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# Good Support Helps to Avoid Data Horror: Experiences with Organising Research Data Management Support

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## Abstract

The complexity around data management decisions is a tangible burden to researchers and can be a significant barrier to engaging with Open Science principles. Researchers often face a multitude of choices regarding storage solutions, sharing technologies, security, and legal and ethical concerns, each with its own set of implications for their work. Simplifying these processes through the development of intuitive tools, clear guidelines, and nearby support is crucial for demystifying the preservation of research data and making it more approachable.

Since 2018, Vrije Universiteit (VU) Amsterdam has been steadily developing a data management ecosystem consisting of professional support services, an adequate technical infrastructure, and an awareness-raising and training programme to increase the skillset of researchers on data and software management. This ecosystem is organised as a collaborative effort in which faculty and central services are strongly involved in a network organisation, the Network for Research Data Support (NeRDS). Operational since April 2021, NeRDS focuses on professionalising Research Data Management (RDM) and services through four main tasks: (1) providing user support on tooling and sustainable data and software management services; (2) maintaining the technical solutions on data and software management; (3) innovating and developing new services based on researcher demand; and (4) offering data and software management information and training within a community.

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# Introduction

Data horror refers to a situation in which a catastrophe so disastrous has occurred that a research project's data is lost, damaged, or otherwise impacted, and the research cannot or can only continue with tremendous difficulty. Therefore, data horror is one of the scenarios that universities, researchers, and research support staff want to avoid. One of the ways to minimise the risk of data horror is to set up and support robust Research Data Management (RDM). Therefore, research institutes understand the importance of data management as a fundamental aspect of responsible research. In addition to the wish to avoid data horror, RDM concerns making data FAIR (Findable, Accessible, Interoperable, Reusable). Making data FAIR and ensuring their longevity beyond the active research phase is listed as an obligation for researchers in every institutional RDM policy.

In addition, research institutes and universities are concerned with Open Science. Open Science is a set of principles and practices that aim to make scientific research from all fields accessible to everyone for the benefit of scientists and society. This is about making sure that scientific knowledge is accessible and that the production of knowledge is inclusive, equitable, and sustainable. Open Science in research especially promotes transparency in how data is collected, analysed and (re)used, so that we can trust findings built on them. However, Open Science practices do not come naturally. It requires a change in the research culture and, to start with, the development of services that make the transition towards Open Science practices possible (UNESCO, 2023).

An important foundation in the Dutch ambitions towards Open Science is that academics are well-supported and well-trained in RDM and making their scientific outputs FAIR. In addition to Open Science and research transparency as important motivations for managing research data, countering scientific fraud has been a decisive factor in the development of standard practices in RDM.

To ensure compliance with the RDM policy and the Open Science principles and to help researchers make the best possible decisions concerning their data and software, Vrije Universiteit (VU) Amsterdam has organised a support ecosystem consisting of professional support staff, services, and infrastructure. This paper aims to describe how VU Amsterdam has organised this ecosystem to smooth out the complexities of RDM. This paper will focus on the support staff in the ecosystem and show how the various actors and roles in the support network make data support at VU Amsterdam work and how this contributes to good research practice.

# Research Data Management in the Netherlands

RDM is an important practice in academic research. It 'concerns the organisation, documentation, storage, archiving and sharing of digital and analogue [research] data' (Vrije Universiteit Amsterdam et al., 2024). The RDM practices should be maintained throughout the project and 'aims to ensure reliable verification of results and permits new and innovative research built on existing information' (Vrije Universiteit Amsterdam et al, 2024). Although researchers have always adhered to best practices around data management, the more recent formalisation of RDM practices has meant that researchers at universities in the Netherlands have been confronted with new requirements around data management, including the requirement by funders to write a Data Management Plan (DMP) (NWO, 2021). This has necessitated setting up support for RDM (and software) at many Dutch universities and research institutions. In the past years, all research-performing institutes invested in the establishment of support teams and in raising professional skills for effectively working with research data and software through the investment in building and expanding so-called Local Digital Competence Centres (LDCCs).[1]

[1] Landelijk Coördinatiepunt Research Data Management: https://lcrdm.nl/dcc/

### Data Stewards as the Driving Force in Data Management Support

An important role in RDM support is that of the data steward. A data steward, in the Netherlands, is usually situated in a university library or a faculty or research department and supports researchers with various aspects of data management. Depending on the institution and the unit where the data steward is situated, a data steward may be an expert or (former) researcher in a specific field or a specialist in RDM.

