base4nfdi Basic Services for NFDI

Progress Report Part 1

nfdi Nationale Forschungsdaten Infrastruktur

Table of Contents

1 General Information

Name of the initiative

Base4NFDI – Basic Services for NFDI

Research domains or research methods addressed by the consortium

Base4NFDI targets all research domains and methods represented by NFDI's 26 consortia which together have initiated and are diving Base4NFDI. Base4NFDI thus covers four broad scientific areas — from humanities and social sciences to engineering, life and natural sciences. In the 2022 proposal, all consortia committed to participation and collaboration in selecting and supporting basic service candidates. Although the development of the basic services currently focuses on the needs of the NFDI consortia, the goal is to make the services accessible to the entire German scientific community.
Base4NFDI provides a framework to ensure the overall coherence of the emerging basic services from a sociotechnical perspective, guarantee streamlined and efficient development, ensure neutral evaluations, and establish models for long-term service operation. NFDI Sections, which work on cross-cutting topics to explore synergies and address common needs of different domains, are central to this user-driven bottom up process. They play a key role in selecting and developing basic services.

URL of the consortium website and repositories used for publishing output

- https://base4nfdi.de/
- https://zenodo.org/communities/base4nfdi
- https://github.com/base4nfdi

2 Summary

Base4NFDI has established itself as the central framework for developing cross-cutting, reusable basic services that benefit all 26 NFDI Consortia and, in the long term, the wider German research community. It has translated an NFDI-wide vision of "OneNFDI" into concrete services, processes, and governance structures that significantly strengthen interoperability, efficiency, and collaboration across disciplines.

Base4NFDI currently manages and funds **nine basic service** candidates that together address key aspects of research data management, infrastructure access, and knowledge

sharing across all NFDI domains. These discipline-agnostic, interoperable services progress through a structured **three-stage** development pathway and already demonstrate concrete benefits for consortia and infrastructure providers. The first **Initialisation** phase focuses on requirements analysis and prototyping; the second **Integration** phase, on ensuring integration across the different consortia; and the third **Ramp-up** phase, on governance and business models for the subsequent service operation.

IAM4NFDI establishes a federated identity and access management framework enabling users to login to NFDI services with their home-institution credentials. **PID4NFDI** develops a central hub for persistent identifiers that ensures consistent, resolvable references to heterogeneous digital objects across disciplines. **TS4NFDI** offers standardized terminologies and ontologies via a unified API improving semantic interoperability across domain boundaries. **DMP4NFDI** provides hosted instances for data management plans (DMP) with discipline-specific templates to harmonise DMP processes. **Jupyter4NFDI** delivers browser-based access to high-performance and cloud infrastructures through a central JupyterHub and reproducible notebooks. **KGI4NFDI** builds a federated knowledge graph infrastructure to enable semantic interlinking and discovery across communities. **nfdi.software** is a quality-assured marketplace that integrates existing repositories and harmonises software metadata for better visibility and reuse. **RDMTraining4NFDI** develops modular RDM training materials and concepts that consortia can adapt to strengthen data management skills. **Accounting4NFDI** creates a federated accounting framework to track distributed infrastructures, supporting transparent reporting and sustainable funding and shared cost models.

Beyond the services, Base4NFDI's major achievement is the establishment of a **coherent, transparent framework** for basic service development. It has also conceptualised a portfolio management approach that is already recognised as strategically relevant for NFDI's long-term evolution. The framework spans the full lifecycle, from early ideas and incubator projects to integration and preparation for sustainable operation, including guidance on technical architectures, legal issues, accessibility, usability, and user training.

Incubator projects are a central instrument for turning Base4NFDI's basic service candidates into tangible solutions for consortia communities by testing integration in real-world environments. Allowing consortia to experiment with new functionalities and infrastructure in a low-risk, collaborative setting, they receive dedicated support from Base4NFDI Service Stewards and service teams. The benefits are already visible in concrete cross-consortial integrations. A successful example is NFDI4Culture, connecting its AAI/SSO backbone, which

already supported approximately 400 user accounts and seven services, into the federated system being developed by IAM4NFDI. A successful TS4NFDI incubator integrates the TS4NFDI Terminology Service Suite into the repository infrastructure of RADAR, enabling it to host and expose domain-specific terminologies via the TS4NFDI API Gateway. This integration allows the hosting repository and its communities to manage controlled vocabularies and mappings in a standardised way, thereby improving semantic interoperability and searchability for research data.

Base4NFDI strengthens NFDI's **international** positioning by aligning basic services with EOSC and through a high-profile International Advisory Board. While long-term funding for operating services remains a challenge beyond the current project, Base4NFDI's framework, roles, and maturing service portfolio provide a strong foundation for sustainable national and international research data infrastructures.

Overall, the project is on track to fulfil its mission of establishing interlinked basic services through a needs-driven process originating from the scientific communities. These services explore and pool existing expertise, develop it further, and strategically supplement it with crucial components. By systematically mapping the landscape in their field, the service teams are already making an indispensable contribution. Building on this analysis they identify and address gaps or catalyse the reuse of existing material.

