

# DMP4NFDI

## NFDI Basic Service for Data Management Plans

DMP tool hosting, template standardization, support and training for NFDI consortia



Proposal for the Initialization of a Basic Service in Base4NFDI

Submitted: Feb. 15th 2024

## Glossary

<b>DMP</b>	Data Management Plan
<b>EOSC</b>	European Open Science Cloud <a href="https://commission.europa.eu/research-and-innovation_en?pg=open-science-cloud">https://commission.europa.eu/research-and-innovation_en?pg=open-science-cloud</a>
<b>FAIR</b>	Findable, Accessible, Interoperable, Reusable
<b>GLAM</b>	Galleries, libraries, archives, and museums
<b>HeFDI</b>	Federal State Initiative Hessian Research Data Infrastructures <a href="https://www.hefdi.de">https://www.hefdi.de</a>
<b>infra-dmp</b>	Working group on data management plans within NFDI Section Common Infrastructure
<b>maDMP</b>	machine-actionable Data Management Plan
<b>OER</b>	Open Educational Resources
<b>RDA</b>	Research Data Alliance <a href="https://www.rd-alliance.org">https://www.rd-alliance.org</a>
<b>RDMO</b>	Research Data Management Organiser. Open Source software tool for the creation of data management plans <a href="https://rdmorganiser.github.io/">https://rdmorganiser.github.io/</a>
<b>RDMO consortium</b>	The open source consortium behind RDMO software consisting of several sub-working groups, e.g. on software or content development <a href="https://rdmorganiser.github.io/en/rdmo_arage/">https://rdmorganiser.github.io/en/rdmo_arage/</a>
<b>SMP</b>	Software Management Plan

## 1. General Information

- Name of proposed Basic Service (in English): NFDI Basic Service for Data Management Plans
- Acronym of the proposed Basic Service: DMP4NFDI
- Service "subtitle" explaining key functionality: DMP tool hosting, template standardization, support and training for NFDI consortia
- Lead Institution: TU Darmstadt, Universitäts- und Landesbibliothek, Magdalenenstr. 8, 64289 Darmstadt
- Name of lead institution principle investigator: Prof. Dr. Thomas Stäcker
- Planned duration of the project: May 2024 - Apr 2025
- Participating institutions:

Principal Investigator	Institution, location	Contact Email	Member in
Prof. Dr. Thomas Stäcker	TU Darmstadt, Universitäts- und Landesbibliothek, Darmstadt	<a href="mailto:direktion@ulb.tu-darmstadt.de">direktion@ulb.tu-darmstadt.de</a>	NFDI4Ing
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Prof. Dr. Konrad Förstner	ZB MED - Informationszentrum Lebenswissenschaften, Köln	<a href="mailto:foerstner@zbmed.de">foerstner@zbmed.de</a>	NFDI4Microbiota

Table 1: List of participating institutions

## 1.1 Summary of the proposal

This proposal outlines DMP4NFDI, a centralized Basic Service for NFDI-wide data management plans (DMPs) and software management plans (SMPs), addressing critical gaps in the NFDI infrastructure for their use and application. In addition to centrally hosting the open-source DMP tool RDMO, the service will coordinate template creation, content standardization, and provide guidance through training and support to consortial staff responsible for DMPs. These measures aim to facilitate discipline-specific DMP templates in standardized, machine-readable, and interoperable formats, enhancing communication among stakeholders and services involved in an RDM process, supporting processes like data collection and review. The initialization phase includes engaging consortia as early adopters to refine requirements, support the development of DMP templates, creating a DMP template framework for the NFDI and prototypes for service integrations in RDMO. The service aims to maximize the benefits of a widespread adoption and utilization of DMPs for the entire research data ecosystem of the NFDI by fostering interoperability and integration of DMPs with RDMO across the NFDI through its central coordination.

Der vorliegende Antrag skizziert DMP4NFDI, einen Basisdienst für NFDI-weite Datenmanagementpläne (DMP) und Softwaremanagementpläne (SMP), der Defizite in der NFDI-Infrastruktur für deren Nutzung und Anwendung beheben soll. Der Service umfasst das Hosting des Open-Source-DMP-Tools RDMO an zentraler Stelle, die Koordination und Unterstützung bei der Erstellung von Vorlagen und der inhaltlichen Standardisierung sowie Beratung und Schulungen für die DMP-verantwortlichen Mitglieder der Konsortien. Diese Maßnahmen zielen darauf ab, disziplinspezifische DMP-Vorlagen in standardisierten, maschinenlesbaren und interoperablen Formaten zu erstellen und die Kommunikation zwischen den verschiedenen am FDM-Prozess beteiligten Stakeholdern und Diensten, sowie Prozesse wie Datenerfassung und -validierung zu unterstützen und zu verbessern. Die Initialisierungsphase umfasst die Einbeziehung von Konsortien als Early Adopters, um die Anforderungen zu schärfen sowie die Entwicklung von Templates zu unterstützen und ein DMP Template-Framework für die NFDI sowie Prototypen für Dienstintegrationen in RDMO zu erstellen. Der resultierende Dienst maximiert die Vorteile einer weit verbreiteten Einführung und Nutzung von DMPs für das gesamte Forschungsdaten-Ökosystem der NFDI, indem er die Interoperabilität und Integration von DMPs unter Nutzung von RDMO zentral koordiniert.