Another role that has come up recently is that of a research software engineer. This is a specialist who translates the research question into a software question and develops and maintains software for research projects. In addition, the research software engineer could advise the researcher on preserving the software and making it FAIR (Jetten et al., 2021).

## Research Data Management at Vrije Universiteit Amsterdam

### Organising Research Data Support at VU Amsterdam

At VU Amsterdam, the LDCC is organised as a network, the Network for Research Data Support (NeRDS). This network encompasses the university library, IT, and faculty support services, and other divisions, such as the legal and grant offices, all closely collaborating to support researchers. The network acts according to a so-called hub and spokes model, in which a small core team (the hub) is responsible for the overall coordination of support activities. This consists of gathering, bundling, and sharing general information about data management developments and organising the development of professional support and expertise. The faculty support teams (including research data stewards, privacy champions, data managers, and software engineers) and central services (e.g., research IT and legal advice services) are the spokes in this model.

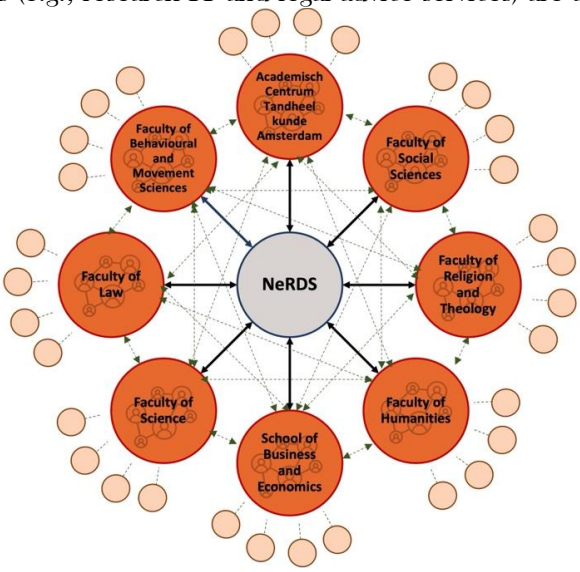


**Figure 1.** Visualisation of the VU Network for Research Data Support.

Figure 1 shows the faculties and the central network hub of VU Amsterdam and their relationships to each other. It visualises the central hub facility of the network, which is accommodated by the library, and the faculty spokes, which could in their own turn act as a sub-network containing the concerned faculty. Of note, there is no strict hierarchical dependency, because each sub-network can act as a separate entity and could relate to other faculty networks. This is important because it gives the VU Amsterdam support network the flexibility needed to operate as close to the researchers as possible.

The network was established in 2021 to create a flexible support organisation that could move along with internal and external developments. More importantly, this way of organising support

fits perfectly into VU's vision, emphasising a culture where addressing questions of data management and data longevity, and taking the necessary steps towards FAIR data are integral parts of the research process. By working alongside researchers, rather than merely offering services to them, RDM teams adopt a long-term vision that encourages active researcher participation and ownership of data management processes.

The vision is that professional support staff focus on supporting and training researchers with, for example, writing a DMP, and advising them on how to choose secure tools for data collection, storage, and analysis. Moreover, support staff can assist in data curation and advise about preserving data according to local, discipline-specific and legal or national requirements. Particularly, support staff encourage, support, and enable the researcher to make the data FAIR; however, the researcher is always responsible and in the lead.

## Data Stewardship at VU Amsterdam

Data stewards at VU Amsterdam primarily fall into two categories: (1) embedded within a faculty; and (2) generic, located in the university library. Embedded (or research) data stewards in a faculty are usually experts (former researchers) in the faculty's discipline and support researchers in various ways. They answer their questions about RDM, help them with the RDM section of grant proposals, and with writing DMPs. In addition, they usually make available information materials and guidance about RDM for their specific faculty or discipline and help draft the faculty's RDM policy. Many faculty data stewards combine this role with that of a privacy officer, in which they support and advise researchers on the role of privacy in the project and how to comply with the General Data Protection Regulation (GDPR). Additionally, some data stewards serve as secretaries of their faculty's ethical review board, which enables them to review the ethical implications of proposed data management strategies. This makes them all-around supporters for the researcher in the faculty. If a central approach to a question or issue is necessary, faculty data stewards will refer to the RDM Support Desk.

