Designing a Digital Platform for Energy Systems Research – Insights from User Interviews
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Abstract. This presentation highlights the outcome of a qualitative study investigating the requirements of researchers in the energy systems field regarding a web-based platform dedicated to the exchange of data, models, and code. The findings reveal the importance of usability, standardization, data management tools, and incentives in shaping an effective platform for open science in energy systems research. While some researchers expressed concerns about centralized platforms, the demand for a collaborative, open-source solution became clear. These insights have far-reaching implications for advancing open science in the energy research community and beyond.

Keywords: Open Science Platforms, User Requirements Analysis, Data and Code Exchange

1. Introduction

Open science plays a pivotal role in advancing energy systems research. The exchange of data, models and code speeds up research, fosters comparability and improves research quality. The potential of active data and code sharing can, for example, be witnessed in the field of natural language processing: The platform Hugging Face [1] offers sharing of machine learning model implementations, alongside with suitable data, which leads to broad knowledge transfer and therefore a massive acceleration in research. Even though there are already open science platforms in energy systems research (e.g., the Open Energy Platform [2], Open Power Systems Data [3], FfE Open Data Portal [4], and openmod [5]), facilitating the exchange of energy systems models and data remains challenging.

This presentation provides an overview of a qualitative study that delves into the perspectives of researchers regarding digital sharing platforms for research artefacts. The study aims at identifying the needs and requirements of researchers particularly in the energy system domain, shedding light on their opinions about central data platforms. The purpose of this research is to inform the development of effective solutions that foster open science practices in energy systems research and beyond.

2. Methodology

We have conducted 20 semi-structured interviews with researchers from the energy systems field, belonging to 11 different affiliations. Research topics include power system automation and simulation, energy management, analyzing distribution grid flexibility potentials, and forecasting, and the employed methods cover (stochastic) optimization, reinforcement learning, high performance simulation, and control theory. The interviewees were not informed about

the topic and goal of the discussion beforehand, and questions were designed to foster an open, unbiased discussion about the researcher's feelings and preferred solutions for efficient data sharing and collaboration. At the end of the interview, we revealed the aim of the interview - and asked researchers about their final thoughts on the endeavor of developing an effective sharing platform for data, models, and code in their area of research. This study design adds additional value to the previously published interview-based study on open science platforms (see [6]), as we have a stronger focus on academic participants, and we do not propose a platform concept to our interviewees, enabling more independent, unbiased answers.

3. Results

The interviews have led to the following key findings so far:

1. Need for usable and accessible data, models, and code: Most participants complained about the time-consuming process to find resources, to identify, whether the resources are suitable, and to process the data / manage to make models and code run.
2. Desire for standardization: The interviewees highlighted the need for a standardized metadata and model description framework. To improve quality and comparability of results, researchers wish for benchmark data sets.
3. Need for user-friendly data management tool: Interviewees complained about the challenge to manage their own data successfully, as they come in different formats, and it is time consuming to store and document resources appropriately.
4. Concerns about project success: Almost all participants remarked that setting up a successful platform will be a large and hard project. Reasons mentioned for this were the diversity of resources required for research, which are hard to collect in a unified format, missing incentives to contribute, and that the platform will have to gain a critical mass of users to become attractive for the entire research community.
5. Resistance to centralized platforms: Some interviewees expressed reservations about the idea of a centralized platform because science is highly individual and decentralized.

4. Discussion

Our findings have important implications for the development of data and model management solutions in the energy systems domain. Researchers' resistance to centralized platforms and their lack of time and willingness to document and share their own resources highlights the need for clear incentives to contribute to such a platform. At the same time, the need for an open-source forum to collaborate, manage and access high-quality data and code became clear in the interviews. If done correctly, a platform solution for research data and code exchange has a high potential to assist researchers, speed up research, and improve research quality.

The results of this study are not only significant for the energy systems community but also hold broader implications for open science initiatives in various domains. Understanding researchers' needs and preferences is crucial for the development of effective solutions that promote transparency, collaboration, and innovation in the energy research field. These findings pave the way for the future development of user-friendly and interoperable data and model management solutions that align with the principles of open science.

Author contributions

Annika Schneider and Christoph Goebel were both involved in the design of this study, in particular, defining its goal and developing the interview guidelines. Annika Schneider conducted the interviews, evaluated the results, and wrote the original presentation abstract. Christoph Goebel reviewed the presentation abstract and funded the research.

Competing interests

The authors declare that they have no competing interests.

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