Priority Initiative “Digital Information” of the

Alliance of Science Organisations in Germany

# *Research Data Vision 2025: One Step Closer*

## *A Discussion Paper by the Research Data Working Group[1]*

*[February 2018]*

---

## I. Motivation

*“Easy-to-use digital infrastructures and scientific and technical information specialists support the complete research cycle.”*
*(Position paper 2015)[2]*

In the last two years, the discussion about research data and research data infrastructures has gained considerable momentum. Many stakeholders at the national[3] and the European[4] level and beyond[5] have taken crucial steps towards the goal of an open and easily accessible digital working environment for research. Numerous challenges remain to be addressed, on both the technical and the sociocultural level as well as relating to education and training.

The members of the Alliance of Science Organisations in Germany[6] in particular have actively initiated the development of research data infrastructures. Science policymakers have proposed the establishment of a national research data infrastructure.[7]

In the authors’ view, the following considerations and recommendations are currently of particular importance to promote the establishment of an operational research data infrastructure for science and research in Germany.

---

[1] The following statements and recommendations focus on the topic of research data. In this discussion paper, the Research Data Working Group in the Priority Initiative “Digital Information” of the Alliance of Science Organisations in Germany describes the current situation and identifies a number of challenges to lay the foundations for the necessary discussion of and reflection on the future handling of research data (http://www.allianzinitiative.de/handlungsfelder/forschungsdaten.html; [25.01.2018]).
Authors: Dr. Gerhard Duda, Dr. Michael Erben-Russ, Michael Franke, Dr. Maria Galda, Stefan Heinzel, Reiner Mauer, Dr. Janna Neumann, Prof. Dr. Heike Neuroth, Dr. Hans Pfeiffenberger, Henriette Senst, Dagmar Sitek, Prof. Dr. Joachim Wambsganß, Dr. Stefan Winkler-Nees, Dr. Elke Witt, Andrea Wuchner
[2] “Research data at your fingertips”, position paper of the Research Data Working Group (http://doi.org/10.2312/allianzfd.001; [25.01.2018]).
[3] German Council for Scientific Information Infrastructures – RfII (http://www.rfii.de/; [25.01.2018]) and Digital Summit (http://www.de.digital/; [25.01.2018]).
[4] DG Research and Innovation, Open Science (https://ec.europa.eu/research/openscience; [25.01.2018]).
[5] Research Data Alliance (https://www.rd-alliance.org/; [25.01.2018]).
[6] Priority Initiative “Digital Information” of the Alliance of Science Organisations in Germany (http://www.allianzinitiative.de/; [25.01.2018]).
[7] RfII Recommendations 2016: “Leistung aus Vielfalt” (“Performance through Diversity”) (http://www.rfii.de/?wpdmdl=1998; [25.01.2018]).

## II. Current Topics and Challenges

### 1. Interfaces between Research and Information Infrastructure

National and institutional efforts should aim at improving research processes, facilitating reproducibility and the wide dissemination of scientific findings. It is vital for all research institutions to address the digital transformation and exploit its benefits. The success of data-intensive and data-driven research, and the realignment of scientific working culture it requires, hinge on digital strategies becoming integral components of institutional policies and guiding principles.

Developing a maximum capacity for interoperability should be among the key objectives, beginning within institutions and extending to the level of international cooperation, for example with regard to data and digital tools. This will facilitate accelerated data collection and knowledge-building processes and reduces the ruptures associated with changing research methods.

Institutional digital strategies should tie in with the national and international environment and be implemented accordingly. Ideally, this process will be accompanied by policy development and will give due consideration to career paths and suitable incentive systems. At the same time, the question of knowledge and method management, e.g. throughout generational change or beyond the duration of individual projects, must be addressed in a timely manner.

Institutional processes of this nature effectively support researchers in voicing their interests and needs in relation to research data infrastructures; they enable them to engage in the formation of suitable communities within the context of a national research data infrastructure (Nationale Forschungsdateninfrastruktur, NFDI)[8]. The successful creation of an infrastructure for research data substantially depends on the involvement of the scientific communities. To move forward, this process requires clear agreements on the reuse of research data as well as strategic measures, and has to be actively shaped by institutions engaged in research and teaching.

Through their contributions and the national negotiation process, it is possible to guarantee to a large extent a balance between scientific innovation on the one hand and efficiency and standardisation on the other, while maintaining the autonomy of individual research organisations.

### 2. Specific Scenarios for a National Research Data Infrastructure

The German Council for Scientific Information Infrastructures (RfII) has suggested measures to promote the creation of a National Research Data Infrastructure (NFDI)[8]. It assigns a key role to existing and prospective specialist consortiums of scientific users and infrastructure organisations.

