Letter of Intent

NFDI4Culture – Consortium for research data on material and immaterial cultural heritage

1   Binding letter of intent as advance notification or non-binding letter of intent

☒	Binding letter of intent (required as advance notification for proposals in 2019)
☐	Non-binding letter of intent (anticipated submission in 2020)
☐	Non-binding letter of intent (anticipated submission in 2021)

2   Formal details

Planned name of the consortium

Consortium for research data on material and immaterial cultural heritage

Acronym of the planned consortium

NFDI4Culture

Applicant institution

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3   Objectives, work programme and research environment

Research area of the proposed consortium (according to the DFG classification system).

Humanities

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

NFDI4Culture aims to create a user-centred, research-driven infrastructure for **research data on non-textual material and immaterial cultural heritage**. The consortium was initiated by several academic associations and has a strong grounding in research. With its focus on cultural assets, it covers the needs of a range of research communities from **musicology, architecture, art history** and **history** to **theatre, film, media sciences** and **ethnology**. In a broader perspective, the research data managed by NFDI4Culture is relevant to the humanities and cultural sciences in general and in some instances even to the social and natural sciences. The research landscape addressed by NFDI4Culture is characterised by **strong institutional differentiation**. It consists of a **large amount of smaller units** (right down to individual researchers) and comprises university institutes, art colleges, academies and non-university

research and **cultural heritage institutions**, with which academic research closely cooperates. These are, in particular, **galleries, libraries, archives and museums (GLAM)**.

Since the **tangible and intangible dimensions** of non-textual cultural assets have an intrinsic value that is never fully realised in a digital representation, the research data targeted by NFDI4Culture is subject to **specific requirements**: **(1)** First, it is necessary to **differentiate between digital representations (reproductions) of cultural assets,** including their metadata, **and procedural research data** resulting from research processes on those digital representations. **(2)** Second, it must always be taken into account that **digital representations** of cultural assets **can become immaterial cultural assets in themselves**. This opens up new perspectives for future research. **(3)** Third, material and immaterial cultural assets are often **subject to complex legal and sometimes even ethical conditions**. This also holds true for research data generated from such assets, which then requires thoroughly considering copyrights and personal rights as well as questions of provenance during the whole research data life cycle. **(4)** Fourth, **research data** as an outcome of research processes on material and immaterial cultural assets **are closely linked to the cultural economy that uses the results for economic purposes**. In turn, the **cultural products created by the economic use of this data can themselves become the objects of research** among the communities addressed by NFDI4Culture. For research data on material and immaterial cultural assets, the consortium has identified **six task areas** and defined the following **guiding questions in response to the needs expressed by users during preparatory workshops and surveys**:

1. **Digitisation:** How can cooperation be improved between institutions so that scientific needs are transparently taken into consideration when cultural assets are digitised? How can the interoperability, reusability and sustainability of digitally reproduced cultural assets be guaranteed?

2. **Standards, Quality and Curation:** Which data standards, data management, quality assurance and data curation processes are suitable for research data on material and immaterial cultural assets? How can NFDI4Culture efficiently contribute to the development or improvement of international standards? Which quality assurance and curation processes need to be implemented to increase the adherence to standards among the participating research communities?

3. **Tools and Services:** Which software tools and data services exist in line with the data life cycle for working with research data on material and immaterial cultural assets? Which tools and services still need to be enhanced or even further developed? How can the institutional and technical sustainability of tools and services be guaranteed?

4. **Availability and Publication:** Which solutions exist for the availability and publication of digital reproductions and procedural research data in line with the FAIR principles? How can these solutions be further developed between the participating institutions so that they are available long-term to all users of NFDI4Culture and beyond?

5. **Rights and Data Ethics:** Which solutions exist to deal with legal situations that are often complex (e.g., due to copyrights, related rights, rights of use, exploitation rights, domiciliary rights, personal rights, protection of cultural assets etc.)? Which ethical questions need to be considered? Which technical options are required to deal with these legal situations, and how can they be implemented?

6. **Expertise, Consultation and Professionalisation:** How can the consortium efficiently provide consultation services and support to the scientific community in a coordinated yet geographically distributed organisational structure? How can the consortium promote data literacy in research and teaching across the scientific community? How can e-learning be supported and needs-based training used to effectively promote these topics?