## 2. State-of-the-Art of Proposed Basic Service

### Background and Motivation

The proposed Basic Service DMP4NFDI addresses critical gaps in the National Research Data Infrastructure (NFDI) concerning the effective utilization and meaningful application of data management plans (DMPs) and its analogues such as software management plans (SMPs).<sup>1</sup> The NFDI aims to establish processes for standardized data handling and quality assurance, and sustainable and interoperable research data management. DMPs can be a tool to achieve these goals and can foster the necessary cultural change, if based on machine-actionable (Miksa et al., 2019), community-curated DMP templates (Grootveld et al., 2018) and if standardized by a common framework within the NFDI integrating further services (Diederichs et al., 2024). DMP4NFDI aims to establish such a standardized framework utilizing the DMP tool *Research Data Management Organiser (RDMO)* in a centralized hosting environment for consortia-wide use. In order to implement DMPs as a communication hub between several involved stakeholders and services in an RDM process (Diederichs et al., 2024) we address identified shortcomings of current DMP usage and implementations, e.g. the lack of discipline-specificity, standardized answer sets, controlled vocabularies, and automation processes. A centralized service relieves the consortia from investing resources in hosting their own DMP tool, ensures the interoperability of DMPs and DMP templates, and enables automation of processes across the NFDI and internationally. This requires not only technical standardization. Substantial content elements also need to be standardized to create sufficient added-value for researchers and the NFDI consortia. During the initialization phase, the Basic Service is largely shaped by previously gained knowledge from workshops, use cases and stakeholder interactions, which will be adapted through further exchanges with consortia over the course of the first year. The primary focus is on enhancing the utility of RDMO and promoting seamless integration with other RDM services. This entails supporting the development of standardized and discipline-specific templates, a general standardization of DMP templates in form and content, and integrating prototypically existing RDM services, while additionally providing support and training for staff of the consortia responsible for DMPs. The service will enable a smooth integration with other NFDI Basic Services, promoting a collaborative ecosystem where RDMO exemplarily serves as a central tool for utilizing information about data creation and usage activities linked with the respective data. It promotes the effective integration of DMPs into research routines and contributes to the overall improvement of research quality assurance within the NFDI.

### State-of-the-Art

The open source software RDMO is a well-established tool that has been productively running in many institutions for years (RDMO, n.d.). DMP and SMP templates have been created by the

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<sup>1</sup> In the context of this proposal DMP is used as an umbrella term, including e.g. SMPs.

RDMO community to cover specific community needs (Github Repository: rdmo-catalog, n.d.). As a DMP tool, RDMO enables research projects to collect metadata on datasets or software that can be made available to other services and workflows. Starting with version 2.0 RDMO allows easier reuse of questions and answer sets across different contexts and DMP templates, thus allowing the creation of question pools. This enables communities to work together on one common frame template, while still incorporating specific community needs contained in dedicated modules that are visible for users only, if needed. Recently, it has been further demonstrated that a template question can interact with other services, i.e. linking with a sensor management system (RDMO, 2023). Thus community-specific tools can be accessed and information maintained herein can be directly linked in DMPs by offering these components in community-specific modules. RDMO was developed based on the principle of openness and adaptiveness, all project data can be accessed via API and a plugin architecture enables the integration of other services. Plugins exist, for example, for the integration into project management tools such as Gitlab or OpenProject to push and pull issue information. Dynamic option sets for predefined answers can be created by querying existing databases, e.g. Wikidata, ensuring the use of quality controlled terminology (Github Repository: RDMO, n.d.).<sup>2</sup> Metadata export to knowledge graphs was demonstrated by the MaRDMO plugin from MaRDI (Reidelbach et al., 2023). RDMO is ready for the machine-actionable DMP standard and the first steps have been taken for its counterpart, the machine-actionable SMP standard (Castro et al., 2023). The maDMP standard ensures interoperability with other international tools, such as Argos (Argos, n.d.) or DMPTool (DMPTool, n.d.). This is also the key aspect of the recently started EU project OSTRails (OSTrails, n.d.) that aims at an interoperability framework to enable integrations and FAIR assessments, supported by the RWTH Aachen UL as national pilot partner. The Science Europe core requirements for DMPs support international development alignment (Science Europe, 2021). Finally, ULB Darmstadt has several years of experience in hosting a multi-site RDMO setup in the context of HeFDI and NFDI4Ing, enabling cross-site DMPs with established workflows and checklists for RDMO client setup. This deployment, combined with the NFDI-IAM login procedure, facilitates collaboration across (international) institutions and makes it ready for the EOSC. NFDI4Ing and NFDI4Chem recently also signed a Memorandum of Understanding to strengthen their cooperation regarding DMPs (NFDI4Ing, 2023). The technical part aside, the development of domain-specific DMP templates is an open issue for many consortia. Initial work was, e.g. carried out by NFDI4Ing and NFDI4Chem (Andres et al., 2024) which developed such templates based on the DFG checklist (Github Repository: rdmo-catalog, n.d.; NFDI4Chem, 2024) and the results of the RDA working group *Discipline-specific Guidance for Data Management Plans* (Hausen et al., 2022), for the educational sciences the STAMP template (VerbundFDB, 2024) is available that follows a different approach. The RDMO community also

