

Current Insights from Task Area 1 in NFDI4Energy: Building and Serving the Energy Research Community

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1. Introduction and Motivations

Energy system research has become increasingly reliant on modeling and simulation approaches. These endeavors are enabled by continuously improving tools and methods for developing, maintaining and sharing models and data. Knowledge of how to better conduct, share and archive one's research has become increasingly complex and hard to manage for individual researchers or single research groups. Identifying and including relevant scientists from energy research, social sciences, and further disciplines is sometimes difficult. Furthermore, a plethora of best practices and guidelines exist on how to prepare data, models and results in ways that make them easier to discover, verify and build upon. To present a sustainable, problem-solving, technical solution for the energy research community, NFDI4Energy develops in Task Area 1 (TA1) two services of the NFDI4Energy platform. Consequentially, the intention of this abstract within the disciplinary track "Engineering" is to provide an overview of the development process with a special focus on *Competence* and *Best Practices*. In addition, it discusses interconnections with other Task Areas as well as the chances and challenges that are associated with those connections. The academic audience, e.g., from the Information Systems and (Software) Engineering domain at CoRDI 2023, can observe and discuss our proposed procedure with other community members. Furthermore, we expect interested individuals to compare the proposed procedures with their own, which can lead to meaningful discussions and knowledge-sharing situations within the Engineering domain.

2. Task Area Objectives and Procedures

TA1 called "Building and Serving the Energy Research Community", is responsible for four **(1-4)** main TA objectives that a mixture of different procedures will achieve: First **(1)**, it collects and updates platform requirements by the energy modeling and simulation communities. For this first object, we follow a requirements-driven process that takes one of the envisioned user groups – the energy research community - into focus in the design process of the platform [1]. As a result, we will first develop an interview guideline within the consortia and identify and

motivate relevant stakeholders for interview participation. Semi-structured single- and group interviews will be performed to collect meaningful requirements for the development process by qualitative content analysis (e.g., Flick [2]). Integrating the community into this process motivates researchers to use our NFDI4Energy platform later and in the long term.

Second **(2)**, TA1 continuously monitors, adapts and improves offerings according to community feedback. A structured review of the strengths and weaknesses of various (research) platforms will identify best practices for user incentivization and user feedback. Feedback mechanisms will be developed based on the resulting review and platform-integrated usage statistic tracking, including quantitative and/or qualitative criteria. An evaluation will take place with the tracked usage statistics along the development process, expert interviews, and platform user surveys to improve the long-term usability of the infrastructure.

Third **(3)**, TA1 creates a platform for sharing best practices, community guidelines and access points to community services. Here, TA1 is responsible for two services that NFDI4Energy will provide: As a first service, *Best Practices* should curate and present the current best practices from the energy system research community. As a second service, *Competence* will guide (unexperienced) researchers within the community to find suitable contact persons, e.g., owners of uploaded datasets within the NFDI4Energy platform. This will be realized through a database of scientific institutes, their members, and relevant industrial partners. Ideally, this database will be searchable and help identify the right research and transfer partners for, e.g., upcoming research projects. In addition, we will provide a platform evaluation workshop to gauge acceptance and usage of the platform. Since the NFDI4Energy platform will live from the participation of its intended stakeholders, TA1 develops a quality assurance process for content submissions.

Last and fourth **(4)**, TA1 develops guidelines, materials and tutorials for best practices in energy system research. Potential tutorial topics will be identified through the extensive requirements analysis before. As a result, NFDI4Energy will produce tutorials and best practices for the energy community and deploy them on the platform. This will align with Open Science and the FAIR principles that advocate for transparency and accessibility of methods, data and results but lack clear definitions and proceedings [3]. Based on these recommendations NFDI4Energy will provide hands-on examples, e.g., research data and software. We see this as a mix of descriptive and instructional content presented in interactive formats, if applicable.

