

The following pages are an excerpt from NFDI4Culture's proposal submitted on 15.10.2019 to the DFG. In the spirit of mutual collaboration in the NFDI, they are intended to foster an open, transparent inter-consortia discussion of cross-cutting topics.

2.3 The consortium within the NFDI

2.3.1 Cooperation with other NFDI consortia

NFDI4Culture has established a **continuous and productive dialogue** with other consortia to **foster inward–outward cooperation in the NFDI**. To foster collaboration between consortia from the beginning, NFDI4Culture's **work programme has been discussed openly with representatives from other consortia** during the Culture Community Workshop and **advice** from this feedback process **has been integrated** during the finalisation phase of the proposal. In the humanities, the consortium is one of the initiators and signatories of the joint ***Memorandum of Understanding***. The other three signatories are the initiatives **NFDI4Objects, NFDI4Memory and Text+**. The *Memorandum* defines the responsibilities and modes of cooperation between the four partners with the **aim to create a meshed structure** with a complementary division of tasks that best addresses the diverse needs of the highly differentiated research landscape in the humanities. Additionally, NFDI4Culture is one of the 21 signatories of the *Berlin Declaration* on cross-cutting topics in the NFDI. The consortium closely embraces the spirit of cooperation and the goals of the *Declaration* and will actively contribute to the cooperative treatment of topics such as metadata harmonisation, provenance concepts, interoperability across research domains, legal and ethical aspects, terminologies and linked data services, and the development of training concepts for Data and Code Literacy.

NFDI4Culture **has planned an appropriate budget for cross area working groups as agreed upon in the *Berlin Declaration*** to allow for close collaboration with other consortia with regard to the cross-cutting topics (cf. TA7/M4). It is to be expected that it will take at least two to three years until the general framework of the NFDI is established and all details of possible collaborations and exchanges of services between NFDI consortia become clear. Nevertheless, there are already concrete arrangements between NFDI4Culture and several other cooperating consortia for collaboration on cross area concerns. Therefore, the following list is not exhaustive and will be expanded as the NFDI development unfolds: **MaRDI** (mathematics) and NFDI4Culture will collaborate in the area of modelling and standardisation of research data. Both consortia engage in complex data types. In mathematics, these are purely ideal objects such as elliptic curves, PDE-based models or theorems/proofs. In research domains such as art

history, musicology or media studies, these are cultural assets with their material, immaterial, conceptual, discursive and reception-historical properties. Both consortia will focus on symbolic object representations and ontology-based metadata approaches. On the basis of this cooperation, MARDI and NFDI4Culture hope for good coverage of these research data categories and aim to evolve their work into a generic standard that is also useful to other consortia and the NFDI in general. In the area of training and qualification, **NFDI4Ing** and NFDI4Culture have identified Data Literacy, Code Literacy, and the provision of open educational resources as cross-cutting topics for close collaboration. Both consortia also intend to cooperate in the area of standardisation and curation of 3D data types (e.g., CAAD models and other forms of 3D representations). Since image data plays an important part in **NFDI4Neuroscience** and NFDI4Culture, both consortia plan to cooperate in the standardisation of image metadata and image formats and in the joint development of image analysis tools in the field of computer vision. **Text+** and NFDI4Culture intend to explore data standardisation potentials at the interface between musicology and philology (taking MEI, TEI for philological editions as a starting point).

2.3.2 Members participating in other NFDI consortia

Members of NFDI4Culture participate in the following NFDI consortia and commit to strengthening the institutional network within the NFDI across subject areas and research domains:

Astro-NFDI	UMR (participant), TIB (participant), UZK (participant)
BERD@NFDI	UZK (co-applicant)
DAPHNE	TIB (participant)
FAIRMat	UPB (participant), TIB (participant)
ForumX	UZK (co-applicant)
MaRDI	FIZ (co-applicant)
NFDI4Agri	FIZ (co-applicant)
NFDI4Biodiversity	UMR (co-applicant), SUBG (participant)
NFDI4Chem	FIZ (co-applicant), TIB (co-applicant), UZK (participant)
NFDI4Earth	TIB (participant), UZK (participant)
NFDI4Health	UZK (co-applicant/participant)
NFDI4Ing	TIB (co-applicant), SLUB (participant)
NFDI4Memory	FIZ (co-applicant), HI (co-applicant)
NFDI4MSE	FIZ (co-applicant)
NFDI4MobilTech	FIZ (co-applicant), SLUB (participant), TIB (participant)
NFDI4Neuroscience	UMR (participant)
NFDI4Objects	SPK (co-applicant), UZK (participant)
PAHN-PaN	TIB (participant), UZK (co-applicant)
Text+	AWLM (participant), DNB (co-applicant), SUBG (co-applicant), UPB (participant), UZK (participant)

