Bausteine Forschungsdatenmanagement
Empfehlungen und Erfahrungsberichte für die Praxis von Forschungsdatenmanager*innen

Overviews of Digital Collaboration Tools and Data Storage Options

Alexandra Mielke[i] Susanne Buch[ii]

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[i]Hochschule Bonn-Rhein-Sieg. ORCID: 0009-0003-1749-8220
[ii]Hochschule Bonn-Rhein-Sieg. ORCID: 0000-0002-3149-0829

Abstract

The tool landscape at universities and research institutions is ever changing. As a result, researchers and students often struggle to keep track of the tools offered. Especially as a new university member or PhD student, finding the right tool is time-consuming and complex. The templates for overviews of collaboration tools and storage options described in this work provide an easy comparison of tools while also giving a short introduction to the different tool types. The templates are licensed under CC BY and can be adapted to the offers of other universities and research institutions.

1 Introduction

To ensure sustainable use of research data and offer reusability, publicly funded universities and research institutions are increasingly required to implement research data management (RDM) practices. However, several studies (Elsayed & Saleh, 2018; Lefebvre & Spruit, 2019; van Panhuis et al., 2014) indicate that RDM is still not sufficiently established in researchers' every-day practices (Donner, 2022).

As one of Germany's centers for data literacy, the Datenkompetenzzentrum Rhein-Ruhr (DKZ.2R) aims to reduce data-related barriers in research. To identify and reduce gaps in training materials, we, as part of the DKZ.2R, conducted qualitative interviews in several research areas at the Bonn-Rhein-Sieg University of Applied Sciences (H-BRS). As a response to the demand identified in the interviews, we designed overviews of available collaborative tools and storage options at H-BRS. Templates of the overviews are published on Zenodo under CC BY license and can be adapted to the offers of other universities and research institutions (Mielke, 2025).

2 Related Work

In a literature analysis of several studies related to RDM, Birkbeck et al. (2022) determined that due to time limitations researchers often do not comply with standards or use metadata. Concerning resources, they found that researchers often have to refer to numerous sources for RDM guidance (Wilms et al., 2018), but also concluded that training courses do not necessarily meet researchers' requirements. Overall, they state that researchers lack expertise in and time for managing and preserving data.

Concerning promotion of RDM practices, Subaveerapandiya (2023) shows in an extensive literature analysis on RDM challenges in academic libraries that awareness

Information	Management	Overhead	Reusability	Accessibility
What is there?	Customization - Access restriction - Data sharing	Tool research	Code licensing	Data sharing
Better information on deprecated tools needed	Legal aspect (sensitive personal data)	Establishment & Awareness of fellow researchers	Accessible storage options	Download / Upload speed
What could be an initial starting point?	Storage infrastructure	Time for Updating & Care	Other people's projects are unknown	Time to access & simpleness
How to decide on naming conventions & metadata?	Missing tools			Place dependence (network accessibility & VPN)
How to anonymize data?	Automation			
	Overengineering			

Figure 1: Challenges mentioned in the interviews

is one of the main issues. In 44 of around 220 studies analyzed, awareness is mentioned as one of the key strategies for effective RDM, indicating that awareness is a still a challenge.

In an online survey, Klocke et al. (2023) analyzed awareness, activities and demands in RDM at 109 Universities of Applied Sciences in Germany including H-BRS. The survey reveals over 25 % need more consulting or training and over 20 % of the participants require more resources. The study does not specify concrete demands. Moreover, as only 2154 researchers of all 109 universities answered the survey, it is unclear whether this subset sufficiently represents the knowledge and demand of all researchers.

3 Interviews

To identify potential gaps in the H-BRS's training material, we conducted team-wise qualitative interviews with researchers at the H-BRS.

We carried out six interviews between August 2024 and April 2025 in the domains of Engineering, Computer Science, Natural Sciences and Social Protection at the H-BRS. For the interview we included questions on general information (group size; data types and sizes; research subject; RDM personnel), challenges (starting hurdles; where do they look for RDM materials) and wishes (what offers are needed; are they interested in training).