3. Discussions and Conclusions

Generally, interconnections of TA1 can be seen on the requirements, services, and content layer. Intentionally, TA1 has strong interconnections to TA2 ("Integrating Society and Policy in Energy Research") and TA3 ("Transparency and Involvement of the Energy-Related Industry"), which examine crucial requirements for the platform from the point of view of society and policy in energy research and energy-related industry. While the requirements of these stakeholders are also important for the development process, a continuous communication information exchange is inevitable for the overall development process. Also, we expect to interact closely with the team of TA4 ("FAIR Data for Energy System Research") as they work on ontology and metadata standards that should be practical and useful for researchers in the field of energy research. These ontology and metadata standards must be implemented into the platform appropriately. Since *Simulations* in interdisciplinary energy research are a key service provided, continuous communication and constant workflows are needed with TA5 ("Simulation in Interdisciplinary Energy Research"), too. The NFDI4Energy platform must be of high usability for its intended stakeholders. Therefore, concrete use cases will be developed in TA6 ("Use Cases for Community Services") that can serve as a foundation for developing content for *Best Practices*. The NFDI4Energy consortium is aware of potential risks within the

overall work and in TA1 in particular. To avoid lacking support and interest in the energy system research community, a detailed requirements analysis will be performed to reflect opinions and feelings appropriately. Community workshops and presentations of different prototypes will support promoting the provided services. Figure 1 depicts the interconnectedness of TA1 within NFDI4Energy described before:

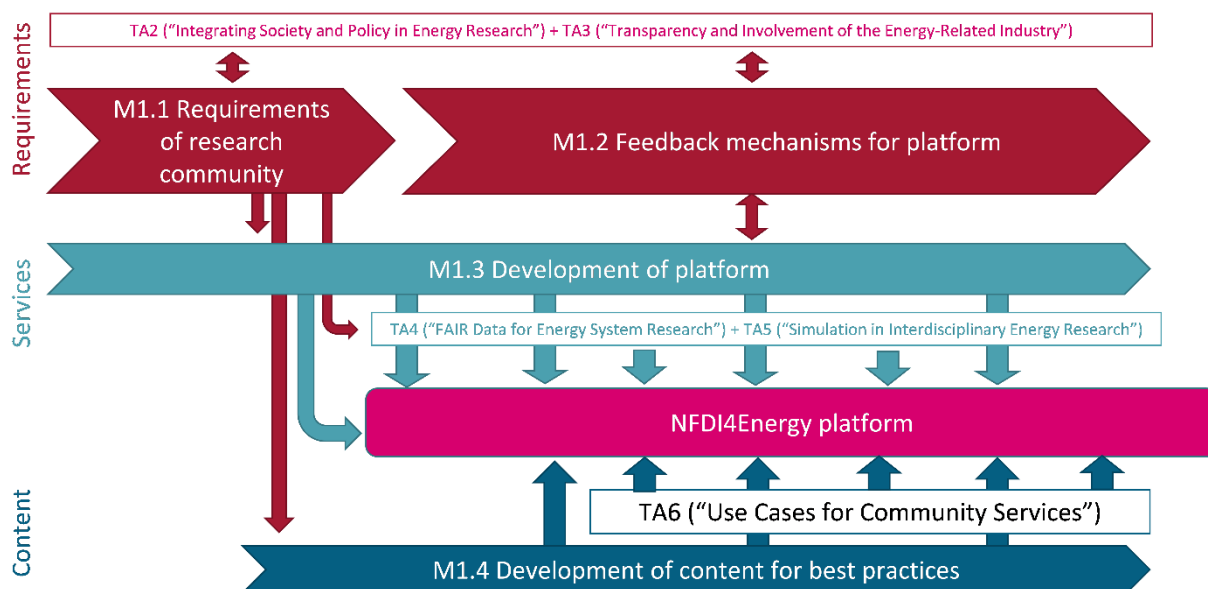


Figure 1. The interconnectedness of TA1 within the NFDI4Energy; Note: The four objectives of TA1 are internally referred to as “Measures” denoted here as M1.1 - M1.4.

Competing interests

The authors declare that they have no competing interests.

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