To ensure wide acceptance by the scientific community in Germany, it would appear necessary in this context to develop transparent, clearly defined, science-based criteria and processes for the integration of consortiums into the NFDI. As proposed by the RfII,[8] the NFDI should essentially be open to all disciplines and communities, including smaller ones and those with limited previous experience with digital data and methods.

[8] RfII Discussion Paper 2017: “Schritt für Schritt – Oder: Was bringt wer mit? Ein Diskussionsimpuls zu Zielstellung und Voraussetzungen für den Einstieg in die Nationale Forschungsdateninfrastruktur (NFDI)”, in German only (http://www.rfii.de/?wpdmdl=2269; [25.01.2018]).

Especially in the initial phase it would be beneficial to equally integrate consortiums with long-standing expertise in data management and consortiums only beginning to engage with this field into the NFDI. The combination of established and innovative approaches helps to promote synergies and learning effects. That said each consortium should be given the opportunity to pursue its own individual development strategy. The capacity to align with international developments should be considered from the outset.

The diversity of the participating consortiums can be expected to strengthen the NFDI. In addition to discipline-based consortiums, others will likely form around a common research topic or shared methods that cross disciplinary boundaries. Where appropriate, the NFDI can be complemented by consortiums offering generic services such as long-term preservation or big data services. It can be expected that the diverse nature of the consortiums and their interactions will contribute to the realisation of full scientific potential in an ideal way.

This diversity reflects the complex and in many cases fruitful discourses and creative processes that become possible where science and infrastructure join forces. In this environment, it becomes easier to address new research questions with interdisciplinary approaches, whilst competences relating to data and methods can be utilised and disseminated across disciplines.

## 3. Basic, Advanced and Continuing Training

It is of extreme importance that infrastructure measures are complemented by a long-term investment in the development of skills and competences related to digital data and methods.

This applies to both higher education and vocational training. In addition, consideration should be given to all other phases of professional development and qualification. There is a need, firstly, for well-trained specialists and, secondly, for training in general basic skills in the handling of digital data for both apprentices and students. New specialist roles include the internationally established professions of data scientist, data librarian, data curator, data analyst, data architect and data manager. These need to be developed both broadly and systematically in Germany as subjects of study and training in their own right. This can be accelerated by appropriate incentive systems[9].

Learning the skills to handle digital data should be an integral part of every degree and doctoral programme. Every researcher should be given the opportunity to improve their own expertise in digital data and methods through basic and advanced training.

The same applies to occupations that require formal training. Owing to the increasing digitalisation, which now affects all aspects of the economy and people's lives, competence in handling digital data is becoming ever more important in almost every area of vocational training – be it for agricultural technology assistants or cycle mechatronic technicians.

It is also necessary to develop and offer advanced and continuing training to enable professionals to improve their skills in using digital data and methods. This can be achieved through postgraduate degree programmes and part-time certified courses.

Just as traditional engineering was one of the foundations of prosperity in the 20th century, it seems likely that the ability to handle digital data confidently, critically and competently will become the basis for a prosperous society in the 21st century.

[9] Sowing the Seed: Incentives and motivations for sharing research data, a researcher's perspective; Knowledge Exchange (http://repository.jisc.ac.uk/5662/1/KE_report-incentives-for-sharing-researchdata.pdf; [25.01.2018]).

## III. Recommendations

In response to the current challenges, the Research Data Working Group in the Priority Initiative "Digital Information" of the Alliance of Science Organisations in Germany has formulated five recommendations, addressing what it regards as essential prerequisites for a functional digital landscape for science and research in Germany.

1. It appears crucial that every institution engaged in research and teaching should develop and implement a digital strategy in order to enable scientific work fit for the future.

2. An important goal of any digital strategy should be to ensure that researchers actively and continuously participate in developing and designing the national and international research data infrastructures.

3. A fully developed national research data infrastructure should encompass the full spectrum of science and be developed in a federated manner in individual institutions. The capacity to link up with international developments should be ensured from the outset.

4. For the inclusion of consortiums in a national research data infrastructure, transparent and science-driven criteria and processes should be defined, taking into account the autonomy of the scientific communities. The architecture should also be designed to enable participation beyond the consortiums.

5. To respond to the high demand for data experts, specific degree programmes and training courses for professional education should be newly established or expanded. All degree programmes and professional trainings should impart general basic knowledge of digital data and methods, supplemented with advanced and continuing training in later career phases.

### About this Publication

The online version of this publication is available at http://doi.org/10.2312/allianzoa.031
Published by: Research Data Working Group in the Priority Initiative "Digital Information" of the Alliance of Science Organisations in Germany.

Edited by: Stefan Winkler-Nees (German Research Foundation)

Contact: Helmholtz Open Science Koordinationsbüro, c/o Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum GFZ, Telegrafenberg, 14471 Potsdam; email: open-access@helmholtz.de

Version dated February 2018