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Future of the NFDI After the Expiry of the Agreement Between the Federal Govern- ment and the Federal States in 2028

Statement by the NFDI Expert Committee

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1 Occasion and purpose of this statement

In view of the expiry of the [agreement between the federal government and the federal states of 26 November 2018](#), this statement sets out the NFDI Expert Committee's views concerning the future of the NFDI from 2029 onwards. To this end, the document first describes the current state of the NFDI, then outlines objectives and characteristics that are important from the point of view of the NFDI Expert Committee, and finally takes these as a basis to set out requirements and framework conditions for an NFDI from 2029 onwards.

The statement draws on the relevant experience and insights gained by the NFDI Expert Committee as the evaluation body responsible for reviewing and assessing NFDI consortia. The specific perspective set out here does not seek to replace the contributions of other stakeholders, in particular those developed by the German Science and Humanities Council (Wissenschaftsrat, WR) in the course of the structural evaluation of the NFDI, but rather to supplement them.

2 Current situation

The NFDI has developed impressively since the conclusion of the agreement between the federal government and the federal states in 2018. The 26 subject-specific and methodological consortia and the consortium for the implementation of basic services have created the foundation required to address the specific needs of a wide range of different communities and provide NFDI-wide services to enable basic tasks based on a participative process that is supported by all consortia. Maintaining close dialogue with their target groups, the NFDI consortia have not only developed themselves over time in terms of content and organisation, they have also made progress in terms of their collaboration with each other. Impressive evidence of this is the fact that within the NFDI, stakeholders from all federal states, all subject areas and the most diverse areas of science and infrastructure are engaged in collaboration with each other – both within the consortia and through overarching activities aimed at developing a common infrastructure, such as Base4NFDI and the sections of the NFDI Association. This process is borne out by the growth of the NFDI Association's structures and bodies, as well as its membership numbers; the Association also enables stakeholders not directly involved in consortia to participate in the NFDI. All in all, therefore, the NFDI is fostering the science-led development of the national and international infrastructure landscape while at the same time stimulating cross-community communication and dissemination processes in the field of research data, thereby making a pivotal contribution to digital sovereignty and boosting research as a whole.

As such, the foundations have been laid for the NFDI's primary goal to be achieved by 2028 according to the agreement between the federal government and the federal states, namely the establishment and further development of overarching research data management. But research and technologies are continuously evolving, as are the needs of the communities being served. The same applies to the requirements for research data itself: the huge advances in the field of artificial intelligence (AI) in the recent past – in connection with generative language models, for example – illustrate the enormous potential available, extending far beyond the scientific community, as well as demonstrating the increasingly rigorous demands and a growing need for high-quality data.

If it is to fulfil its purpose, a National Research Data Infrastructure must take such developments into account in the long term, and therefore beyond 2028. In order to achieve this, it is first necessary to outline the objectives and characteristics of a National Research Data Infrastructure from 2029 onwards, before subsequently taking these as a basis for specifying the relevant requirements.

3 Objectives and characteristics of an NFDI from 2029 onwards

From the point of view of the NFDI Expert Committee, the primary goal of a National Research Data Infrastructure must continue to be to strengthen the German research system and its sovereignty. As can be seen from the current agreement between the federal government and the federal states, an NFDI should not only serve as a data repository and make data widely accessible, it should also contribute to the interlinking of data sets and to standardisation. This is essential for researchers in their pursuit of scientific knowledge and innovation, also in the area of interdisciplinary collaboration. For this to succeed, an NFDI must exhibit the following characteristics:

- ▶ **Needs orientation:** For the NFDI to continue, it must remain focused on the needs of the research communities. These needs are constantly changing, so flexible structures are required to meet them.
- ▶ **Cross-consortium services:** Cross-consortium services that meet the basic needs of a wide range of communities are a key element in terms of the further development of an NFDI. They increase the usability of an NFDI for different target groups, increasing acceptance and providing a common basis for networking within the NFDI itself as well as in terms of its national and international compatibility. For this reason, the provision of cross-cutting services must continue to be a key factor for a future NFDI. As with the development of an NFDI in general, the distribution of tasks in the

provision of cross-cutting services should be implemented by way of a science-led and participatory process.

