








Let's Talk About Research Software Competencies

The key results of the workshop Research Data and Software Competencies (RDSC)

Jan Bernoth¹, Bettina Buchholz¹, Maria Chlastak², Christine Hennig³, Alicia Janz⁵,
Ulrike Lucke¹, Evgenia Samoilova¹, and Sonja Schimmler^{3,4}

¹Universität Potsdam, Germany

²Gesellschaft für Informatik e.V., Germany

³Fraunhofer FOKUS, Berlin, Germany

⁴Technische Universität Berlin, Germany

⁵Forschungszentrum Jülich, Germany

*Correspondence: Jan Bernoth, jan.bernoth@uni-potsdam.de

Abstract

While the availability of research data is widely accepted as indisputable for transparent and reproducible research, research software is not yet recognized and supported as an equally important component of scientific discovery. Not only the scholarly paper, along with the data behind the findings, but also the associated software should be published in a findable, accessible, interoperable, and reusable (FAIR) manner. However, different measures are required for the data [1] and the software [2], and satisfying the FAIR principles for software is not (yet) a quality standard in research. Moreover, dedicated research software competencies are necessary, which create current needs in these interdependent competence fields: the handling of research data and software as well as their archival and publication. [3]

To further develop this topic, a workshop was held with different experts in data science, computer science, data literacy, and didactics. A short overview of the workshop, its findings, and future work will be presented to spread the results to the community and involve more people interested. The workshop convened specialists from research data management, software engineering, didactics, and data literacy, leveraging these domains' intersections and multiple projects' collaborative potential to structure the proceedings into three tracks.

The *Software Track* aimed to identify essential but often overlooked competencies across disciplines, particularly addressing gaps in existing frameworks and considering various digital research artifacts. Discussions centered on the 'dev-use continuum'. This continuum is a spectrum where researchers position themselves between developing their own software and utilizing existing tools. This continuum acknowledges that researchers distribute their efforts differently: some focus primarily on using software, others on development, while many occupy intermediate positions based on their research requirements and technical expertise. Moreover, positioning in this spectrum

may change during the lifetime of a project. Structuring and detailing the competencies necessary to assess and re-use research software is planned as an upcoming collaborative activity.

The *Didactics Track* explored effective teaching methods for these competencies, emphasizing addressing discipline-specific needs and meaningful assessment approaches. A major challenge identified was that many existing training programs are focused on similar basic skills for different disciplines. However, advanced training courses specifically tailored to individual needs are also needed. However, a competency framework with different skill levels and disciplinary characteristics, which could be used to align these offers, is still missing. Also, mapping existing didactic strategies and formats to given training needs could further improve the offerings.

The *Collaboration Track* focused on strategies for developing and sharing educational resources and avoiding redundancies by supporting inter-project collaborations. These include identifying shareable materials and actions such as workshops and hackathons, addressing challenges such as intellectual property, establishing quality standards, and measuring the effectiveness of training programs.

Resources

- NFDI Podcast Episodes about the workshop, Episode 6-8, <https://www.nfdi.de/nfdi-podcasts/>

Author contributions

All authors have been co-organizing the on-site workshop and jointly created and edited this abstract. (Writing - original draft; Writing - editing & review)

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