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User-centric development of Materials Knowledge Solutions in NFDI-MatWerk

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The long-term preservation and accessibility of research data will accelerate future research. To reduce structural and financial risks in research data management (RDM) in Germany, the National Research Data Infrastructure (German acronym: NFDI) was established for "bundling expertise and creating universal access to services for research data management"(1).

NFDI-MatWerk is one of 26 domain-specific consortia developing and providing software, workflows, ontologies, and metadata schema, aiming at a materials knowledge system for materials scientists and engineers. Materials Science and Engineering (MSE) plays a key role in addressing global challenges such as climate change, resource scarcity, and the transition to renewable energy. The complexity of materials research due to the different scales and structures of materials, as well as the manifold possibilities of chemical compositions and treatments, make the process of research software solutions development complex. Developing research software that helps making materials data FAIR will change the way how research in MSE is conducted. Therefore, software solutions must meet the needs of MSE researchers.

To ensure this quality, NFDI-MatWerk uses a user-centered approach to develop MSE-specific research data management software. The project consortium includes institutional computing centers, which not only bring in their know-how and infrastructures but also their already developed services to build further upon. At the same time, the MSE community is involved through pre-existing large MSE projects and working groups, which represent prototypical research data management tasks as Participant Projects (PP). Together with them, infrastructure usage profiles have been developed and consolidated into infrastructure use cases (IUC). The aim of each IUC is to make the solutions available to other researchers in the field who may be working on related research workflows (leading to more requirements). To enable the research data management and further digitalization for these IUCs, we established the following elements:
- Specific teams are being formed for each IUC with members from the PPs and developers from the NFDI-MatWerk team.
- Each IUC team is supported by an agile manager who helps defining roles, working packages and supports user-centered development.
- A product owner from a PP ensures requirements engineering and a general understanding of the researchers´ challenges.
- To maximize the usability and dissemination of the research software developed, a central roll-out working group is currently establishing roll-out mechanisms, including quality control, accessibility, understandability, documentation, user feedback, teaching and marketing. This allows the developers and domain experts to focus on their core tasks, while fostering a diversity of research software engineering skills within NFDI-MatWerk.

The collaboration of software development specialists from IT centers and MSE domain experts from participating projects in interdisciplinary use case teams characterizes the software engineering process of NFDI-MatWerk. We will present our learnings about the NFDI-MatWerk user-centered development approach along concrete examples from MSE, emphasizing the impact of the specific development process on the research community.

(1) Alliance of German Science Organisations. 2010. "Principles for the Handling of Research Data."Publisher: Alliance of German Science Organisations.

I want to participate in the youngRSE prize

yes

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