

DISCOVERING AND BRIDGING KNOWLEDGE GAPS

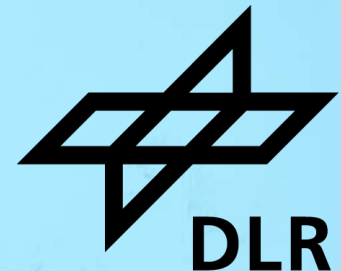
BETWEEN *RESEARCH SOFTWARE ENGINEERING*
AND *SOFTWARE ENGINEERING RESEARCH*

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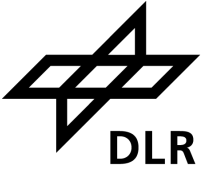
RSECon24, Newcastle upon Tyne, UK, 2024-09-03



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Overview



- Motivation
- Brief overview of **Dagstuhl Seminar 24161**
"Research Software Engineering: Bridging Knowledge Gaps"
- Lightning overview of common de-RSE and GI
SIG "Research Software Engineering"
- Conclusion

Mutual Benefit Hypothesis:

Research Software Engineering (RSEng) and *Software Engineering Research* (SER) can **benefit from each other**.

- **RSEng benefits** from state-of-the-art SER methods and tools
→ Better software, better research
 - **SER benefits** from RSEng as a research object
→ New research with interesting challenges specific to research
- virtuous circle?  virtuous circle? 

- **Problem:** Known and unknown **knowledge gaps**
- **Solution:** Discover and bridge knowledge gaps through **collaboration**

The background of the slide is a high-resolution photograph of a satellite in orbit above Earth. The satellite is a rectangular platform with two long, parallel solar panel arrays extending outwards. The panels are covered in a grid of small, square solar cells. The satellite's main body is centrally located between the panels and features various instruments, antennas, and a large cylindrical component. Below the satellite, the Earth's surface is visible, showing a mix of green landmasses and blue oceans, with a thin white layer of clouds. The curvature of the Earth is visible at the bottom of the frame, where the dark blue of space meets the light blue of the atmosphere.

DAGSTUHL SEMINAR 24161

Dagstuhl Seminar 24161

"Research Software Engineering: Bridging Knowledge Gaps"



1-week seminar, April 2024

<https://dagstuhl.de/24161>

Goals:

- Bring together ~40 RSEs and SERs
- Identify knowledge gaps & start collaboration to bridge them
- Publish results
- Formats:
 - Plenaries
 - Workings groups
 - Evening discussions
- Collaborative & agile



Fundamental knowledge gaps

1. Perception gap:

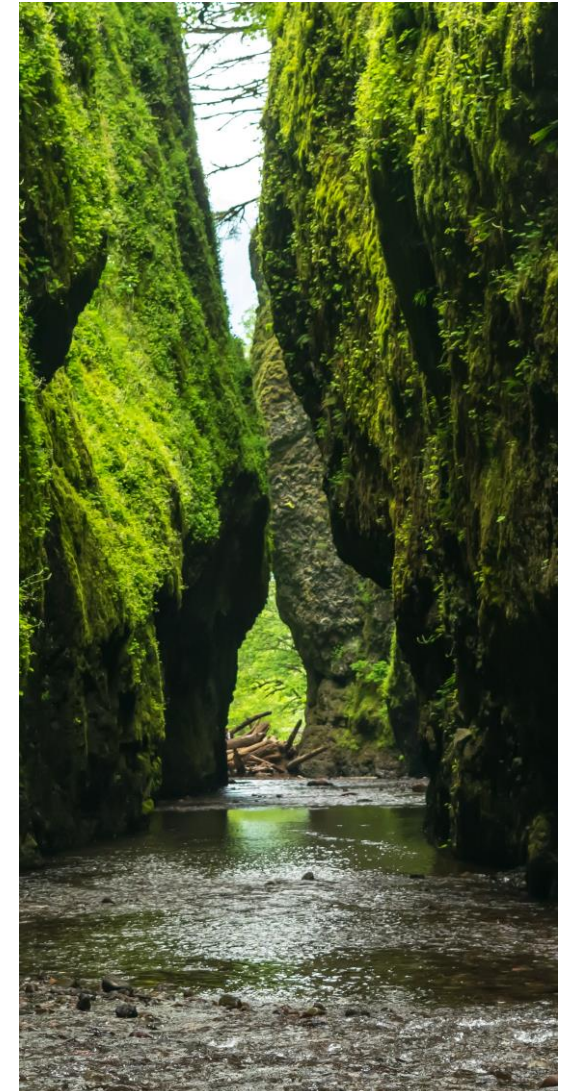
- What are scope and practice of RSEng?
- What are aims and scope of SER?