2.3.3 Contributions to the NFDI as a whole

NFDI4Culture already has solutions and experience in regard to several cross-cutting topics that could be of interest to other consortia and the NFDI as a whole. Its partners from archives, libraries and museums have long-standing expertise in the field of **metadata, the development and sustainable curation of authority data and data harmonisation workflows**. NFDI4Culture deals with complex data types (that always consist of a combination of other data types like semantically annotated 3D reconstructions of historic buildings, multimodal works of art like music, theatre or dance performances consisting of annotated video and/or audio streams, etc.). The consortium will develop standardisation recommendations and reference implementations for **long-term archiving and publication solutions for complex data types** and will be glad to exchange knowledge and technologies with other consortia. The partners of NFDI4Culture are very much aware that the field of **rights management** as well as **ethical advice** for research data can only be solved in close cooperation on the NFDI level. Since legal expertise and data ethics are of primary importance for research in the field of cultural heritage as well as the NFDI in general, NFDI4Culture has planned dedicated measures in its work programme, e.g. the establishment of a **legal helpdesk and an advisory panel on data ethics** (cf. TA5/M4, M5). It will also initiate a stakeholder process for the development of a legal framework for research data (cf. TA5/M5). These measures could also provide expertise to the NFDI as a whole.

Together with the participating universities and in exchange with other NFDI consortia, NFDI4Culture plans to implement **training and education** programmes in Data and Code Literacy, two skills that will become indispensable for future research in any subject. NFDI4Culture also has a strong grounding in the field of **linked data and the semantic web**. The concepts developed together with **Wikimedia** for the **collaborative curation of terminologies** and the active onboarding and engagement of users from research as well as from the citizen science, and the **joint creation and community-driven curation of an overarching knowledge graph** on tangible and intangible cultural assets could be an interesting methodological approach for other NFDI consortia as well. On a more general level, due to the close connection of its research domain with cultural politics and the cultural economy, NFDI4Culture intends to contribute the results and experiences with regard to the **development of adequate models for public/private partnerships** in the NFDI. The consortium can also share knowledge and best practices from its experience in integrating a diversified landscape of disparate research units into a consortium's network.

2.3.4 Expectations from the NFDI

NFDI4Culture defines **three levels of action in regard to cross-cutting topics**: (a) at the **level of the consortium** itself, pooling user needs from different research communities covered by the consortium, (b) at the **level of cooperation between several consortia**, shar-

ing common methodological or technological expertise for the benefit of a larger user base and (c) generic solutions at the **level of the NFDI as a whole**. With this differentiation in mind, NFDI4Culture has identified the following relevant topics that are aligned to the findings from the NFDI conference, the assessment of the NFDI expert committee and the results of the DFG's NFDI governance workshop in August 2019 that need to be decided within the NFDI's collaborative framework:

- A **common legal framework** as well as a single legal entity for the NFDI to which consortia can join as members **while allowing to keep their internal structures** that have been carefully considered with respect to their community of interest.
- Joint development of a **Research Data Commons** as outlined in the *Berlin Declaration*. This cross-consortia infrastructure should include NFDI-wide solutions for a **common authentication and authorisation infrastructure (AAI)** which must include a **flexible access management** for data sets that are subject to particular legal and ethical obligations. It should include solutions for **persistent identifier management (PIDs)**.
- Joint **data federation solutions and federated discovery systems** across NFDI consortia and close collaboration in the area of **terminology services** and linked data.
- Joint development and exchange of experiences regarding **adequate operating models (especially for long-term operation, archiving and data publication)**. This also includes a **common NFDI certification scheme** for the services offered by the NFDI.
- Joint development of **new reputation schemes and academic credit systems** that will support a cultural change towards new forms of academic contributions and achievements (like data publications or research software).
- Joint development of subject-specific as well as general **criteria for the sustainability and long term provision of research software**.

Mainz, 24.04.2020