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<sup>2</sup> All plugins are available in separate repositories via the RDMO Github organization

provides some templates for specific domains, e.g. agricultural sciences, metrology, software management plans, or mathematical workflows (Github Repository: [rdmo-catalog](#), n.d.; Github Repository: [MaRDMO-questionnaire](#), n.d.).

## **Status of Work Results in Preparation for the Basic Service**

In preparation for the service, requirements were collected during several occasions. In 2022 the *infra-dmp* working group in section Common Infrastructures (Enke et al., 2023) initiated a small survey across all consortia, collecting information on planned activities, desired tools or template development. Two-third of the consortia named RDMO as their DMP tool of choice, one consortium developed its own solution, while others had been undecided at the time of the survey. In 2023, *infra-dmp* organized two workshops for all consortia, one on DMP templates and best practices, the other to develop a common vision for DMPs in the NFDI, both for fostering collaboration, and collecting requirements and ideas. It became clear that researchers are reluctant to incorporate DMPs into their research routine. The challenges stem primarily from the lack of well-curated, domain-specific templates and also missing added-value when the DMP tool is merely connected to other services. The envisioned role of the service includes supporting NFDI consortia in making the DMP information more user-friendly, integrating it seamlessly into the research process with the involvement of all stakeholders, and to simplify application and review processes (Diederichs et al., 2024). For example, there is a recognized value in technically connecting DMPs to measured, modeled or simulated data, with an emphasis on documenting the metadata associated with these datasets, and efforts are being made to capture this asset. *Infra-dmp* also developed a set of quality criteria for DMP templates (Krause et al., 2024). The *infra-dmp* initiatives were accompanied by additional work in the RDMO community. Members from the ULB Darmstadt and ZB MED were elected for the RDMO consortium's steering group (RDMO consortium, n.d.). The ULB was highly involved in the development of RDMO 2.0 that brought the necessary features for template modularity. This means that questions, or any part of an existing DMP can be easily reused within other templates, enhancing flexibility and customization options for consortia and specialist disciplines. This functionality is especially needed for cross-consortia template development and standardization. The ULB Darmstadt also organized the first RDMO hackathon on service integration in 2023, during which an RO-crate plugin for RDMO was developed (Github Repository: [rdmo-plugins-rocrate](#), n.d.) and ZB MED was the organizer for the NFDI4DataScience hackathon on machine-actionable SMPs, in which RDMO plugins for SMPs and further work on the maSMP standard and mappings for RDMO have been created (Castro et al., 2023). Furthermore, in an ongoing effort, ZB MED has undertaken extensive groundwork in conducting training workshops for collaborating research data centers, institutes, and libraries within the consortia NFDI4Microbiota and NFDI4Health. These addressed discipline-specific RDM, including the development of discipline-specific DMPs and their use in RDMO (Vandendorpe & Lindstädt, 2023). This endeavor has the potential to contribute expertise

and knowledge in creating synergies with the proposed DMP4NFDI service, as ZB MED staff are actively involved. ZB MED is also active in the proposal of the NFDI section EduTrain's service application "RDMTraining4all" as a Basic Service. The domain-specific DMP templates for NFDI4Ing and NFDI4Chem developed by RWTH Aachen UL can serve as initial prototypes to develop a modular template system within RDMO for all consortia. The structure of the templates is based on the DFG checklist (DFG, 2021), which, in turn, aligns with the Science Europe core requirements for DMPs (Science Europe, 2021). Also the procedures used in the creation process in both consortia can be models for other consortia.