→ "Ask us anything" sessions & presentations of RSEng projects/contexts

→ "Mythbusting fishbowl" sessions

2. Lack of a common language

→ Mapping task of terms (working group)



- **Bridging Communities: Bringing the RSEng and SER Communities Together for Mutual Benefit**

Jeff Carver, Hannah Cohoon, Ian Cosden, Stephan Druskat, Nasir Eisty, Carole Goble, Samuel Grayson, Samantha Wittke

- Mutual benefit can be achieved
- Focus needs to be on collaboration (not studying a population)
- 10 Simple Rules for catalyzing collaborations and building bridges between RSE & SER

- **Developing a common language: Mapping between software engineering fundamentals and research software terminology**

David E. Bernholdt, Rob Haines, Guido Juckeland, Timo Kehrer, Shurui Zhou

- RSEs often aren't trained software engineers
- Communities need to speak the same language
- Mapping terminologies between SWEBOK and RSEng



Working groups (2/3)



■ Security and Usability of research software

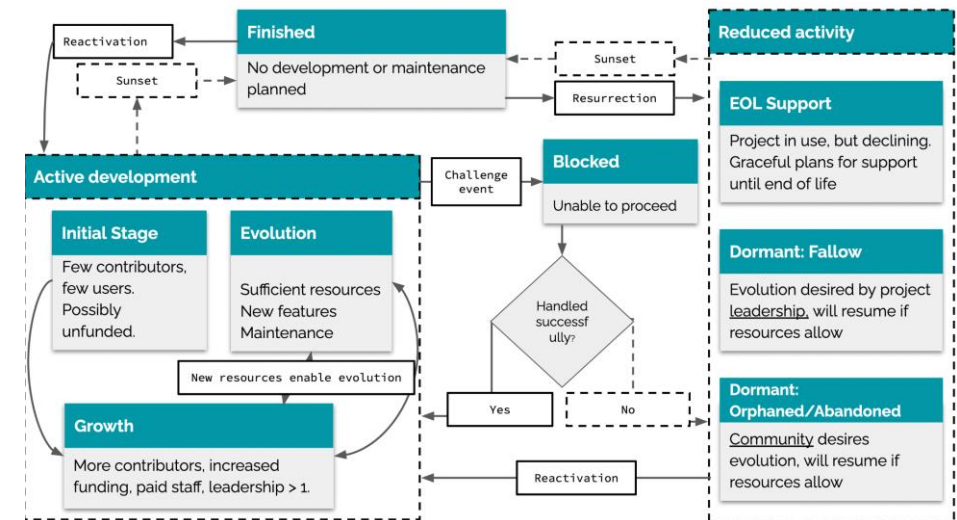
Jeff Carver, Stuart Allen, Hannah Cohoon, Anna-Lena Lamprecht, Christopher Lazik, Michael Meinel, Lata Nautiyal

- Survey shows research software not perceived as usable or secure
- Systematic review of security and quality in RSE
- Survey/interviews in progress

■ Research software: Towards categories and lifecycles

Mikaela Cashman McDevitt, Michael Felderer, Michael Goedicke, Wilhelm Hasselbring, Daniel S. Katz, Frank Löffler, Sebastian Müller, Yo Yehudi

- Categories:
 - Modeling and simulation
 - Proof-of-concept
 - Infrastructure



Working groups (3/3)



▪ **Better architecture, better software, better research**

Neil Chue Hong, Myra B. Cohen, Stephan Druskat, Nasir Eisty, Michael Felderer, Samuel Grayson, Wilhelm Hasselbring, Jan Linxweiler, Colin Venters

- Use architectural metrics to evaluate & improve research software:
Static analysis, test coverage, etc.
- What are tools to improve architecture?

▪ **Software Engineering Research Questions on Research Software Engineering**

Bernhard Rumpe

- Do standard SE approaches work for RSE?
- Are there new research questions for RSE?
 - E.g., how do we measure the scientific quality of research software?