- ▶ **Common, interoperable architectures:** Furthermore, science must be enabled to work with data across domains and disciplines. A key element here is the collaborative development of common architectures as part of an NFDI. Differing technical architectures could potentially exist alongside each other, providing their interoperability is guaranteed – by means of overarching standards, for example. This requires a sufficiently well-staffed and well-funded architecture management team.
- ▶ **Long-term, interlocking operating and financing models:** An NFDI must be designed for the long term. Operating models must be designed transparently with this in mind, offering infrastructure users the security of reliable structures and services with a long-term perspective. Given the enormous diversity of consortia, different models must be permissible within an NFDI, whereby it is imperative for all models to be organisationally and legally compatible, among other things. This requires a crisis-proof financing concept that is integrated into planning from the outset. Such a concept must take account of the fact that an NFDI as a whole cannot support itself financially and that public funding is justified based on the fact that the services it provides are geared towards the public interest.
- ▶ **Compatibility:** An NFDI must not only ensure networking between stakeholders, subject areas and structures in Germany, it must also guarantee international compatibility. As a science-led and community-driven information infrastructure, an NFDI develops significant reference solutions at various levels that serve as models. For this reason, an NFDI must seek to be an obvious point of reference for national and international activities, and be actively involved in setting standards across all subject areas. Among other things, this means that an NFDI would by definition act as a national node for the European Open Science Cloud (EOSC), as well as serving as a pioneer in the field of research data beyond Europe.
- ▶ **Reliable legal and organisational framework conditions:** Reliable legal and organisational Germany-wide framework conditions are crucial in order to ensure the reliable provision of services at both the national and international level. It will continue to be important for such framework conditions to be created jointly in future, too, involving relevant stakeholders of an overall NFDI system as well as external actors.
- ▶ **Digital sovereignty:** An NFDI conceived in this way will contribute significantly to national digital sovereignty: this is an essential factor in view of current and future developments in science, technology and politics.

4 Requirements and framework conditions from 2029 onwards

In the following, requirements are set out based on the goals and characteristics described above. Firstly, the proposals aim to maintain well-functioning structures and processes as established under the current agreement between the federal government and the federal states, and as embraced in practice. Secondly, however, aspects are specifically selected where readjustment or restructuring would appear to be advisable.

A needs-based approach must remain a key element of an NFDI.

Based on the requirements to date, subject-specific consortia, methodologically focused consortia and NFDI-wide basic services will all continue to be needed in the future so as to be able to respond specifically to the sometimes starkly differing needs of users, achieve synergies by combining services across consortia, and further advancing the NFDI as a networked information infrastructure. For this reason, all considerations regarding an NFDI from 2029 onwards must take into account the fundamental link in terms of content and structure between subject-specific needs and cross-disciplinary requirements.

Both consolidation and dynamic (further) development are indispensable for an NFDI.

One key question that arises in terms of the continuation of the NFDI is the relationship between consolidating existing structures on the one hand and dynamically (further) developing the NFDI on the other. Here, the focus must remain on the community-driven and needs-based orientation of individual consortia and of an NFDI as an overarching system. In view of this, it is right to revisit the question of the number, size and specific composition of consortia for the period after 2028. All considerations must be aimed at avoiding rigid structures so as to maintain the necessary flexibility of an NFDI in responding to new and constantly changing requirements. This will not just require the regular evaluation of existing consortia but also the possibility of meeting new needs, such as by adding additional NFDI consortia, for example. For this purpose, clear funding criteria must be set down in a new agreement between the federal government and the federal states that can be verified based on review and evaluation.