Located in the University Library, the RDM Support Desk serves as a help desk for researchers who can contact it to ask questions related to RDM. The Support Desk is made up of generic data stewards who will also answer researchers' questions, help them with DMPs or RDM sections for grant proposals and write information materials about RDM; however, they tend not to be experts in all fields. Instead, the materials they produce are domain agnostic and can be specified further by the faculty data stewards. In addition, the data stewards in the library are responsible for the university-wide policy on RDM, of which the faculty's policies are a specification. Library data stewards design, coordinate, and teach courses about RDM and writing a DMP. In addition, they play a role in harmonising RDM knowledge and advice throughout the university, and they take the lead in innovating and improving the university-wide support process. The activities of faculty and library data stewards overlap to some degree, which is beneficial. It facilitates knowledge sharing and collegial discussion and allows library data stewards to support faculty data stewards with their workload and take over when they are absent or when there is some kind of gap in a faculty. In addition, data stewards, embedded and generic, participate in national and international RDM and Open Science events, communities, and working groups.

In addition to the RDM Support Desk, the library houses functional application managers, who deliver account and user support for research data collection, storage, and preservation tools offered by the university. These functional application managers give one-on-one support to the researcher.

For example, when a researcher contacts the RDM Support Desk with a question about one of the RDM tools, the library data steward who receives the question can answer it or decide to forward it to the functional application manager(s), who act as a second-line helpdesk. The Support Desk and functional application managers utilise a ticketing system that enables questions to be shared with colleagues and facilitates the tracking of unresolved issues.

Similarly, colleagues in the IT department use the same ticketing system. The RDM Support Desk data stewards can decide to completely forward a question to IT or can decide to 'share' a

question with IT, where an IT consultant can pick up the part of the question that was IT-related, and the RDM Support Desk data stewards can continue to discuss the RDM aspects of the question.

Some faculty data stewards work with the library data stewards in the ticketing system, and the library data stewards assign questions to them if the question is clearly intended for the faculty data steward. This is the case for, among others, some data management plans, domain-specific questions, or questions about a faculty's policies or protocols. For faculty data stewards who do not work in the ticketing system, the RDM Support Desk simply forwards the question by email, and the faculty data steward handles the question directly with the researcher. The same route via email works if a question needs to be answered by another colleague who does not work in the ticketing system, for example, a colleague from the legal department or the grants office.

These agreements are made and maintained by the Support Desk staff with various colleagues, and they require commitment and (some) coordination, but mainly a friendly collegiality between all parties. This friendly collegiality allows all colleagues to quickly check in and determine whether someone can answer a question, and how the question should be forwarded if there is any doubt.

## Shaping the Research Data Landscape at VU Amsterdam

Important elements of a professional support organisation are the technical infrastructure and the services based on this infrastructure. These should be up-to-date, easy to use, and adhere to data practices, while connecting to the requirements of researchers. Because VU Amsterdam is strongly committed to the transition towards FAIR and Open Science, it invested in strengthening its fundamentals. The approach taken was to set up a supportive ecosystem that aims to smooth out the complexities often associated with RDM and the preservation of research output. Between 2019 and 2022, VU Amsterdam invested over EUR 2 million in a 4-year innovation programme to develop state-of-the-art infrastructure. Among others, the programme delivered the RDM Support Desk, established more support capacity at the faculty and central levels and implemented the necessary digital infrastructure for researchers to securely store, share, analyse, publish, and archive research data according to the FAIR principles.

A professional infrastructure enabling researchers to work with data is an absolute prerequisite for ambitious research. The VU Amsterdam data management infrastructure consists of a set of tools for every stage of the research life cycle. Organising data management services based on the research life cycle helps to make clear which services and solutions to use at each stage of a research project. Figure 2 shows the services that are supported and recommended by VU Amsterdam. The green beams depict the support services offered by professional staff, such as data stewards and functional application managers. These services consist of the support and advice provided to researchers during their research project, and the training courses and workshops for, mainly, PhD candidates, focusing on data and software management skills.

