Letter of Intent

Application for a
joint collaboration of NFDI consortia
on basic services

Base4NFDI

Basic Services for NFDI

1 Formal details

Planned name of the joint collaboration

Basic Services for the NFDI

Acronym of the planned joint collaboration

Base4NFDI

Joining Consortia

BERD@NFDI: NFDI for Business, Economic and Related Data
Applicant institution: University of Mannheim
Mannheim Center for Data Science
68131 Mannheim
Head of the institution: Prof. Dr. Thomas Puhl
Spokesperson: Prof. Dr. Florian Stahl
Acronym: BERD@NFDI

DAPHNE4NFDI: DAta from PHoton and Neutron Experiments for NFDI
Applicant institution: Deutsches Elektronen-Synchrotron (DESY)
Notkestraße 85
22607 Hamburg
Head of the institution: Prof. Dr. Dr. h.c. Helmut Dosch
Spokesperson: Dr. Anton Barty
Acronym: DAPHNE4NFDI

DataPLANT: Data in PLANT research
Applicant institution: Albert Ludwig University of Freiburg
79104 Freiburg
Head of the institution: Prof. Dr. Kerstin Krieglstein
Spokesperson: Dr. Dirk von Suchodoletz
Acronym: DataPLANT

FAIRmat: FAIR Data Infrastructure for Condensed-Matter Physics and the Chemical Physics of Solids
Applicant institution: Humboldt-Universität zu Berlin
Unter den Linden 6
10117 Berlin
Head of the institution: Prof. Dr. Peter Frensch

Spokesperson: Prof. Dr. Claudia Draxl
Acronym: FAIRmat

GHGA: German Human Genome–Phenome Archive
Applicant institution: Deutsches Krebsforschungszentrum
Im Neuenheimer Feld 280
69120 Heidelberg
Head of the institution: Prof. Dr. Michael Baumann
Spokesperson: Prof. Dr. Oliver Stegle
Acronym: GHGA

KonsortSWD: Consortium for the Social, Behavioural, Educational and Economic Sciences
Applicant institution: GESIS - Leibniz Institut für Sozialwissenschaften
B6 4-5
68159 Mannheim
Head of the institution: Prof. Dr. Christof Wolf
Spokesperson: Prof. Dr. Christof Wolf
Acronym: KonsortSWD

MaRDI: Mathematical Research Data Initiative
Applicant institution: Weierstraß-Institut für Angewandte Analysis und Stochastik (WIAS)
Mohrenstraße 39
10117 Berlin
Head of the institution: Prof. Dr. Michael Hintermüller
Spokesperson: Prof. Dr. Michael Hintermüller
Acronym: MaRDI

NFDI4BioDiversity: Biodiversity, Ecology and Environmental Data
Applicant institution: MARUM – Center for Marine Environmental Sciences, University Bremen
Leobener Str. 8
28359 Bremen
Head of the institution: Prof. Dr. Michael Schulz
Spokesperson: Prof. Dr. Frank Oliver Glöckner
Acronym: NFDI4BioDiversity

NFDI4Cat: NFDI for Catalysis-Related Sciences
Applicant institution: DECHEMA Gesellschaft für Chemische Technik und Biotechnologie e.V.
Theodor-Heuss-Allee 25

60486 Frankfurt am Main
Head of the institution: Dr. Andreas Förster
Spokesperson: Dr. Andreas Förster
Acronym: NFDI4Cat

NFDI4Chem: Chemistry Consortium in the NFDI
Applicant institution: Friedrich Schiller Universität Jena
Fürstengraben 1
07743 Jena
Head of the institution: Prof. Dr. Walter Rosenthal
Spokesperson: Prof. Dr. Christoph Steinbeck
Acronym: NFDI4Chem

NFDI4Culture: Consortium for Research Data on Material and Immaterial Cultural Heritage
Applicant institution: Akademie der Wissenschaften und der Literatur | Mainz
Geschwister-Scholl-Straße 2
55131 Mainz
Head of the institution: Prof. Dr.-Ing. Reiner Anderl
Spokesperson: Prof. Torsten Schrade
Acronym: NFDI4Culture

NFDI4DataScience: NFDI for Data Science and Artificial Intelligence
Applicant institution: Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
Hansastraße 27 c
80686 München
Head of the institution: Prof. Dr.-Ing. Reimund Neugebauer
Spokesperson: Dr. Sonja Schimmler
Acronym: NFDI4DataScience

NFDI4Earth: NFDI Consortium Earth System Sciences
Applicant institution: Technische Universität Dresden
Helmholtzstraße 10
01069 Dresden
Head of the institution: Prof. Dr. Ursula M. Staudinger
Spokesperson: Prof. Dr. Lars Bernard
Acronym: NFDI4Earth

NFDI4Health: National Research Data Infrastructure for Personal Health Data
Applicant institution: ZB MED Information Centre for Life Sciences