NFDI4Culture will **set up processes and structures** specifically targeted toward the needs of the participating research communities. **Forums will be organised** where existing data standards will be discussed in close dialogue between providers and users. Data management, quality assurance and data curation processes will be developed collaboratively and matched with scientific criteria and technical innovations. This will also lead to new research questions. For the **digitisation of material and immaterial cultural assets (task area 1)**, needs-oriented competency centres will be set up between the applicants and the participating research and heritage institutions; they will pool particular expertise in relation to the specific technical digitisation processes (2D, 3D, reconstructions, music encoding, audio, video) and develop suitable format models and description standards for the digitisation of cultural assets. In respect to **data standards, data quality, data management and data curation (task area 2)**, the consortium will implement criteria for data standards along with quality assurance measures for the description and exchange of data on cultural assets. These standards are the prerequisite for **task area 3**, which is devoted to **tools and services** for the analysis of research data on cultural assets. Well-documented **interfaces** will be implemented and furnished with a differentiated and comprehensive **rights management**. As concerns the **availability and publication of digital reproductions as well as the procedural data and research results based on them (task area 4)**, existing offerings will be scaled and made available to the wider research community. In addition, the partners will standardise their **publication services** and provide users with **subject-specific repositories** for their data publications. In respect to **rights and data ethics (task area 5)**, NFDI4Culture aims to establish **legal certainty for users**. To do so, technical **authentication and access solutions** for research data will be implemented alongside consultation services. **Expertise, consultation and professionalisation (task area 6)** is a crucial field of responsibility for the success of NFDI4Culture. Alongside distributed consultation centres, needs-based **training (e-learning) and further education programmes** will be developed, which will then be offered by institutional or sometimes commercial providers. To further support individual institutions or researchers, a web-based helpdesk will be set up to guide users and facilitate direct access to the digital resources, services and tools of NFDI4Culture. The helpdesk will also be used as an instrument that is part of the quality assurance cycle by collecting application feedback and support requests.

In summary, NFDI4Culture will offer a dynamic and iteratively evaluated portfolio of digital **resources, tools and services** to address the needs of the participating research communities in the area of material and immaterial cultural heritage. The consortium will take measures to ensure **the transfer of results** to **cultural policy-making**, the **cultural economy** and the **wider public**.

Brief description of the proposed use of existing infrastructures, tools and services that are essential in order to fulfil the planned consortium's objectives.

To ensure optimal evaluation and reuse of existing infrastructures, tools and services from the beginning, **the (co-)applicants have jointly set up the NFDI4Culture Coordination Office (NCCO)**. The staff provided by the partners for the NCCO is working closely with the designated spokesperson, co-spokespersons and representatives from the scientific communities and associations. A transparent and iterative process for participation has been put into practice by the NCCO that **continuously collects, evaluates and structures information and feedback about existing infrastructure components, tools and services** from the applicant institutions and participants of NFDICulture. At the same time, this process also takes the existing and emerging needs of the involved research communities into account. So far, a large number of participants have expressed their interest in NFDI4Culture and submitted around four hundred suggestions for contributions to the consortium's infrastructure in relation to users needs. This clearly demonstrates the great demand for taking research data on material and immaterial

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cultural heritage into account within in the NFDI. On the basis of this data, the NCCO **continuously identifies and formalises exemplary user stories and validates them in close dialogue with researchers** from the communities participating in NFDI4Culture. All user stories are aligned with the research data life cycle and will be covered by measures in NFDI4Culture's work programme. The consortium's working paper already provides 20 such formalised user stories (cf. https://doi.org/10.5281/zenodo.2763576, pp. 32–50) as examples for mutual discussion with a larger user base and also with other NFDI consortia that might share some similarities in regard to their research communities.