The blue beams show the technical infrastructural services supported and recommended by VU Amsterdam and the type of use: when in the research process should the tool be used, and does it support (privacy-sensitive) data sharing and collaboration? In addition, it shows if a solution is capable of storing large volumes of research data. This should help researchers to choose the best possible solution. Additional resources to help to find the best storage solutions are the data storage finder on the VU Amsterdam website,[2] guiding researchers in find the appropriate VU Amsterdam storage solution. In addition, the VU Amsterdam website has a data classification tool,[3] a tool for a basic assessment of the risks and confidentiality aspects related to the (use of) data in a research project.

[2] VU Amsterdam: https://vu.nl/en/research/storagefinder
[3] VU Amsterdam: https://vu.nl/en/research/dataclassification

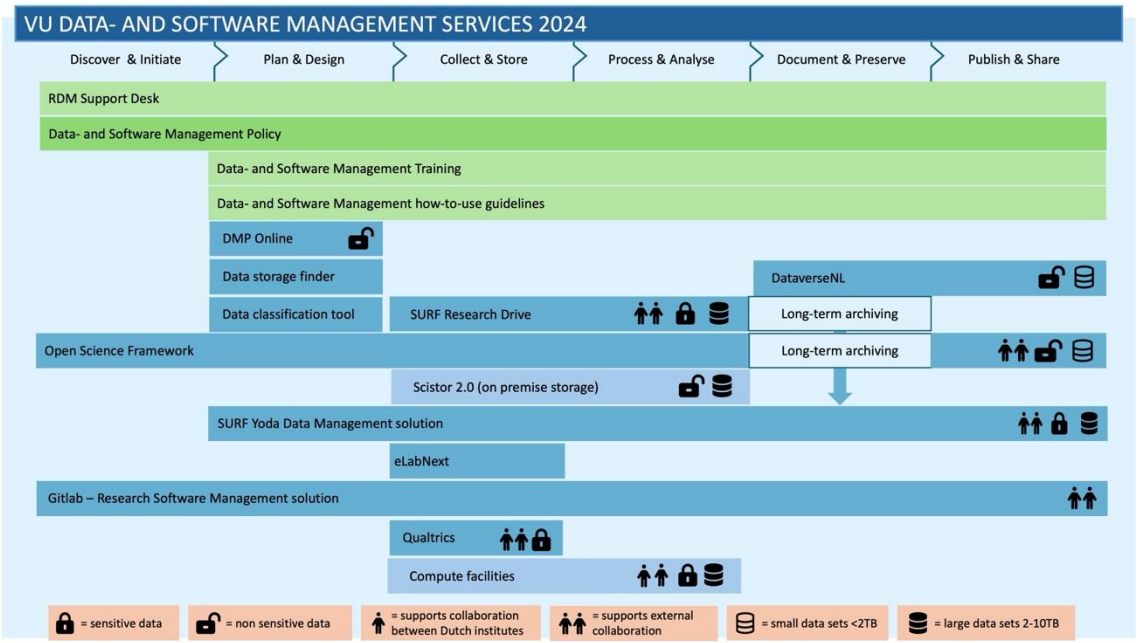


**Figure 2.** Recommended VU Amsterdam Data and Software Management services overview.

When starting a research project, researchers can use DMPonline, a tool that enables researchers to write, share, and review DMPs that meet VU Amsterdam and the funders' requirements. For data storage, VU Amsterdam offers a set of tools, each with its own functionalities and advantages. One of the core solutions the VU offers is Yoda (Your Data), a tool that ranges from safe and easy storage to sharing of data and ultimately to archiving and publishing of data.[4] Yoda helps the researcher to make their data FAIR by providing a solution that enables data discovery and sharing (i.e., findable and accessible). In addition, it facilitates and enforces the use of metadata, therefore contributing to data interoperability and reusability. The service provides a platform for the implementation of standard workflows that can ensure metadata quality satisfies (institutional) policy requirements, for example, for data archiving and publication. In addition, through integration with iRODS, it forms a single platform that accommodates both researchers with data-heavy requirements, as well as those seeking an accessible, user-friendly solution.