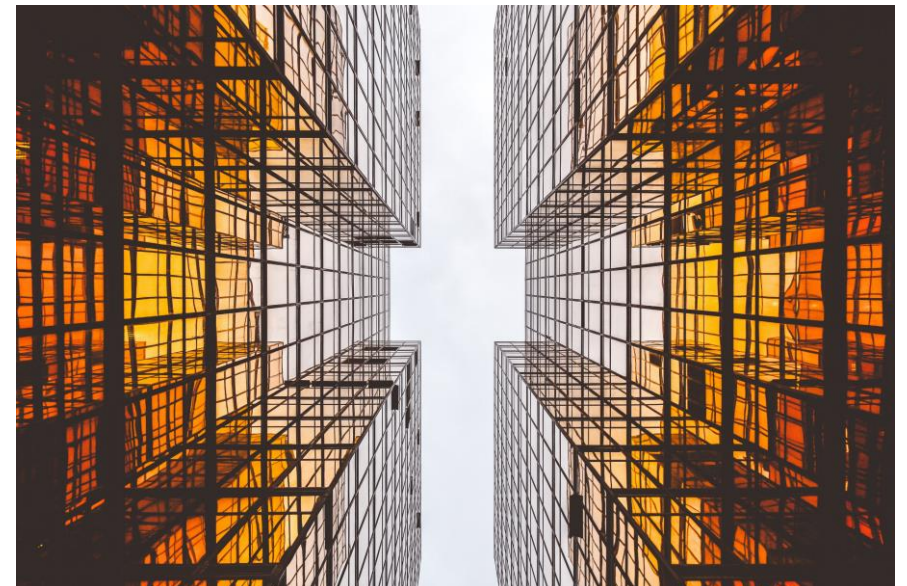


Photo: CC0 from [PxHere](#)

- **Special issue** [*IEEE Computing in Science & Engineering*](#) (Issue 2/2025)
 - collecting written outputs from working groups
- **(R)SE(R) website:** <https://ser-rse-bridge.github.io>
 - Overview & links to outputs
 - Mapping of terms between SER & RSEng (*contributions welcome!*)
- **Short form videos** introducing SER & RSEng knowledge concepts

Lessons learned



- Bringing people together was harder than anticipated
- Some tension between communities
 - Expertise & status
 - Incentives
 - Reciprocity
- Highly productive seminar (but hard work!)
- People engaged and are engaging
- Construction of some bridges was started

A satellite with two large solar panel arrays is shown in orbit above Earth. The satellite is gold-colored with various instruments and antennas. The Earth below shows green landmasses, blue oceans, and white clouds. The curvature of the planet is visible against the blackness of space.

SIG "RESEARCH SOFTWARE ENGINEERING"

SIG „Research Software Engineering“



- Common special interest group of de-RSE and German Informatics Society
 - Interface between communities
- Meetings
- Mailing list
- Joint working groups, e.g.
 - Categories of research software
 - Organizational guidelines for Research Software Engineering
 - RSE Research

<https://fg-rse.gi.de>



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CONCLUSION

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- Mutual benefit can be created through (continued) collaboration
 - (R)SE(R) community at Venn intersection between RSEng and SER

- Fundamental requirements:
 - Trust & transparency
 - Catalysts



Conclusion



- Future of (R)SE(R)?
 - Special issue of [IEEE Computing in Science & Engineering](#) (Issue 2/2025)
 - **(R)SE(R) website:** <https://ser-rse-bridge.github.io>
 - Future events?
- Join us!
 - Subscribe to ser-rse-bridge@listserv.dfn.de and share your ideas  
 - Contribute to <https://ser-rse-bridge.github.io>
- Be a catalyst!
 - Find software engineering researchers at your institution and start a conversation
- Cross-pollinate!
 - Attend & submit to each others' events

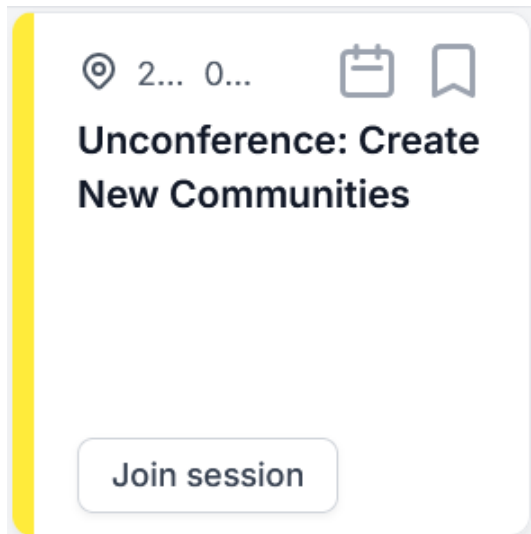
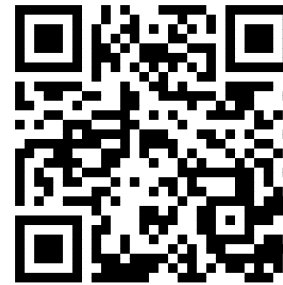


Thanks!



