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Cooperation as an Opportunity

Second Discussion Paper on the Development of a National Research Data Infrastructure (NFDI) in Germany

In April 2017 the German Council for Scientific Information Infrastructures (RfII) published a discussion paper on the objectives and prerequisites for joining a National Research Data Infrastructure NFDI.¹ The paper was intended for researchers, data and information experts, and scientific policy makers interested in the management of research data. The paper deals with the contributions expected of each party, when scientific communities form a consortium with infrastructure partners in order to develop, take responsibility for, and operate research data services under the umbrella of an NFDI.

The Joint Science Conference (GWK) assigned the RfII the role of a consultant on policy and science. In the meantime it has taken up the recommendation to establish an NFDI. Approval has been expressed by many stakeholders in the sciences and the humanities. Against this background, this second discussion paper from the RfII deals with obvious questions regarding the development of an NFDI that are significant right now in the early phases of the formation of NFDI consortia.

HORIZONTAL – POLYCENTRIC – INTEGRATED INTERNATIONALLY

An NFDI will not be established as an additional “pillar” in the scientific system. As a polycentric network, it links existing stakeholders ‘horizontally’.² This is the only way to ensure the usability of data across discipline and institutional boundaries. Furthermore, the RfII has made it clear that the NFDI consortia will develop differently according to their needs, that an NFDI is a comprehensive effort over the long term, and that it should be financed in addition to existing, continuing infrastructure funding paths.

The added value of an NFDI lies in the services themselves, their federation (i.e. interoperability) and new opportunities for quality assurance. It will also contribute to increase the effectiveness, efficiency, and sustainability of the research through services and data collections that are available nationwide and are internationally networked. A decisive factor for the success of the NFDI is a development driven by science as well as good links to existing initiatives and extensive international integration. The NFDI forms a basis for the creation of a common European data space. At the present time, it could become a strong node in the planned European Open Science Cloud (EOSC).

¹ Cf. German Council for Scientific Information Infrastructures (RfII): Step by step – Defining Contributions - A Discussion Paper on the Objectives and Prerequisites for Joining a National Research Data Infrastructure (NFDI) (2017). Available online at: <http://www.rfii.de/download/step-by-step-defining-contributions/>.

² Cf. RfII: Enhancing Research Data Management: Performance through Diversity. Recommendations regarding structures, processes, and financing of research data management in Germany (2016). Available online at: <http://www.rfii.de/?p=2075>.

DESIGN FEATURES OF A NATIONAL RESEARCH DATA INFRASTRUCTURE (NFDI)

The following propositions are not a construction plan, but do outline ideas for the development of an NFDI, especially for its initialisation phase.

Mission. The NFDI is a distributed, networked infrastructure for data producers and data users that provides reliable and sustainable services to ensure both the quality and the dynamics of science and the humanities in the digital age. The added value of the NFDI lies in the integration and consistency developed. “N” (as in national) thus is not intended to be a limitation. The goal instead is to utilise synergies regarding generic services and the interoperability of services aimed at scientific communities as well as across such communities.

- *It is designed* - and built - as a managed process.
- *Functionally*, it is a demand-driven system.
- *Institutionally and in terms of personnel*, it is a network of expertise.
- *Geographically*, it is a distributed network consisting of nodes.
- *By law*, it is a permanent entity whose rules are supported by its participants.
- *For users*, it is a reliable, trustworthy service portfolio.

Its achievement is to ensure the quality and the dynamics of science and the humanities in the digital age through a sustainable offer. The NFDI will also contribute to gain substantial scientific value by offering highly available and high quality research data.

User integration. During the establishment of the NFDI, it is necessary to overcome a critical threshold in the overall development of the scientific system: the widespread emergence of a new data culture and acceptance of research data management in the scientific communities. For this reason, it is necessary for scientific users to acquire competent and accepted stakeholders that are willing and able to develop service portfolios with long-range planning for entire thematic domains together with infrastructure partners.³ The process of organising the “voices” of scientific communities and acting as stakeholders can take some time.

Entry phases. Communities and infrastructure providers work closely together for the purpose of joining the NFDI. After its formation (both form a “consortium”), the process of joining the NFDI passes through several phases. The subsequent development phases can be roughly distinguished, have milestones and evaluation periods and will be individually tailored to each consortium.