Other solutions offer support for data collection, sharing, and publication activities throughout the various stages of a research project. Another set of services is the high-performance computing facilities, which are provided by the IT for Research team of VU Amsterdam. These services range from an on-premises compute cluster[5] at VU Amsterdam, to support the usage of the Dutch National supercomputer hosted at SURF, a system facilitating scientific research carried out in Dutch universities.[6]

Information about recommended solutions, where to find support, and how to use the services offered by the VU Amsterdam support team is found in the VU Amsterdam Research Support Handbook.[7] This GitHub-based handbook helps researchers learn about topics relevant to their research and guides them through specific issues they might encounter. All information on these pages is collaboratively curated by VU Amsterdam support staff within the Research Data Support Network.

[4] VU Amsterdam: https://yoda.vu.nl/site/index.html
[5] VU Amsterdam: https://rdm.vu.nl/topics/bazis.html
[6] VU Amsterdam: https://rdm.vu.nl/topics/snellius.html
[7] VU Amsterdam: https://rdm.vu.nl/

## Integrating RDM Services into the Research Workflow

Making decisions around data management is a real burden to researchers, because they often face a multitude of choices regarding storage solutions, sharing technologies, security, and legal and ethical concerns, each with its own set of implications for their work. Simplifying these processes through the development of intuitive tools, clear guidelines, and nearby support is crucial to demystify the FAIR principles and make the topic more approachable. A decision-making tool, such as the data storage finder, could significantly help researchers select appropriate data storage solutions based on their specific project needs. These tools have been developed with the user experience in mind, ensuring they are easily usable for researchers with varying levels of technical experience. In addition, embedding these tools within existing research workflows helps normalise their use, making data management an automatic consideration rather than an afterthought.

Integrating data management into the research workflow from the outset is a crucial step. In a top-down approach scenario, the support services might be contacted in the final stage of research. Unfortunately, reaching out to support at this stage often becomes a 'box-checking' exercise to ensure compliance with the policy.

In contrast, the seamless integration of data management practices into research workflows from the beginning ensures that research data is preserved for future verification and reuse. To ensure that RDM comes on board early, VU Amsterdam offers courses on how to write a DMP to first-year PhD candidates. The faculty data stewards and, when applicable, department data stewards and data managers, reach out to researchers at various stages; they make recommendations for improvements, including the sustainability of their research data. Furthermore, work is currently underway to integrate information about data and software management into the onboarding process for researchers and support staff.

Researchers need to be introduced to data management and services available to them as soon as possible; however, support staff must be made aware of the challenges researchers experience and the barriers to reaching out. In addition, the network is working on an IT project towards integrating various parts of DMPs into other forms that are required, such as an Ethics Review Application Form. This project should lead to DMP updates being connected to research milestones and embedding data curation tasks into the regular workflow, such as data collection, analysis, and publication stages. This set of natural interactions with the RDM support team at the right time helps to reinforce the importance of data and software management and ultimately triggers a shift in perception, where this is seen not as an additional burden but as an integral part of responsible research conduct, with the researcher being confident and in control.

## Uptake of RDM Services

VU Amsterdam has made significant strides in developing RDM services and infrastructure, as explained in the previous paragraphs. A substantial financial investment in the indispensable technical infrastructure, the appointment of professional support staff at faculty and central levels, and a strong commitment to the development of support and training services, all resulted in a professional and up-to-date data and software management ecosystem. Having all these services available to be used is not a direct guarantee of actual usage. To foster the uptake of RDM services, the NeRDS network spent a great deal of effort in raising awareness and promoting recommended services. This led to an increase in the number of researchers who are aware of the available RDM support services, especially the existence of the RDM Support Desk.

However, following comprehensive user experience research, it became evident that awareness of the RDM support services alone does not necessarily lead to researchers using the services provided (Dubov & Karvovskaya, 2024). All the university's researchers face multiple data and software management questions throughout their work on scholarly projects. However, regardless of whether they are aware of or have used our services before, they do not always bring up their issues with the support team. The user experience research showed that the actual decision of reaching out to the RDM Support Desk is the final step in a long and complex user journey. The decision to seek support is not taken immediately after a question arises; in fact, multiple steps need

to be made before reaching out to the RDM support service becomes a viable option. This reveals a crucial insight for the RDM support service: awareness alone is insufficient to ensure engagement. Realising this, VU Amsterdam has put more effort into building up communities of practice and providing hands-on support when it comes to using the technical infrastructure.