Many thanks to the participants of Dagstuhl Seminar 24161 and the members of FG-RSE!

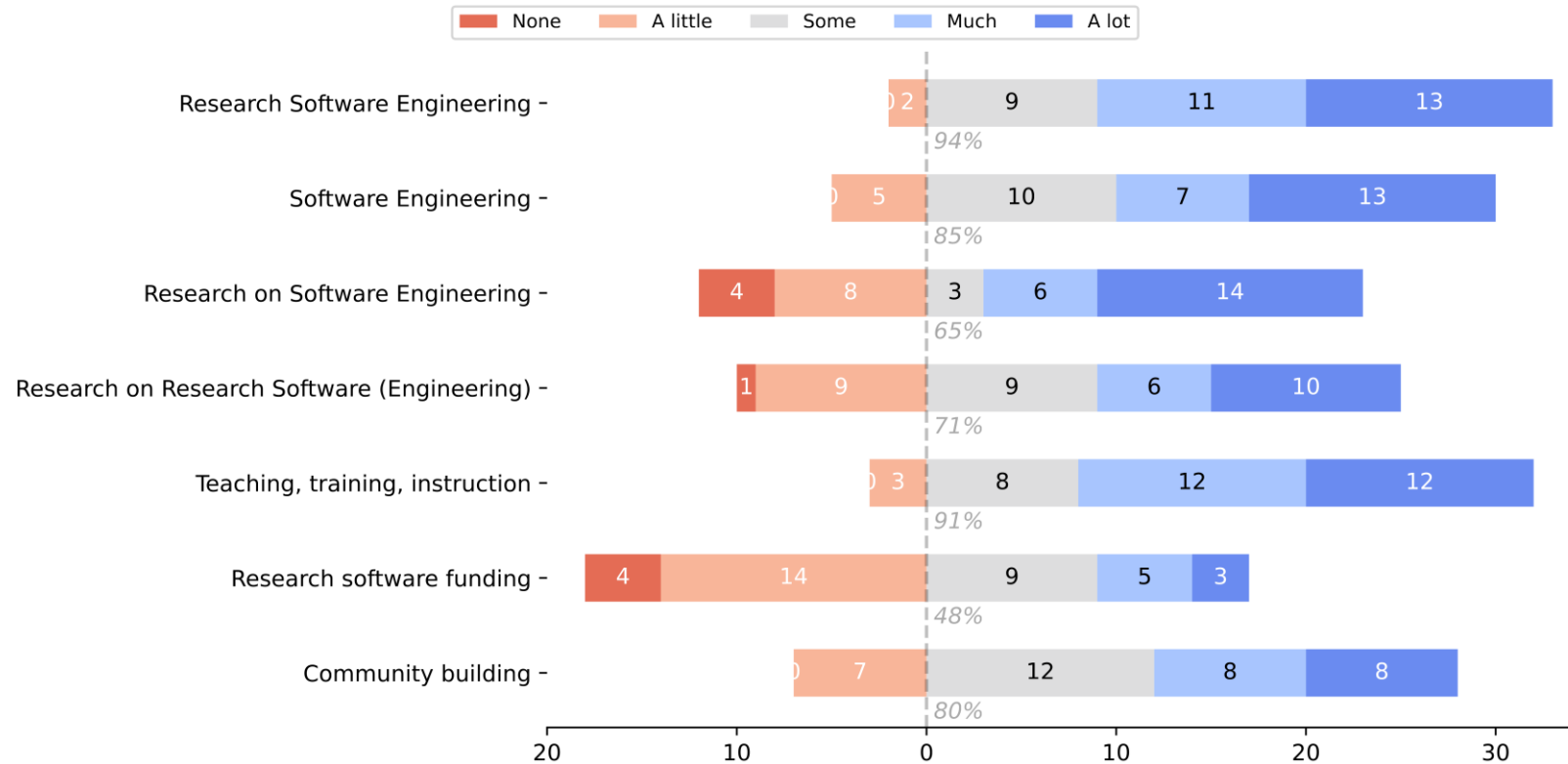
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Bonus



Participants



- Survey responses to a question on participants' experience in a given area.