## **Current Technical Readiness Level (TRL) of the Proposed Basic Service**

RDMO is a well-established and widely tested software, with 50 known instances in various research institutions, of which about half are operational. It serves as the predominant DMP tool in Germany, with an engaged and contributing user community (RDMO, n.d.). The RDMO API and a plugin architecture allow the integration of RDMO in complex RDM environments. Thus, the TRL for the tool itself is estimated at level 8. The new modular structure in RDMO 2.0 makes it easier to manage, change and share specific template modules. The templates developed by NFDI4Ing and NFDI4Chem have been evaluated in workshops and feedback sessions with their respective communities (e.g. Hastik et al., 2023). Additional work for service integration is still needed, thus the TRL for template development can be estimated at level 5. As far as training is concerned, ZB MED has already implemented a series of online training sessions and materials (Vandendorpe & Lindstädt, 2023). The conceptual and technical set-up of the training serves as a blueprint for the training of our service. However more testing and iterative development is needed based on trainee feedback and collaboration with other services to optimize the training experience. For training activities, a TRL of 5 is assessed. Integrating promising elements into a cohesive Basic Service is a pioneering task demanding technical and social coordination. While the use of the agile development approach shows promise, full integration into a coordinated Basic Service is an early, proof-of-concept endeavor that relies on strategic advancement through iterative evaluations and stakeholder engagement across multiple phases. The current stage signifying a conceptualization and initial prototyping phase aligns with a TRL of 4.



### 3. SWOT Analysis

Internal	<b>Strengths</b> <ol style="list-style-type: none"> <li>1. Enhanced data quality through discipline-specific DMP templates</li> <li>2. Efficient utilization of RDMO as a central tool with established monitoring and maintenance workflows</li> <li>3. Central coordination ensures consistent quality, processes, maintenance and development</li> <li>4. Standardized templates and common vocabulary will ensure interoperability and integration with other NFDI services</li> <li>5. Template management allows customization for different subject communities/project types</li> <li>6. Automated processes enhance efficiency and usability of developing and using DMPs</li> </ol>	<b>Weaknesses</b> <ol style="list-style-type: none"> <li>1. Resistance to changing limited DMP understandings</li> <li>2. High coordination effort required for alignment between consortia</li> <li>3. Current heterogeneity of DMP approaches complicates standardization</li> <li>4. Possibly steep learning curve for RDMO usage</li> <li>5. Technical hurdles in developing machine-readable templates</li> <li>6. The initial development of templates and modules is time consuming</li> <li>7. Need to gain buy-in from consortia to agree on common standards</li> </ol>
External	<b>Opportunities</b> <ol style="list-style-type: none"> <li>1. Seamless integration of DMPs into the research process by utilizing machine-actionable DMPs</li> <li>2. Added-value for researchers through automation</li> <li>3. Promotion of standardization initiatives for consistent and interoperable processes</li> <li>4. Improved communication between stakeholders through machine-readable DMPs</li> <li>5. Increased automation of planning, review and archiving processes through machine-readable DMPs</li> <li>6. Improved guidance for researchers in developing FAIR and funder-compliant DMPs</li> </ol>	<b>Threats</b> <ol style="list-style-type: none"> <li>1. Alignment of diverse priorities and stakeholder needs</li> <li>2. Overly generalized templates may not capture needs of all disciplines</li> <li>3. Excessive standardization lagging behind the changes of scientific practices could impede scientific progress</li> <li>4. Resistance from some consortia towards centralized approach and standards</li> <li>5. Researchers' reluctance to integrate DMPs into their research process (due to lack of convenient and/or well-curated, domain-specific templates)</li> </ol>

Table 2: SWOT analysis

The SWOT analysis underscores the advantages of a centralized DMP Basic Service for NFDI consortia. We recognize that challenges stem from the lack of well-curated, domain-specific templates and the perceived lack of convenience and added-value in using RDMO during a research project. Developing standardized yet modular DMP templates within a common RDMO framework strengthens capabilities in interoperability, integration, and process automation. Template customization accommodates diverse disciplinary needs, while centralized maintenance ensures consistent quality. The service fosters improved communication, streamlined workflows, and enhanced researcher guidance in developing FAIR and policy-compliant DMPs. The planned service empowers consortia by taking on shared challenges of

DMP standardization, permitting them to focus expertise on disciplinary nuances. This maximizes NFDI-wide benefits from widespread DMP adoption. Weaknesses like initial time consuming and costly template development and technical hurdles are normal for pioneering efforts but will be managed proactively. Upfront coordination challenges are outweighed by long-term gains such as standardization for consistent and interoperable data management across the NFDI. Consortia resistance and complexity of harmonization risks are mitigated through an inclusive governance model. This encompasses decision-making through stakeholder engagement of consortia via pilot implementations, training programs and support with feedback mechanisms to foster consortium community involvement. This is facilitated by an iterative development approach within the different planned phases of the service: testing with selected pilot consortia to gather early feedback and continuous monitoring of usage and feedback to refine templates. Comprehensive training and support helps overcome the familiarization phase and the steep learning curve of RDMO, ensure acceptance and helps to solve technical problems. Collaboration among service staff ensures seamless operation and active engagement with the RDM community, maximizing effectiveness and impact. To address the risk of low end-user awareness and demand for DMPs, our Basic Service focuses on participatory engagement in all areas of DMPs. These efforts are an essential step in the necessary "mind shift" that promotes cultural change in the use of DMPs within NFDI research communities.