Both efforts, raising awareness and organising support as close and practical as possible to the researchers, resulted in a constantly increasing usage of the service among researchers.

With the yearly RDM monitor (Ras, 2024), the network collects user statistics on the VU Amsterdam data and software management services. This helps gain insight into development in usage and enables action to be taken. Where should the network raise the available storage capacity? Is it necessary to spend extra attention on the availability of specific services? Is it necessary to raise support capacity on specific topics? In the previous years, the number of inquiries to the RDM Support Desk has increased rapidly, from just over 500 in 2020 to 1,200 in 2023 and over 1,600 in 2024. The main categories are questions about DMPs, data processing and analysis, and the courses provided by the RDM team. Growth is particularly evident in questions and requests regarding the technical infrastructure provided by VU Amsterdam. The growing number of questions about technical services is reflected in the usage of these services. The number of users, deposited datasets, and the volumes of these datasets are increasing rapidly. With an average growth of almost 400% in deposited datasets in 2023 compared to 2022, this constitutes a 200% increase in the number of users and a nearly doubling of storage volumes over the same period (2022–2023).

## Aligning Goals and Resources within the Network

A professional research support organisation consists of a number of services, ranging from a team of data and software management experts advising and supporting researchers in their data management activities to an up-to-date technical infrastructure that is easy to use and adheres to data practices and connects to the requirements of researchers. A professional data and software management support ecosystem is ideally a system organised as close to the researchers as possible, with support from a professional staff having the appropriate knowledge and skills to support researchers regularly. In addition, an infrastructure that strikes a balance between standardised and easy-to-use solutions within different research disciplines. At VU Amsterdam, the Network Research Data Support is the connecting link within this support ecosystem.

The network is the coordinating link between support services, maintenance of the technical data management solutions, and the development of these services. This is reflected in the four pillars of the network, as shown in Figure 3. In particular, the connection between support services and the technical solutions used by researchers is important for organising a professional ecosystem that adheres to data practices and researchers' requirements. Adding innovation as one of the pillars of the network guarantees a continuous update of the ecosystem. VU Amsterdam is committed to this continuity.

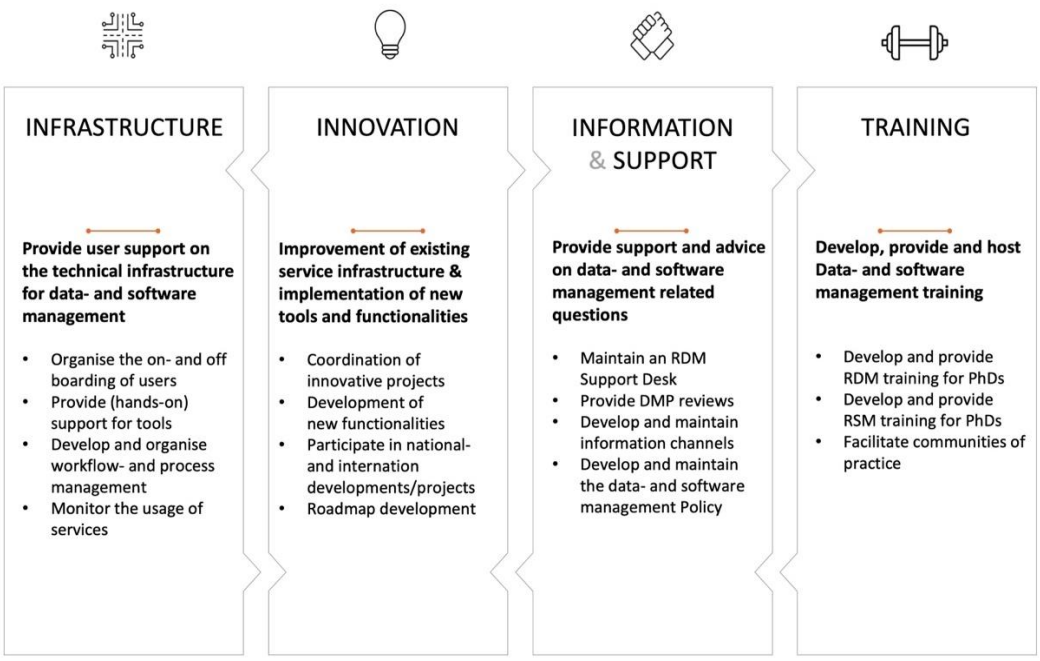


**Figure 3.** The four pillars of the VU Amsterdam Network Research Data Support.

The success of the support network relies on the actors within it, such as data stewards in faculties, and on network management and community management. The network manager aligns goals and activities and finds the right actors for project groups, and the community manager facilitates a platform for the actors to share knowledge and experiences and connect to the larger (research) community.