Gleueler Straße 60
50931 Köln
Head of the institution: Prof. Dr. Dietrich Rebholz-Schuhmann
Spokesperson: Prof. Dr. Juliane Fluck
Acronym: NFDI4Health

NFDI4Ing: National Research Data Infrastructure for Engineering Sciences
Applicant institution: RWTH Aachen University
Templergraben 55
52062 Aachen
Head of the institution: Prof. Dr. Ulrich Rüdiger
Spokesperson: Prof. Dr. Robert Schmitt
Acronym: NFDI4Ing

NFDI4Microbiota: National Research Data Infrastructure for Microbiota Research
Applicant institution: ZB MED Information Centre for Life Sciences
Gleueler Straße 60
50931 Köln
Head of the institution: Prof. Dr. Dietrich Rebholz-Schuhmann
Spokesperson: Prof. Dr. Konrad Förstner
Acronym: NFDI4Microbiota

NFDI-MatWerk: National Research Data Infrastructure for Materials Science & Engineering
Applicant institution: Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
Hansastraße 27 c
80686 München
Head of the institution: Prof. Dr.-Ing. Reimund Neugebauer
Spokesperson: Prof. Dr. Christoph Eberl
Acronym: NFDI-MatWerk

Punch4NFDI: Particles, Universe, NuClei and Hadrons for the NFDI
Applicant institution: Deutsches Elektronen-Synchrotron (DESY)
Notkestraße 85
22607 Hamburg
Head of the institution: Prof. Dr. Helmut Dosch
Spokesperson: PD Dr. Thomas Schoerner-Sadenius
Acronym: Punch4NFDI

Text+: Language- and Text-based Research Data Infrastructure

Applicant institution: Leibniz-Institut für Deutsche Sprache (IDS)

R 5, 6-13

68161 Mannheim

Head of the institution: Prof. Dr. Henning Lobin

Spokesperson: Prof. Dr. Erhard Hinrichs

Acronym: Text+

Prospective institutions to become participants in existing consortia for the purpose of basic services

Verein zur Förderung eines Deutschen Forschungsnetzes e.V. (DFN-Verein)

Alexanderplatz 1

10178 Berlin

Head of the institution: Prof. Dr. Odej Kao

Contact: Dr. Christian Grimm

2 Objectives, work programme and needs analysis

Summary of the need(s) of subject-specific or methods-oriented consortia to be met by the basic service(s) of your initiative

The Base4NFDI initiative is based on 12 months' work on cross-cutting topics in the NFDI consortia and a four-month-process of exploring needs for basic services in the NFDI. As a result, more than a dozen topics emerged where NFDI-wide services seem plausible and/or desirable to enable interoperability, achieve synergies and economies of scale and/or cost-efficient development and operation.

For Base4NFDI a basic service is a technical and/or organisational solution that can include storage and computing services, software, processes and workflows, as well as required personnel support, e.g., to operate service desks. An NFDI-wide basic service would have the potential to serve most or all consortia and thus be of maximal use to the scientific system in Germany.

In general, many community services of NFDI consortia can benefit from well-known concepts: infrastructure-as-a-service (IaaS), software-as-a-service (SaaS), platform-as-a-service (PaaS) in combination with an identity and authorization infrastructure and a service infrastructure for persistent identifiers. That said, many of the 19 existing consortia already run more or less well-established generic services. These domain-specific services may be embedded in larger international networks, may be subject to long-term contractual obligations and thus are hard to replace. Other consortia, however, are in early stages of common service provision and could adopt NFDI-wide basic services. It is worth noting that also general services like a NFDI helpdesk or an infrastructure for training have been mentioned as potential candidates for NFDI-wide basic services.

For a few services, a technically mature basis exists from prior initiatives within the German and European science system. Base4NFDI's partner organisations have been involved in these initiatives and are prepared to negotiate adaptations necessary for providing services for the NFDI. Many other service candidates are in early conceptual stages and working groups are now being formed in the NFDI's Sections to further explore joint topics and collect requirements from the consortia. Base4NFDI sets out to complement, facilitate and speed up these - hitherto unfunded - efforts. It does so by organising a thoroughly systematic and agreed upon process leading from identification of an NFDI-wide basic service to its development, implementation, and conceptualisation for its sustainable future operation. Base4NFDI will ensure the interoperability of basic services in the overall infrastructure and also stress permanent monitoring and quality control.

Thus, this initiative will strongly support and enable further its target community - the organisations responsible for delivering scientific services in NFDI - by providing a sound co-design and development process for an initial set of basic services. The initiative builds on all 19 NFDI consortia funded to-date, as well as from most consortial initiatives in round three.

Concise summary of the planned initiative's main objectives and task areas

The proposal builds on the Statement by the NFDI Consortial Assembly[1] and two subsequent workshops[2], which led to this joint proposal.