## **4. Working Concept for the Development of the Basic Service**

### **Service Initialization Concept**

In the initialization phase the Basic Service will be modeled on the existing NFDI4Ing RDMO service (NFDI4Ing RDMO, n.d.) which will be further developed. Additionally to the applying parties we identified four consortia interested in being early adopters or contributing to the development of the service: NFDI4Culture, NFDI4Memory, NFDI4Biodiversity, and NFDI4Earth. NFDI4Earth has a need to integrate specific community tools offering information about measuring devices and infrastructures as well as controlled vocabularies that shall be directly accessed and linked in DMPs, e.g. for measuring campaigns and observatories. Furthermore, the information about measuring activities planned and documented in DMPs shall be accessed by data portals linking these information together with the data. NFDI4Culture is focussing on the development of an extensive DMP template that is directed at GLAM institutions, thus placing high demands on template modularity, access for non-research users and an easy-to-use interface. NFDI4Memory is generally interested in setting up a DMP service for their community, seeing a need for training measures. Finally, NFDI4Biodiversity offers a broad and long-established DMP service for its community based on a highly customized RDMO and together we will elaborate and collect requirements on how to support such consortia needs. We collect further requirements from other consortia during the initialization phase by organizing workshops

in infra-dmp, prospectively for discipline-specific communities, and exchange with other Basic Services on service integrations, e.g. concerning PIDs or terminology services (see WP4). For template development (see WP5 and WP6) the exchange with the RDMO community will also be used to collect expectations on a central nation-wide RDMO service and discuss its relationship to the already existing local RDMO services and its future role in local RDM service architectures.

## **Development and Integration Outlook**

The requirements collected during the initialization phase together with testing carried out by our use cases will enable us to plan additional steps. Adding more consortia to the RDMO instance can be done in parallel to the work on standardized DMP templates and modules for other communities. Procedure models for updates and maintenance of the RDMO service need to be developed. The template-related work must be accompanied by further standardization steps, coordinated by the Basic Service in infra-dmp and in exchange with the RDMO community. The community will highly benefit from this standardization allowing local instances to be made interoperable with the service. As for the service integration, the initialization phase will provide a list of urgently desired implementations. We also expect that additional features for RDMO fulfilling specific consortia needs must be developed, e.g. to enable integrations of specific community services such as those of NFDI4Earth. Based on our experiences for setting up and supporting our first use cases, we can further refine our operating model.

## **Ramping up for Operation**

During the first phases the RDMO software will undergo extensive modifications to keep up with the different consortia needs. RDMO plugins allow to cope with divergent needs for on the one hand a stable running service, on the other hand support for new rising community services. The service must be able to provide reliable support and development capacities in such circumstances. Regarding the need for compute resources we don't expect a high demand, since RDMO does not process research data, but only metadata. Still, scalability tests during initialization and integration phases with increasing numbers of clients will provide more reliable figures. Onboarding for new staff in the consortia needs to be supported by training, accompanied by general support for the maintenance and updates of DMP templates. As for the maintenance of the open source software the RDMO community recently initiated a process to become a registered association (RDMO, 2023). If running as NFDI service, the consortia have a high interest to get officially involved in this new association. We also expect that a number of local RDMO implementations will decide to migrate to DMP4NFDI, which will be possible due to our standardization activities. The standardization process will be an ongoing mission for DMP4NFDI.

Editorial workflows and mediation processes need to be established and carried out in order to maintain a standard that benefits all consortia.

## Risks and Challenges

The RDMO service provided by ULB Darmstadt is reliably running for several years for Hessian and NFDI4Ing clients without major issues and will scale well if rolled out at a national level. Therefore we don't see high risks in the technical aspects of our service which couldn't be solved by good monitoring, maintenance and update workflows. To accelerate and facilitate acceptance on behalf of the researchers, our approach is to improve the visible added-value of DMPs by creating discipline-specific templates and service integrations to support the automation of processes. For this, an agile approach is needed aiming at delivering a minimum viable product during the initialization phase followed by an iterative process of testing and feedback cycles. As a starting point we refer to an already standardized approach, based on the Science Europe core requirements (Science Europe, 2021), that can be further extended in later phases. However, to meet researchers' expectations on a DMP service, a variety of integrations and details in the templates may be required that are not available during the initialization phase, but will need to be developed during the integration phase. Fortunately, we can rely on experiences made by those consortia already running a DMP service, e.g. NFDI4Ing and NFDI4Biodiversity, as well as our strong connections into the RDMO community. Without a coordinated approach by DMP4NFDI, this high level of integration and standardization cannot be achieved by each consortium individually. Instead, we would expect each consortium to develop its own solutions, which would make interoperability difficult, prevent interdisciplinary collaboration, and reduce the overall value to researchers. Another aspect is the interoperability with already existing local RDMO instances at universities and other research institutions. Researchers already using local RDMO instances might be hesitant to move to another service. All templates and vocabularies developed will be available for the RDMO community, thus allowing local services to implement the same standards easily. On the other hand, due to experience made with the NFDI4Ing client service, we expect a number of local instances to move completely to the central service provided by DMP4NFDI.<sup>3</sup> This will reduce the need for local maintenance resources profiting from a more integrated service with increased support for collaboration. During the integration phase we will intensify the exchange with the RDMO community on these issues and elaborate different models for migration, information exchange or interfaces.