Formation of consortia. The identification of potential partners and the formation of the consortia is a transparent process and should be facilitated and moderated. From a scientific perspective, the NFDI process is about creating suitable partnerships, and not about upgrading existing centres. The decisive factor is therefore not the geography of existing facilities, but the ability of a consortium to offer a maximum of user-oriented services.

On the establishment of the NFDI. The NFDI will be established step by step over a period of several years. In each expansion stage, a small group of selected consortia will join the NFDI. Allowing up

³ Cf. also Rfll (2017): Step by step – Defining Contributions, p. 1.

to ten sufficiently different scientific communities, each with their corresponding infrastructure partners, to join per stage seems reasonable. The total number of consortia is expected to be in the medium double-digit range. The selection takes place over a two-stage process and is strictly science-driven to achieve the highest possible level of acceptance among scientific users. A coherent usage/data access concept as well as a plausible operating model must be included in the list of criteria as well as the structural effects on the scientific system as a whole.

Governance. The NFDI has a governance structure with an active management that is clearly separated from management of the particular consortia (*top down*). The consortia are represented (*bottom up*) in the NFDI. Upon joining the NFDI, the consortium partners reach a binding cooperation agreement, including a roadmap. The supervisory body of the NFDI contains representatives from the German Federal Government, German *Länder*, scientific organisations, and grant providers; their collaboration is essential to ensuring a good supply of research data infrastructures is available nationwide.

Quality management. The phases involved in joining the NFDI must be monitored and require suitable evaluations of the scientific footprint of each consortium, the size of its infrastructure, and the services it organises. Furthermore, data security, data protection, and ethical issues must be considered.⁴ The NFDI consortia as well as the NFDI as a whole are regularly evaluated in view of their continuation.

Future viability of the NFDI consortia. Just like scientific research itself, the NFDI consortia should also remain dynamic over the long term. They are designed to enable the integration of additional stakeholders and should develop their service portfolios towards achieving maximum interoperability and convergence. Research on the NFDI and on the effects of the formation of NFDI consortia on the scientific system would also appear reasonable.

International dimension. The NFDI is needed as a vital transregional system for Germany. In addition, it must guarantee German research activities are internationally networked and vigorously promote the use of internationally available data. Resources must be allocated to enable participation in international networks at all levels of the NFDI (consortia, managing unit, supervisory boards).

Resource requirements. The resource requirements of the NFDI grow parallel to its step-by-step establishment and includes above all qualified personnel for the development and operation of the service portfolios (“investing in minds”), whereby the consortia will also need to contribute. Typical costs in the NFDI consortia consist of development activities for the service portfolio, additional services in the areas of data management, data analysis, and data acquisition as well as support activities for the development of the data culture in the particular domain. Additional costs are related to the establishment, operation, and further development of generic services for the NFDI as a whole – this is where synergies will be created – or even resources for backing up data (e.g. for long-term archiving and availability).

⁴ Cf. also Rfll (2016): Enhancing Research Data Management, recommendations 4.11 and 4.12, p. 55 f.

Financing. Funding from the NFDI is permanent and complementary to existing – basic or otherwise sustainable – financing of services and resources brought into the NFDI by each consortium (e.g. computing capacity). Currently (2018), though, the status of many research data services, even successful services with a broad impact, is only that of a project, or they are being operated temporarily by facilities at their own risk. With the first of its 13 recommendations in its position paper “Performance through Diversity”, the RfII recommended options for the long-term financing of such services.⁵ Actually creating these options (using resources other than those of the NFDI) is critical to the success of the NFDI. NFDI funding itself will initially be used to establish the NFDI. Some of the funds are also intended for permanent and sustainable provision of the high quality data services which are necessary for a coherent overall structure, so that the long-term financing efforts of the consortium partners and their grant providers can be matched. In terms of operation, moderate fee and compensation models that do not have a prohibitive effect are conceivable – in part due to the regulatory effects they can have.

Launch/establishment of the NFDI. The establishment of the NFDI is an extraordinary and, in many respects, also a singular construction and transition process whose objective is to overcome a critical threshold in the development of the scientific system as a whole.⁶ To establish the NFDI governance structure, a discussion process is recommended that involves scientific stakeholders. The process of establishing and successfully launching an NFDI should – even if competition is a characteristic feature of research – primarily focus on the opportunities offered by collaborative efforts of all parties involved.

Imprint

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⁵ Cf. also RfII (2016), Enhancing Research Data Management, p. 32 f.

⁶ Cf. also RfII (2016), Enhancing Research Data Management, recommendation 4.13, p. 56.