Figure 1 shows the challenges and wishes mentioned in the interviews clustered into classes. Challenges concerning overhead caused by RDM match the findings that researchers generally lack time for RDM (Birkbeck et al., 2022; Klocke et al., 2023). Moreover, the explicit mention of overhead for tool research and a lack of general

overview (cf. "What is there?" in Figure 1) matches the findings of Wilms (2018) that researchers often have to refer to several sources for RDM guidance. One of the key issues mentioned in all interviews is the lack of a general overview. While some groups did not know about the tools offered at the university, others were aware of available tools but lost track of the options. Some even mentioned that tool research and comparison required too much time as information is spread in several locations.

From these challenges the following gaps can be derived:

- *Tool overview*: Interviewees are not always aware of the available tools and tool research requires too much time.
- *Awareness*: PIs and team leaders need to be more aware of the time and resources necessary for RDM.
- *Infrastructure*: Some teams require additional tools that are not available yet. Others demand faster and easier access to storage tools.
- *Network*: Not all H-BRS researchers are aware of other projects and their data. This inhibits potential multi-use and reuse of data.
- *Knowledge*: Missing general information and training on anonymization of data and legal aspects when storing and publishing data or code.

While the challenge of better infrastructure and missing tools can only be addressed by providing the requested tools, which are often too costly, the other challenges can be tackled more easily.

Creating a tool overview in particular is one of the countermeasures with high impact at low cost. Therefore, the following chapter will describe the design and implementation of overviews of RDM tools available at a certain research institution.

4 Overviews

In RDM there are two main types of tools: Tools to store data and tools to work on data (e.g., electronic lab notebooks, wikis). While storage options are often similar and thus easy to compare, this does not apply to collaborative working tools. These tools differ widely in their features and make a tabular comparison more difficult. Therefore, we created two overviews: a tabular overview of storage options and a broader comparison of collaborative working tools.

4.1 Storage options overview

The design of the storage options overview is inspired by generic software comparisons. The aim was to give a fast overview and easy comparison of different storage options. In the first iteration, we used small icons in the table to indicate a storage option's features. While this design was visually more appealing, it was not supported

by the spreadsheet programs typically used and was therefore discarded. As an alternative, a feature's availability is color-coded and indicated by symbols (Figure 2).

The features include storage space, access, data protection and data security as well as extras such as metadata support or versioning. Additionally, the table includes costs. Although storage options at research institutions are typically provided free of charge to researchers, it is worthwhile to emphasize this fact explicitly to ensure that researchers do not need to spend additional time checking whether a tool introduces extra costs. Next to a storage option's features, the overview includes a description and contact information. This information is positioned below the general features to facilitate comparisons and to ensure that those who are already familiar with the options do not need to scroll through the descriptions again.

Depending on a research institution's storage options, the overview can be adapted accordingly. This includes the incorporation of additional features, modification of the clustering of storage options in the primary row and incorporation of the university's logo. However, we do not advise deleting rows with features. Although counterintuitive, we advise keeping features even if they are not implemented in any of the options to ensure that researchers do not need to search for this information elsewhere.

Storage Tools at the <Uni>

As of 25.03.2025

Provider

Feature comparison

Features			Provided by the <Uni>		Provided externally	
			Shared drives Department of ...		Sciebo Personal Account	Sciebo Projectbox
Storage space	How much?		50 GB	200 GB	30 GB (500 GB for employees*)	2 TB per project
	What type of data?		Personal data	Research data	Data	Research data
	How long?		For the duration of employment	For the duration of the project	1 year, extension possible	2 years, extension possible
	What happens to data if I'm no longer part of the H-BRS?		Deletion after 1 year		Deletion after max. 1 year after the last extension	Ownership is transferable
	Expandable?		X	✓	500 GB for employees*	X
Access	From where?	Uni network or VPN	✓	✓	-	-
		Browser access	X	X	✓	✓
		Offline (Synchronization)	✓	✓	✓	✓
	Who?	Students	X	✓	✓	✓
		Employees*	✓	✓	✓	✓
		External	X	X	X	✓
Data Protection	Access control?		Person specific	By project	Person specific	By role
	Are editing rights adjustable?		X	✓	X	X
	Where are my data stored?		<Uni>	<Uni>	NRW	NRW
Data security	Geo-Redundant storage		✓	✓	X	X
	Automatic back-ups?		✓	✓	X	X
Extras	Includes collaborative working tools?		X	X	Overleaf, OnlyOffice	Overleaf, OnlyOffice
	Metadata?		X	X	X	X
	Versioning?		X	X	✓	✓
Costs						
Description			Department-specific centralized storage systems to store, manage, and share files among multiple users (in most cases employees only). Shared drives can be accessed like local drives (e.g. like C: on Windows, /home on Linux and /Users on mac).		A non-commercial cloud storage by universities for universities, where you can securely store your research, study and teaching data. There are personal accounts for single people and project boxes for work groups that work with very large amounts of data. Project boxes are particularly suited for long-term projects with changing project management.	
Additional information						
Documentation & Contact					Sciebo Documentation	

