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Towards Services to Enable FAIR Research Software in a Typical Research Project Cycle

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In a digitalized world, the use and development of research software is fundamental for research. Reusing research software can improve the quality and efficiency of research. Therefore, Chue Hong et al. defined the FAIR principles for research software [1] which describe how FAIR search software looks like. Ideally, making research software FAIR is not the last step in the research process. But what does it take to consider the FAIR principles for research software during the whole research project? What standards should be adopted and what services are required to support researchers? To address these questions, and distinguish between universal and domain-specific needs, we analyzed the life cycle of a typical research project and specifically the role of research software in it.

Our analysis divides the cycle of a research project into five distinct phases: Starting with the analysis of existing research software, planning for new software developments, actual software development, strategies to make software findable, and, finally, ensuring the software fulfills FAIR principles to allow reuse. Each phase poses unique requirements and challenges that should be addressed while adhering to the FAIR principles.

As a result, we identified three domain-specific standards and guidelines that could significantly contribute towards making the research software FAIR in its respective community. These incorporate a tailored domain-specific metadata scheme for research software (based on general standards like CodeMeta [2]), structured guidelines for Research Software Engineering (RSE) in the particular domain (e.g., [3]), and application programming interfaces (API) standards for typical APIs manifesting in the domain. From our perspective especially the guidelines are an important instrument to successfully integrating the FAIR principles into the routine exercise of software design and use in research projects.

Additionally, we highlight seven services that could support research to achieve FAIR research software. These include a domain-specific registry, aiding researchers in cataloging and locating domain-specific research software; software repositories, for the developing and versioning of research software; a service to create and organize software management plans to help plan and track software development [4]; a reproducibility checker to verify the consistent results of the research software; a metadata generation service to automate the creation of comprehensive and standardized metadata; software journals which offer a legitimate publication medium to ensure peer-review for research software; and a FAIRness Evaluator, a service to confirm the adherence of the FAIR principles.

We want to showcase the different aspects required to support researchers to include the FAIR principles in their daily work when using and developing research software in research projects. By defining useful services, standards, and guidelines we want to contribute to a better understanding of what is needed to get closer to FAIR research software in all research projects.

In our conference presentation, we would like to present and discuss these identified phases of the research project cycle, especially the envisaged services, standards, and guidelines linked to each step.

[1] https://doi.org/10.15497/RDA00068
[2] http://ssi1.eprints-hosting.org/id/eprint/2/
[3] https://doi.org/10.1371/journal.pcbi.1005265
[4] https://doi.org/10.37044/osf.io/k8znb

I want to participate in the youngRSE prize

no

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