An important priority is the alignment of the strategic goals of all stakeholders within the network, including faculty. The network team is responsible for support and infrastructural services. In addition to managing RDM tools, the NeRDS network initiates projects to improve existing services and add new tools and services. Alignment with resources, staff capacity, and researchers' needs, therefore, is an important driver for the network.

In addition, effective community management fosters collaboration across all disciplines, faculties, and divisions. The community manager of the network has achieved this by holding regular community meetings, where news and recent developments in the RDM landscape are shared. The community manager organises smaller meetings where data stewards from all faculties and the university library share recent cases or projects they have worked on, what they learned from them, and what questions they currently have. RDM community members can find each other on an online platform to ask questions of the community and share knowledge. Data stewards frequently use this approach, and they assist one another in this way. This has built a culture of trust and friendly collaboration between faculty data stewards and between faculty and library data stewards. Faculty data stewards act as a linking pin to their faculties, and library data stewards act as a linking pin to the university library services, such as the functional application managers, research software coordinator, training coordinator, and subject specialists. In addition, library data stewards act as a linking pin to other centralised divisions, such as the IT department and the grants desk.

In addition to facilitating this community of research support staff, the community manager aims to bridge the gap that could exist between researchers and research support staff. Therefore, the community manager organizes Data Conversations, where researchers are offered the opportunity to share their work as it relates to RDM practices. Additionally, the community manager is at the forefront of communication regarding RDM to researchers. This communication ranges from guidance and handbooks about the RDM offered and written by the VU Amsterdam data stewards to communication about lectures, events, and funding opportunities.

# Conclusion: RDM Support Does Help to Avoid Data Horror

The NeRDS network at VU Amsterdam connects researchers with available support to help them access the best possible services and solutions for managing their data and software, enabling them to work in line with the FAIR principles. VU Amsterdam has organised this as a network to strengthen support and facilities at different levels through collaboration. This must ensure that knowledge, experience, and development of skills are available for all support staff. In addition, this should ensure that advice on FAIR practice becomes a collaborative effort and that support staff at various levels provide researchers with coherent advice.

The establishment of the NeRDS network had a positive effect because VU Amsterdam RDM support has changed dramatically since 2021, which affected support staff and the researchers alike. There is a noticeable increase in researchers' awareness of RDM tools and practices, as demonstrated by their tendency to ask more specific questions. The RDM support is evolving, and it shows in both the queries from researchers and solutions provided by staff (Scholten et al., 2024).

With the establishment of the NeRDS, the RDM support team experienced positive changes, including improved knowledge-sharing channels and practices, stronger collaboration between departments, more direct support for researchers, and the fostering of a sense of trust and community. Researchers experience a greater diversity of information resources, improved availability of online information about RDM, and enhanced visibility of support at various levels. Researchers also engage more in collaborative discussions with colleagues for quick RDM queries and feel that they do not have to invent the wheel themselves (Scholten et al., 2024).

With respect to the actual use of tools and services, the annual RDM monitor shows that support, tools, and services are not only being used, but their numbers have grown impressively over the past five years (Ras, 2024). For example, the number of questions asked to the RDM Support Desk grew from 363 in 2019 to 1,202 in 2023, and 953 over the first half of 2024. In addition, both the data volume and the number of datasets and users in various storage tools grew significantly over 2022 and 2023. The RDM monitor brings together this and other information to show the effect of the RDM support network on the academic community.

Although data horror cannot always be avoided, there are ways to mitigate its risks. Robust RDM support can, indeed, help to do so, and also support researchers with making data FAIR. Robust RDM also contributes to good and healthy Open Science practices. In addition, as we have shown, organising RDM support in a network is a very effective way to bring high-quality support to the researcher.

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