*Employees mean research associates, professors and other non-student employees only (keine Hilfskräfte)

Description

Documentation and person of contact

Figure 2: Extract of overview of storage options

CC BY

4.2 Tool overview

The design of the overview of collaborative working tools is influenced by a poster by Billie Ruben (2020). In her poster, Ruben first focuses on what a tool type can be used for before recommending a suitable tool. This ensures that users who are not familiar with specific terminology still find suitable options. Moreover, in the poster, similar tools are clustered and additional information, such as which operating systems a program supports, is offered. This ensures a quick overview of whether a program is suitable for the intended purposes.

For the tool overview (Figure 3) we included four common tools for RDM: electronic lab notebook, wiki, online text editor and reference management. This choice is based on the options available at H-BRS, but other or additional tools as well as tool types can be added to the overview depending on an institution's offers. The idea is that the collection gives a broad overview of the tools currently available to researchers at their institution.

There are several reasons for this local focus:

- Tools that are not already institutionally supported often introduce additional costs, e.g. server capacity, IT support or license fees, which can be a barrier for researchers and are usually not a feasible option without institutional backing.
- Too much information hinders easy comparison of tools.
- Overviews of generally available RDM tools are already offered by the NFDI or state RDM organizations.

4.3 Discussion

As the tool overview is meant to be used as a broad overview in form of a flyer or poster, it is limited in space and therefore in detail. This issue might lead to misinterpretation of a tool's potential performance and therefore reduced use. However, as the tools vary largely in their target use and thereby properties, a more thorough comparison is not feasible.

Compared to the tool overview, the storage option overview has a far higher density of information. In this case, the detail might overwhelm potential users or make it difficult to easily compare different solutions. Moreover, depending on the institution, there might be too many options to fit onto a single sheet. In this case, it might be a better solution to cluster storage options into options with similar use cases, e.g. institutional publication options, long-term and short-term storage options. Alternatively, we advise distributing the overview in the form of a locked spreadsheet. This allows the use of the spreadsheet's scrolling and sorting functions to facilitate the comparison without changing any information by accident.