The interlinking of the consortia in an overall NFDI system is to be further strengthened.

Close collaboration between the individual consortia and the use of synergies through joint architectures will be essential to the success of an NFDI, not least when it comes to establishing jointly supported services. For this reason, there is already a focus on collaborative activities and on the contributions made by individual consortia to joint NFDI architectures, especially where consortia are evaluated for continued funding. This criterion must also be firmly anchored in future review and evaluation processes and addressed accordingly.

The sections of the NFDI Association, in which cross-cutting topics (such as the involvement of industry) are currently addressed across the boundaries of the consortia, have an important role to play in the integration of NFDI consortia into the system as a whole. These sections should be continued and further expanded as necessary. During the NFDI's establishment phase, the process for applying for basic services was separated from that of the subject-specific consortia under the third round of calls for proposals. It is advisable to consider how far it would make sense to finance the work defined by the sections from separately provided funding: the aim here would be to detach the processing of certain cross-sectional issues from the competitive environment of the activities pursued by individual NFDI consortia.

Services offering long-term stability are required to make an NFDI attractive to users in the long term.

For a community-driven and science-led information infrastructure such as an NFDI, it is vital to ensure ongoing feedback from the communities addressed. In order to reach all envisaged target groups and generate long-term enthusiasm for an NFDI, reliable, needs-oriented services must be provided that consistently support users in their work, whatever that may involve. But the long-term stability of such services can only be ensured based on long-term funding, so the necessary underlying conditions, models and structures must be created for this purpose.

An NFDI should further build on its function as a compatible anchor point for national and international networking.

Greater attention must be paid to links between the NFDI consortia and other research data initiatives at state, federal, European and non-European level. With regard to the EOSC in particular, it is important for NFDI consortia both to achieve a clear delineation as well as identify and address potential interfaces. Furthermore, it will be essential to

develop the service portfolio of an NFDI in such a way that it can also be used to identify which services can be incorporated into the EOSC via an NFDI. This is the only way to ensure that the NFDI is firmly embedded in the international research and infrastructure landscape – a crucial point when it comes to ensuring a functional and compatible over-all system without parallel structures in the area of research data management.

Future funding requirements should be based on both existing tasks and new ones from 2029 onwards.

Tasks arise at different levels in connection with an NFDI. Coordinated by the Directorate, the consortia drive forward the establishment, consolidation and further development of the NFDI. Here, an NFDI is faced with the challenge of having to continuously evolve in line with the needs of different target groups without compromising the reliability of its existing services. This involves a great deal of effort, since both data management and the provision of services follow a continuous life cycle involving differing work stages, requiring the deployment of different actors and resources over the period as a whole. As such, all NFDI offerings incur running costs – including those that are still in the conceptualisation phase.

In order to ensure a sustainable and reliable NFDI, it will be essential that consortia are guaranteed financial planning security, so sustainable (financial) framework conditions will be crucial to the future of an NFDI. As the NFDI is developed further, attention should also be paid to the ways in which additional financial needs can be met. This applies in particular to the procurement of hardware for storing research data. Currently, NFDI consortium funding can only cover investment costs in exceptional cases, and only where this has been explicitly applied for, or where the DFG has been approached with a request retrospectively and has given its approval. In addition, it should be noted that an NFDI is also affected by price increases of various kinds (e.g. energy, personnel and technology), so an increase in funding requirements is to be expected in the short to medium term. Other increased funding requirements that are regarded as necessary result from the following: firstly, the demand for greater flexibility regarding the maximum number of funded consortia; secondly, the focused funding of cross-consortia basic services and/or the work packages defined by sections; and thirdly, the idea of making funds available – in a way not explicitly provided for in the current system – for the conceptual development and implementation of common architectures for an NFDI. This point in particular is essential to promote more intense networking within an NFDI as desired, as well as to ensure the increased synergistic establishment and use of services and structures supported by several consortia.



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