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<sup>3</sup> Notably, ZB MED has already confirmed moving its RDMO4Life local instance to the central platform, reinforcing the trend towards consolidation and collaboration within the NFDI.

## 5. Work Programme

### Overview of Work Packages

Work package	Deliverables (D) and milestones (M)	Responsible partners
1. Project and Service Management		ULB Darmstadt / RWTH Aachen UL / ZB MED
2. RDMO Requirements	D2.1 Feedback feature for RDMO	ULB Darmstadt
3. Implementing RDMO Hosting Service	M3.1 RDMO hosting for first use cases	ULB Darmstadt
4. RDMO Integration Preparations	D4.1 Prototypes and concepts for service integration for use cases	ULB Darmstadt
5. Technically Enabling DMP Template Management	D5.1 Collection and analysis of existing tailored DMP catalogs M5.1 Technical framework to tailor RDMO question-templates	RWTH Aachen UL
6. Content-based DMP Catalog Development	D6.1 Workshop on generating new content for DMPs based on the templates	RWTH Aachen UL
7. RDMO Support	D7.1 Support infrastructure	ZB MED
8. Specialized RDMO Training	D8.1 Training concept and material D8.2 Conducted training sessions	ZB MED

Table 3: Overall work programme with work packages, deliverables, milestones, and responsible partners.

### Detailed Work Programme

With its work packages, the DMP4NFDI service focuses on technical development as well as on the interaction with communities and NFDI consortia.

#### 5.2.1 WP1 Project and Service Management

<i>WP no:</i> 1	<i>WP lead:</i> ULB Darmstadt <i>WP partners:</i> RWTH Aachen University Library, ZB MED
<i>WP title:</i> Project and Service Management	
<i>Objectives:</i> <ul style="list-style-type: none"> <li>● Establishing a project management</li> <li>● Reaching the milestones</li> <li>● Collecting the deliverables</li> </ul>	

*Description of work:*

For cooperation and creating a common client experience the partners will meet regularly and establish a common project and service management via OpenProject. This also includes preparing the service for the following integration phase. All partners will be responsible for organization, reports, and exchange with the NFDI sections, the Base4NFDI service stewards, and the NFDI consortia.

### 5.2.2 WP2 RDMO Requirements

<i>WP no:</i> 2	<i>WP lead:</i> ULB Darmstadt
<i>WP title:</i> RDMO Requirements	
<i>Objectives:</i> <ul style="list-style-type: none"> <li>• Requirements analysis from the use cases</li> <li>• Developing and testing a feedback feature in RDMO</li> </ul>	
<i>Description of work:</i> <p>For the service we expect different needs for rights and roles management and other community-specific configurations. We will collect these and other requirements from our use cases, organize workshops for and exchange with all consortia within infra-dmp. To support the requirements analysis, a new feedback feature will be developed and implemented in RDMO. As requirements will evolve during the use of the software, this feature allows us to collect immediate feedback from RDMO users including our use cases, thus providing valuable insights. After setting up RDMO for our use cases (see WP3) we expect several iterations until a sufficient state is achieved, thus requirements analysis will be an ongoing process.</p>	
<i>WP Deliverable:</i> Feedback feature for RDMO	

### 5.2.3 WP3 Implementing RDMO Hosting Service

<i>WP no:</i> 3	<i>WP lead:</i> ULB Darmstadt
<i>WP title:</i> Implementing RDMO Hosting Service	
<i>Objective:</i> <ul style="list-style-type: none"> <li>• Providing a platform for hosting and maintaining RDMO for first use cases</li> </ul>	
<i>Description of work:</i> <p>We will implement, host and maintain RDMO for the first use cases. Therefore, we will gradually add clients to the already existing multi-site RDMO instance based on a prioritization and timeline developed during a kick-off meeting with our use cases. Besides, we expect new</p>	

RDMO releases during the first year, which will provide us with the opportunity to implement and test update workflows with the consortia.