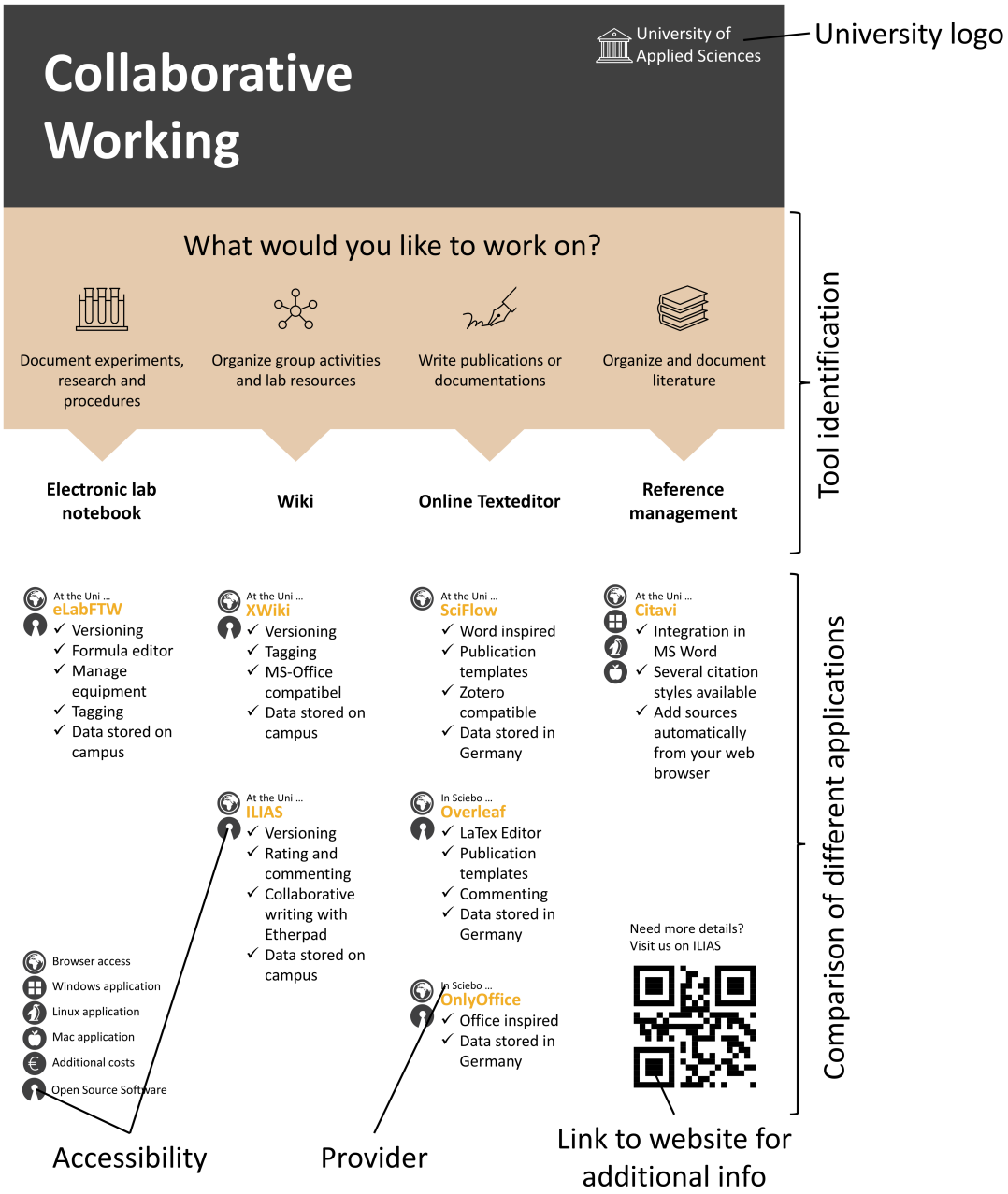

Figure 3: The tool overview shows available software for collaborative working

cc

4.4 How to use the overviews

With the target group of both overviews being researchers and PhD students, both overviews are meant to be adapted to the institution they are used at. When choosing the tools, include all tools readily available at the institution. This means all tools already licensed or implemented by the institution. For reasons of completeness, include all available storage options, even those that are not intended for research purposes. In cases where a tool is no longer offered by the institution it might be a good idea to include the former tool with the newly introduced costs in the overview's next iteration. This makes it easier for viewers to find the new alternative and to decide if it is more viable to keep the former tool despite the additional costs.

These overviews can then be distributed as flyers or posters and handed out as welcome information to new employees. From the perspective of cyber security, the storage options overview might contain confidential or vulnerable information and should therefore only be published internally. Should students not have access to the internal web presence, e.g. an institution's intranet, then publication on a student learning platform, e.g. Moodle or ILIAS, should be preferred. To ensure that researchers are well informed about changes, the overviews should be placed in a static and central place of the web presence and updated regularly. In our case we added the overviews in the H-BRS's student learning platform next to information on other RDM-related offers. We also distributed pdf versions of both overviews to new PhD students and employees and hung posters of the collaborative working tools in the library, the main hallway and break rooms for research staff. While we already registered increases in RDM service requests related to the interviews, we expect to see changes in RDM tool usage due to the overviews within the next one to two years.

5 Summary and Outlook

In this work we conducted qualitative interviews with researchers at the Bonn-Rhein-Sieg University of Applied Sciences to identify gaps in training and information materials for research data management. The results showed that researchers lack a general overview of available tools for RDM.

To address this lack of general overviews, we propose creating visual overviews of collaborative working tools and storage options. The former includes an explanation of the tool types and indicates suitable software, while the latter includes a thorough comparison of all storage options available at a certain institution. This work includes templates of both overviews which can be reused by other institutions. Overall, these overviews are a low-cost solution that do not only reduce the time otherwise needed for research on RDM tools but might also lower starting hurdles with RDM and increase awareness if shared digitally or in form of posters or flyers.

As a next step, the overviews could be implemented as an interactive website. For example, embedding the storage options into an interactive flow chart with questions that lead to the best-fitting option might make finding the right tool faster and more accessible for people less experienced with the available storage options. There will also be further work aimed at reducing the other challenges we identified in the interviews.

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