UK during 2-6 September 2024 in Newcastle (UK).
- Follow:
  - https://society-rse.org/rse-conference-2024/

References

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