(Objective I) Setup and launch basic services that meet the common needs of the consortia through an agreed-upon process. The establishment of basic services will strongly benefit from the ongoing work of the NFDI Sections and will feed directly into joint development. Initial services tackling particularly pressing topics are foreseen to be prioritised in an agreed-upon process by the NFDI consortia at the start of Base4NFDI.

(Objective II) Achieve seamless structural integration by building on decision making bodies of the NFDI Association. This is essential to cope with cross-cutting topics, to foster collaboration among NFDI consortia, and to aggregate as well as articulate their expertise and their needs. Further bodies of the NFDI Association, in particular the NFDI Consortial Assembly and the NFDI Scientific Senate, assure overarching governance and the legitimacy of the process.

(Objective III) Assure overall coherence by establishing a structured process for selection, initialisation and integration of basic services. A process will be established to support requirement analysis and selection of appropriate services and technologies, and to ensure consistent and agreed-upon design, development and monitoring, taking into account the complexity of the shared service landscape. The process will lead to defined steps of initialisation, integration and operation. Base4NFDI will make use of flexible funds for each of the steps of this process. Flexible funds reflect the dynamics of the identification process and allow for specific funding for service providers. Application for and assignment of flexible funds will follow generally installed and transparent Base4NFDI rules and decision makings.

(Principle I) Be efficient by building on existing solutions and capacities and assuring interoperability. Existing services need to be adapted to the needs of the communities and may require upscaling as well as **integration with national and international structures**. Examples are EOSC or GAIA-X on a European level, and NHR, AI centres, or Helmholtz platforms on a national level. Especially, the bridge between Base4NFDI and European initiatives is bi-

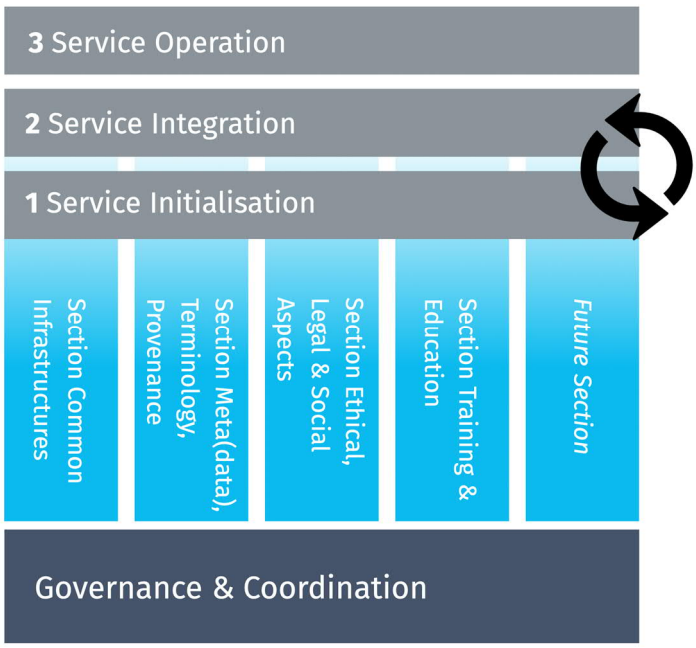
[1] https://doi.org/10.5281/zenodo.6091656
[2] https://doi.org/10.5281/zenodo.6367047, https://doi.org/10.5281/zenodo.6367200

directional, allows for seamless integration and enables the reuse of services available on a European level as well as to providing NFDI services throughout Europe.

(Principle II) Ensure high service quality by integrating the best expertise available for development. To develop and launch basic services a common framework for service development will foster and safeguard a professional and agile design. For this purpose, Base4NFDI can rely on the NFDI Sections and their working groups, which pool cross-cutting expertise on all topics relevant to potential basic services.

(Principle III) Ensure broad acceptance through a community-driven approach. Via its governance Base4NFDI will make sure that creation and operation of NFDI-wide basic services will - in full accordance with NFDI's core principle - be driven by demand. NFDI-wide basic services will prove beneficial where they facilitate the delivery of domain-specific services as planned by the NFDI consortia for their scientific communities.

(Principle IV) Ensure sustainability of NFDI-wide basic services. The sustainable operation of basic services cannot be financed by project funds. Therefore, proposed basic services need long-term commitments by service providers. Base4NFDI will foster appropriate business models and supply additional governance elements for coordination and operation.



Matrix structure of the Base4NFDI working programme

Structure and Task Areas

Within the initiative, we will set up our working programme as a matrix structure (see figure). *Governance and Coordination* integrates the initiative's two dimensions. The matrix structure will intertwine a structured development process with thematic areas. The development process is divided into three **process steps** *(1) Service Initialisation*, spanning requirements analysis and design, and *(2) Service Integration*, ramping up, spanning development, testing, deployment and maintenance, as an incremental and fast-moving process, and *(3) Service Operation* as an ongoing task. A fixed budget schema will be applied to the organisation and administration of each of the process steps, thus also supporting the transparent allocation of flexible funds for future basic service candidates.