*Milestone:* RDMO hosting for first use cases

#### 5.2.4 WP4 RDMO Integration Preparations

<i>WP no:</i> 4	<i>WP lead:</i> ULB Darmstadt
<i>WP title:</i> RDMO Integration Preparations	
<p><i>Objectives:</i></p> <ul style="list-style-type: none"> <li>• Establishment of connection options to other NFDI services</li> <li>• Developing plugin prototypes and concepts for service integration for use cases</li> </ul>	
<p><i>Description of work:</i></p> <p>In this work package, the NFDI4Ing RDMO client serves as a prototype. The NFDI-AAI of IAM4NFDI has already been tested and successfully implemented for this client, which is an essential prerequisite for cross-institutional collaboration. However, we will work together with other Basic Services to establish connections, either on a technical level like with IAM or on the content level through prototyping plugins for RDMO. Concrete implementations and prototypes will be discussed in workshops with the Basic Service for PIDs (PID4NFDI), e.g. concerning PIDs for DMPs, or PIDs used in the DMP itself like ORCID, ROR or PIDs for instruments, and Terminology Services for NFDI (TS4NFDI), concerning the integration of terminology widgets into RDMO. The ideas and progress will be exchanged with infra-dmp and other NFDI groups.</p>	
<i>WP Deliverable:</i> Plugin prototypes and concepts for service integration for use cases	

#### 5.2.5 WP5 Technically Enabling DMP Template Management

<i>WP no:</i> 5	<i>WP lead:</i> RWTH Aachen University Library
<i>WP title:</i> Technically Enabling DMP Template Management	
<p><i>Objectives:</i></p> <ul style="list-style-type: none"> <li>• Developing a technical framework for template management</li> <li>• Streamlining the customization of catalogs to the specific needs of NFDI consortia, disciplines or institutions</li> <li>• Making RDMO templates available for external use and integration into other schemas or international efforts</li> </ul>	

<p><i>Description of work:</i></p> <p>This work package is dealing with the customization of DMP templates. To perform the customization without unnecessary variations and to promote reuse across different consortia, it is necessary to set up a suitable framework for template management. This intended management system simplifies this process by leveraging the experience of existing instances such as NFDI4Ing and evaluating how customization has been performed in different catalogs, taking into account aspects such as question wording, help texts and attribute ranges. The main intention is to enable the tailoring but prohibit unnecessary deviation and divergence by focusing on reuse. For example, a need for new attributes in one domain should be introduced in such a way that other consortia or domains are entitled to reuse it. In addition, collaboration with consortia such as NFDI4Earth provides insights into the customization of catalogs and different technical environments.</p>
<p><i>WP Milestone:</i> Technical framework to tailor RDMO question-templates</p>
<p><i>WP Deliverable:</i> Collection and analysis of existing tailored DMP catalogs</p>

### 5.2.6 WP6 Content-based DMP Catalog Development

<p><i>WP no:</i> 6</p>	<p><i>WP lead:</i> RWTH Aachen University Library</p>
<p><i>WP title:</i> Content-based DMP Catalog Development</p>	
<p><i>Objectives:</i></p> <ul style="list-style-type: none"> <li>• Establishing an editorial board</li> <li>• Utilizing the technical framework set up in WP5</li> </ul>	
<p><i>Description of work:</i></p> <p>In this WP we will set up an editorial board that assists consortia in creating individual DMP templates. This process maintains coherence and interoperability across disciplines. Prototypes for NFDI4Chem and NFDI4Ing serve as initial models, adhering to Science Europe core requirements, DFG checklist and infra-dmp quality criteria (Krause et al., 2024). The editorial board, drawing on the infra-dmp group's experience, introduces new attributes with standardized naming conventions. Outreach is a key aspect, involving surveys and workshops to generate content and best practices. Demonstrations at workshops highlight the template benefits, and case studies are actively sought to enrich the template library.</p>	
<p><i>WP Deliverable:</i> Workshop on generating new content for DMPs based on the templates</p>	



### 5.2.7 WP7 RDMO Support

<i>WP no:</i> 7	<i>WP lead:</i> ZB MED
<i>WP title:</i> RDMO Support	
<p><i>Objectives:</i></p> <ul style="list-style-type: none"> <li>• Setting up operational support service</li> <li>• Support consortia staff responsible for DMPs in the use of DMPs within RDMO</li> </ul>	
<p><i>Description of work:</i></p> <p>An RDMO support service will be established to provide regular second-level support to the consortia, including weekly synchronous office hours during the start-up phase. Technical assistance will be provided for developing DMP templates within RDMO. This will include guidance on importing existing templates, migrating document-based templates to RDMO, and in exchange with WP5 and WP6 support the consortia in the development and implementation of discipline-specific and customized DMP templates. The collaborative exchange of expertise from the consortium disciplines and the technical knowledge emerging from the work of the proposed Basic Service and support will guarantee assistance for the effective implementation and optimization of all facets of DMP usage in RDMO.</p>	
<i>WP Deliverable:</i> Support infrastructure	