In view of the necessary **administrative infrastructure** for smoothly running the consortium, the Academy of Sciences and Literature | Mainz (AWLM) has long-standing expertise in the administration of funds and in scientific project management. The AWLM currently disburses funds for research undertakings in 11 federal states (Academies' programme) and also manages project funds from the DFG, BMBF and other funding agencies. The AWLM will provide NFDI4Culture with **a highly efficient and goal-oriented administration**. In addition, the ALWM is also a learned society and a research institution that connects domains such as musicology, art history, literature, the philologies and ancient studies. In the area of **2D and 3D digitisation**, the consortium partners have **long-standing expertise and the necessary equipment** (e.g., scan robots, laser scanners etc.) and **certified storage capacities** (peta-byte range) at their disposal to set up coordinated measures for standardising the digitisation of material and immaterial cultural assets (task area 1). The partners also play an active role in national and international boards and in research projects for the development of (meta-)data standards and data exchange formats in the area of cultural heritage (e.g., LIDO, IIIF, IFLA-LRM, CIDOC, MEI, etc.), **operate infrastructures for data mapping and data harmonisation** as well as offer and contribute to services for **cultural authority data** (task area 2). The continuous evaluation by the NCCO of existing tools and data services among the participants of NFDI4Culture has shown the availability of a **broad spectrum of components ranging from basic tools such as version control systems and project management tools to dedicated research software** for the management and analysis of research data on material and immaterial cultural heritage (task area 3). This is also applies to **repositories and digital publication services** for the long-term publication and preservation of the research data managed by NFDI4Culture (task area 4). Regarding rights management and data ethics, the consortium partners can **draw on existing expertise, established workflows and specialist lawyers** from their legal departments (task area 5). In the area of expertise, consultation and professionalisation, NFDI4Culture has a **strong grounding in universities and professional associations** and can ensure the continuous transfer of results to teaching and research in the participating academic communities.

Interfaces to other proposed NFDI consortia: Brief description of existing agreements for collaboration and/or plans for future collaboration.

NFDI4Culture has established a **continuous and productive dialogue** with its research communities as well as with other NFDI consortia to **foster inward–outward cooperation**. In the field of the humanities, NFDI4Culture is one of the four initial signatories of a joint **memorandum of understanding** (cf. https://doi.org/10.5281/zenodo.3265763). 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 in matters of research data management.

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 all 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. Their cooperation will build on the well-established digital humanities infrastructure at FAU Erlangen.

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. Additionally, both consortia intend to cooperate in the area of standardisation and curation of 3D data types (e.g., CAAD models and other forms of 3D digital 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 as well as in the joint development of image analysis tools in the field of computer vision. Future collaborations with other consortia from the natural sciences (e.g., medicine and biodiversity) are planned.

4   Cross-cutting topics

Please identify cross-cutting topics that are relevant for your consortium and that need to be designed and developed by several or all NFDI consortia.

NFDI4Culture has worked intensively on identifying cross-cutting topics. To foster mutual exchange and cooperation between NFDI4Culture and other NFDI consortia, the results have been published as an extensive working paper (https://doi.org/10.5281/zenodo.2763576). 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, sharing 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 cross-cutting topics that are aligned to the findings from the NFDI conference and the statement of the NFDI expert committee:

- Joint authentication and authorisation infrastructure across the NFDI
- Data federation and federated discovery systems across the NFDI
- Common standards and best practices for metadata and authority data
- Development of adequate criteria for data quality (subject-specific and general)
- Governance models (especially for long-term operation)
- Questions of ethics and rights with regard to research data
- Research software engineering
- Training & dissemination (with particular focus on data and code literacy)

Please indicate which of these cross-cutting topics your consortium could contribute to and how.

NFDI4Culture will **plan an appropriate budget in its work programme** to allow for close collaboration with other consortia in regard to the cross-cutting topics mentioned above. Following an **embedded approach**, each task area of the work programme will **include dedicated measures** for working on cross-cutting topics. The results of those cross-cutting measures will continuously be integrated into the overarching structure of the NFDI.

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. Our partners from archives, libraries and museums have long-standing expertise in the field of **metadata management and standardisation**. Together with our participating universities and in exchange with other NFDI consortia, NFDI4Culture can implement **training and education** programmes in data and code literacy, two skills that will become indispensable for future research in any subject. To advance the development of general as well as subject-specific **criteria for data quality and sustainable research software,** NFDI4Culture is looking forward to a fruitful knowledge exchange within the NFDI. The partners of NFDI4Culture are very much aware that the complex field of **rights management** can only be solved in close cooperation. This pertains to technical aspects such as a common authentication and authorisation infrastructure as well as legal mechanisms, which must be jointly developed. Finally, NFDI4Culture already has a strong grounding in the field of **authority data, linked data and the semantic web**. This area of activity should become an important pillar of the NFDI as a whole.