The **thematic areas** are structured along the NFDI Sections and their working groups. Based on the current structure, the following thematic areas will be established at the outset of Base4NFDI:

(A) Common Infrastructures; (B) (Meta-)data, Terminologies, Provenance; (C) Ethical, Social & Legal Aspects; and *(D) Training & Education*. Along with the agile concept of NFDI Sections and Working groups in the NFDI Association thematic areas will be added, merged or adapted in the future process. A flex fund serves to finance the development of agreed-upon service candidates and to enable participation of new actors from round three.

Brief description of the proposed basic service(s) with regard to the re-use of existing infrastructures, tools and services that are essential in order to fulfil the planned initiative's objectives

Cross-cutting topics for which NFDI-wide basic services are plausible or desirable include the technical, semantic, organisational, educational, legal and ethical aspects of interoperability within the NFDI as well as with the wider international context. From these topics, several potential basic service candidates will emerge. If and how they can serve "potentially all" NFDI consortia and their communities will need to be carefully assessed and organised in a coherent way.
Currently, despite plausible extensibility, none of the existing services are readily available for potentially all consortia, nor have they succeeded in bridging all the involved distributed infrastructures. To this end and to this degree, NFDI-wide basic services can be considered as meta-services that foster interoperability or combine existing solutions in certain fields into a broad community service. However, basic services need to reflect this distributed nature, whether in the area of legitimating access to federated infrastructures for individuals, through the persistent identification of objects and their creators, through providing long term archiving solutions, or through the provision of distributed support networks, to name just a few examples.
Defining a list of initial basic services to be implemented is part of the process described above. It is essential that all candidates undergo the foreseen assessment process, which is linked to the allocation of funding. A few service candidates mature enough for a "fast lane process" have been identified early on in the Base4NFDI initiative. Some of these candidates are therefore very likely to enter into the service initialisation step as soon as the governance of Base4NFDI is established. The selection of candidates will follow a defined list of criteria. These criteria include the availability and adaptability for potentially all consortia, detailed requirements analysis, an operating concept for a service's medium and long-term operation, and the reuse and further development of existing services, e.g. as already being hosted for parts of the German science community.

Interfaces to other funded or proposed NFDI consortia, to the NFDI Association and its bodies as well as to its Sections: brief description of existing agreements for collaboration as well as for future collaboration

Base4NFDI is set up as a collaboration of all 19 NFDI consortia being funded from the first two funding rounds. In addition, 11 NFDI consortial initiatives applying in the third call expressed their willingness to join Base4NFDI in case of being funded.

In preparation of this proposal, all consortia agreed on participating in the common process of identifying needs and candidates for basic services, their development and evaluation. This decision was achieved within the governance structures of the NFDI Association. Base4NFDI commits to continue this practice. As a key principle Base4NFDI avoids any parallel governance structures and complements cross-consortia collaboration and negotiations within the NFDI Association. A workflow will be established from the NFDI Sections to the process steps and thematic areas of Base4NFDI, and back to the NFDI Sections, which prepare recommendations for basic services to the NFDI Consortial Assembly and the NFDI Scientific Senate. The NFDI Consortial Assembly ensures a cross-consortium mandate for basic services and provides common technical and subject-related principles. Basic services adopted by the NFDI Consortial Assembly will be submitted to the NFDI Scientific Senate which is responsible for the integration of cross-consortium services into the NFDI, comprising basic services. In this way, the NFDI bodies will be able to implement basic services developed in the Base4NFDI project by following the mechanisms foreseen in the NFDI Association's statutes. The current consortia already started the NFDI-wide collaboration within these NFDI bodies successfully and Base4NFDI will build on and further develop these initial common structures.

In preparing the Base4NFDI proposal the consortia identified two core pillars for the successful development and establishment of NFDI-wide basic services; (1) the community driven co-design of basic services via the NFDI Association and (2) a common framework establishing quality assured and coherent models for continuous identification, development, operation and evaluation of NFDI-wide basic services. Base4NFDI combines both pillars in its matrix structure: The NFDI Sections provide infrastructural and technological expertise in combination with domain knowledge. The NFDI Sections' part in the co-design process is to consolidate the user requirements and guarantee that the evolving basic services are driven by demand and linked back to specific usage scenarios within the different consortia. Complementarily, Base4NFDI will provide a framework to ensure the overall coherence of the emerging basic services from a socio-technical perspective, to guarantee orderly development, to ensure neutral evaluations, and to organise the models for long-term operation. This common framework for basic services will be made up by infrastructural and technological experts from the NFDI consortia.

3 Annex

Not applicable.