### 5.2.8 WP8 Specialized RDMO Training

<i>WP no:</i> 8	<i>WP lead:</i> ZB MED
<i>WP title:</i> Specialized RDMO Training	
<p><i>Objectives:</i></p> <ul style="list-style-type: none"> <li>• Creating training concept</li> <li>• Conducting RDMO training sessions</li> </ul>	
<p><i>Description of work:</i></p> <p>The focus of this WP is on the subject-specific requirements for the creation and use of DMP templates in RDMO. The training adopts a “train the trainer” approach, focusing on equipping consortia staff with the skills to become trainers themselves, thereby enabling them to support their own consortia through subsequent training sessions. Close cooperation with the NFDI section EduTrain for the "RDMTraining4all" service application is intended. Collaboration with this service in the form of workshops will be very synergetic, especially in areas where the topics of "subject specificity" and "template customization within RDMO" overlap.</p>	

Intensive training is required to cover the various aspects, including structure, content creation and management functions. For this reason, we are preparing live training and material to support self-directed learning and explore blended learning concepts, allowing participants to access materials on demand and offer instructor-led sessions for deeper engagement. The collaborative engagement between the proficient technical staff of the proposed service and its training and the trainees, enhances the identification of specific requirements for continuous RDMO improvements. We plan to publish all training materials as Open Educational Resources (OER) in further stages of the service to encourage wider access and use. Synergies with existing helpdesks, services and initiatives will strengthen the training workshops.

*WP Deliverables:* Training concept and material, Conducted training sessions

### 5.2.9 Gantt Chart

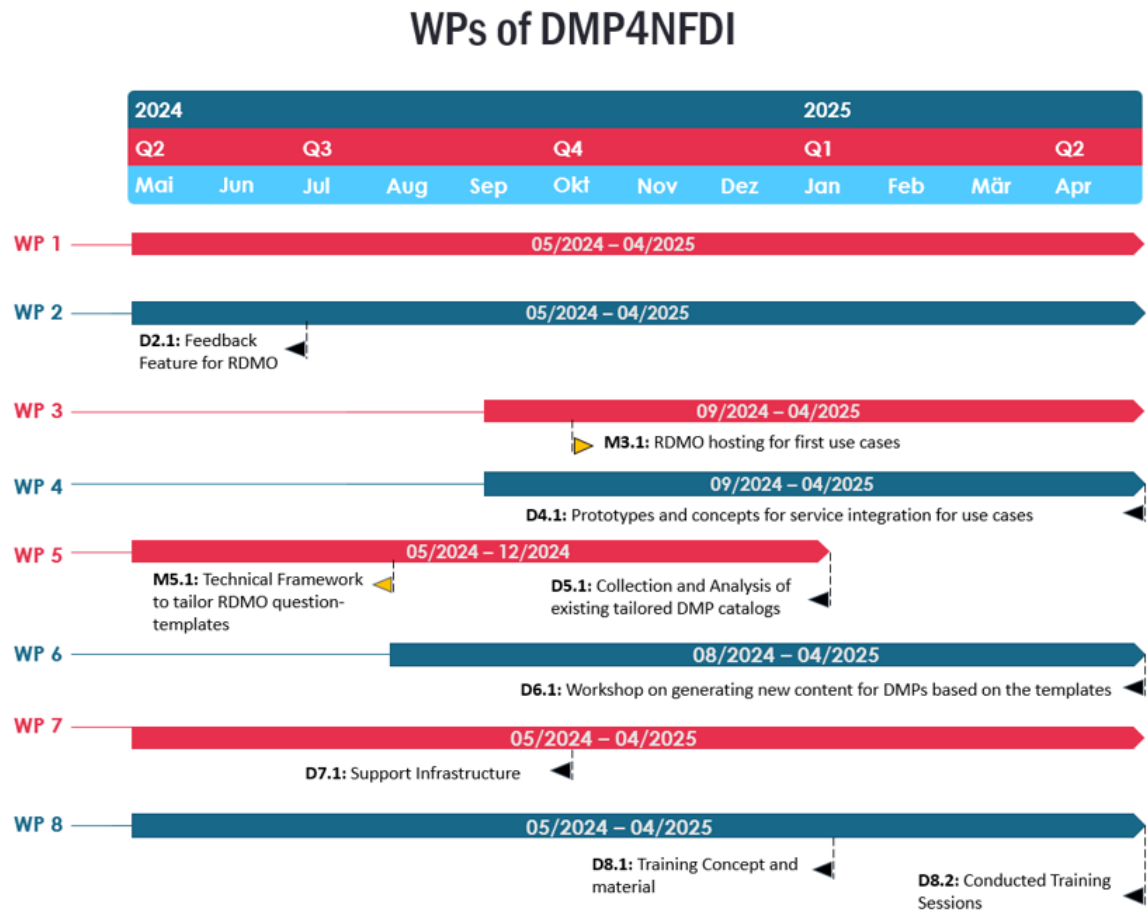


Figure 2: Gantt Chart Overview of Initial Phase Work Programme for Basic Service

## Appendix

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