3 Composition of the consortium

Applicant institution

Applicant institution	Location	Duration
Technische Universität Dresden	01062 Dresden	03/23 - 02/28

Spokesperson

Spokesperson	Institution, location	Duration
Prof. Dr. Lars Bernard	TU Dresden, 01062 Dresden	03/23 - 02/28

Co-applicant institutions

Co-applicant institutions	Location	Duration
Deutsches Elektronen-Synchrotron (DESY)	Notkestraße 85, 22607 Hamburg	03/23 - 02/28
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel (GEOMAR)	Wischhofstr. 1-3, 24148 Kiel	03/23 - 02/28
Georg-August-Universität Göttingen, Niedersächsische Staats- und Universitätsbibliothek Göttingen (SUB)	Platz der Göttinger Sieben 1, 37073 Göttingen	03/23 - 02/28
GESIS – Leibniz-Institut für Sozialwissenschaften in Mannheim (GESIS)	B6 4-5, 68159 Mannheim	03/23 - 02/28
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.; Fraunhofer Institut für Offene Kommunikationssysteme (FOKUS)	Hansastraße 27 c, 80686 München	03/23 - 02/28
Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V. Max Planck Computing & Data Facility (MPCDF)	Hofgartenstraße 8, 80539 München	03/23 - 02/28
Stiftung Preußischer Kulturbesitz - Staatsbibliothek zu Berlin (SPK)	Unter den Linden 8, 10117 Berlin	03/23 - 02/28
Technische Informationsbibliothek (TIB)	Welfengarten 1 B, 30167 Hannover	03/23 - 02/28
Universität Bielefeld, Bielefelder Institut für Bioinformatik Infrastruktur (BiBi)	Universitätsstraße 25, 33615 Bielefeld	03/23 - 02/28
ZB MED Information Centre for Life Sciences (ZB MED)	Gleueler Straße 60, 50931 Köln	03/23 - 02/28

Co-spokespersons

Co-spokespersons	Institution, location	Task area(s)	Duration
Reinhard Altenhöner	Stiftung Preußischer Kulturbesitz - Staatsbibliothek zu Berlin, Unter den Linden 8, 10117 Berlin	TA3: Service Coherence, Processes and Monitoring	03/23 - 02/28
Prof. Dr. Juliane Fluck	ZB MED Information Centre for Life Sciences, Gleueler Straße 60, 50931 Köln	TA3: Service Coherence, Processes and Monitoring	03/23 - 02/28
Axel Klinger	Technische Informationsbibliothek (TIB), Welfengarten 1 B, 30167 Hannover	TA1: Service Requirements, Design and Development	03/23 - 02/28
Sören Lorenz	GEOMAR Helmholtz-Zentrum für Ozean-forschung Kiel, Wischhofstr. 1-3, 24148 Kiel	TA2: Service Integration and Ramping-up for Operation	03/23 - 02/28
Dr. Brigitte Mathiak	GESIS – Leibniz-Institut für Sozialwissenschaften in Mannheim, B6 4-5, 68159 Mannheim	TA2: Service Integration and Ramping-up for Operation	03/23 - 02/28
Dr. Bernhard Miller	GESIS – Leibniz-Institut für Sozialwissenschaften in Mannheim, B6 4-5, 68159 Mannheim	TA4: Project Governance	03/23 - 02/28
Dr. Raphael Ritz	Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V., Max Planck Computing & Data Facility (MPCDF) Hofgartenstraße 8, 80539 München	TA2: Service Integration and Ramping-up for Operation	03/23 - 02/28
Prof. Dr. Sonja Schimmler	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., FOKUS; Hansastraße 27 c, 80686 München	TA1: Service Requirements, Design and Development	03/23 - 02/28
PD Dr. Thomas Schörner	Deutsches Elektronen-Synchrotron (DESY), Notkestraße 85, 22607 Hamburg	TA3: Service Coherence Processes and Monitoring	03/23 - 02/28

Prof. Dr. Alexander Sczyrba	Universität Bielefeld, Bielefelder Institut für Bioinformatik Infrastruktur Universitätsstraße 25, 33615 Bielefeld	TA1: Service Requirements, Design and Development	03/23 - 02/28
Regine Stein	Georg-August-Universität Göttingen – Nieder-sächsische Staats- und Universitätsbibliothek Göttingen (SUB), Platz der Göttinger Sieben 1, 37073 Göttingen / Verbundzentrale des GBV (VZG), Platz der Göttinger Sieben 1, 37073 Göttingen	TA4: Project Governance	03/23 - 02/28

Participants

Participating institutions	Location	Duration
Verein zur Förderung eines Deutschen Forschungsnetzes e. V. (DFN-Verein)	Alexanderplatz 1 10178 Berlin	03/23 - 02/28

Participating individuals	Institution, location	Duration
Dr. Christian Grimm	Verein zur Förderung eines Deutschen Forschungsnetzes e. V., Alexanderplatz 1, 10178 Berlin	03/23 - 02/28
Dr. Simone Rehm	Universität Stuttgart, Keplerstraße 7, 70174 Stuttgart	03/23 - 02/28
Prof. Dr. Ramin Yahyapour	Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen, Burckhardtweg 4, 37077 Göttingen	03/23 - 02/28