Open Training for Research Data Management in the Energy Domain

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1. Introduction and Motivations

Research Data Management (RDM) is an increasingly relevant topic for all researchers. Good RDM leads to a better handling of data during research projects and beyond. It improves the reproducibility of science and, through reuse of digital research objects also the comparability and the efficiency of research. Still, RDM is not integrated into most curricula at universities and most researchers are not trained in RDM. Therefore, there is a high need for training material to improve the skills in the area of RDM for academics at different levels, e.g. students, doctoral students, postdocs [1]. While the core information of such training material are domain-independent, a domain-specific preparation of training material has multiple advantages: first, domain-specific problems can better be addressed, e.g., data from certain devices or data based on certain methods. Second, domain-specific portals and services can be linked which is especially relevant for the proper publication of digital research objects. Third, a domain-specific preparation of the material might be closer to the real research of the researcher which makes it easier to relate to the material and learn.

Therefore, we developed an energy-specific course for RDM. The course reuses as many as possible existing resources and prepares them in a domain-specific way. The course is published as open educational resource (OER)[1]. In the following section, we shortly give information on the technical foundation of the course. Furthermore, we outline its main content. We conclude with a short discussion on further extensions and dissemination of the course.

2. Technical Foundation

To create the course, we look for a tool which fulfills the following requirements:

- The tool should allow the use of interactive elements, e.g., quizzes.
- The tool should integrate non-textual elements, such as videos, images.
- The tool should allow a development in a distributed way.
- The tool should allow easy changes and extensions.

After checking different options, we found LiaScript [2]. LiaScript is a tool to easily build open online courses. It is based on markdown and it comes with an interpreter which directly renders the content live to regular websites. LiaScript supports quizzes and other interactive formats. A LiaScipt course can be developed within a version control system, e.g., git, which makes it easy to collaboratively develop and extend the course. Besides versioning, git allows to perform changes in a distributed manner. [2]

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[1] LiaScript:
https://liascript.github.io/course/?https://raw.githubusercontent.com/NFDI4Energy/EFZN_rdm/master/README.md#1; Twillo: https://www.twillo.de/edu-sharing/components/collections?id=cdaaa23c-4f8f-481f-bdad-19aad3bef880

Since LiaScript fulfills all our requirements, we decided to use LiaScript and developed the course on GitHub[2]. In this way, further extensions and possible mistakes can be discussed within GitHub issues. Also, further changes can be directly documented.

3. Content

The course should allow a basic entry to RDM and, therefore, the content is limited to fundamental topics. The course starts with a short overview on the usage of the course (see **Figure 1**). It is possible to work with the course in multiple ways. First, the users can just go through the material and learn about RDM. Second, the users can also do multiple quizzes to deepen their understanding of the learned content. Third, the users can just go to the parts which are of interest for them. Also, the users can create their own research data management plans while doing the course.

Figure 1. Start page of the course

Within the first chapter, RDM is motivated by introducing the research data lifecycle. Also, benefits of RDM are shown and two researchers from energy research talk about their experiences in two short videos.

In the following chapter, multiple basics are introduced. This includes the FAIR criteria as well as Open Science in chapter 2. Afterwards, data management plans are outlined by reusing an existing video of Ghent University in chapter 3.

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[2] https://github.com

Next, the course gives multiple practical hints. Chapter 4 shows multiple tools including domain-specific ones which can support researcher with their RDM. Chapter 5 introduces legal aspects of RDM. Chapter 6 outlines relevant data types and gives information on backup and archiving. Metadata are highly relevant for RDM and, therefore, are explained in the last chapter. Here, also relevant repositories are shown.

4. Discussions and Conclusions

We presented a course for RDM specifically tailored to the energy research community. After a short revision phase the course will be publicly advertised. Therefore, the course will be integrated into the website of Energy Research Network Niedersachsen (EFZN[3]) and the NFDI4Energy platform.

While creating the course, we focused on the basics. In multiple parts further information can be integrated, e.g., guidelines to create useful interoperable metadata. Also, the context of the research software management is highly relevant in energy research [3]. Therefore, additional material about research software management should also be added later on into the course.

Competing interests

The authors declare that they have no competing interests.

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