

Progress Report NFDI4Ing

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B-1 Progress Report Part 1

1 General Information

1.1 Name of the consortium

Nationale Forschungsdateninfrastruktur für die Ingenieurwissenschaften (NFDI4Ing)

1.2 Research domains or research methods addressed by the consortium

RB №	DFG Review Board
401	Production Technology
402	Mechanics & Constructive Mechanical Engineering
403	Process Engineering, Technical Chemistry
404	Fluid Mechanics, Technical Thermodynamics & Thermal Energy Engineering
405	Materials Engineering
406	Materials Science
407	Systems Engineering
408	Electrical Engineering & Information Technology
409	Computer Science
410	Construction Engineering & Architecture

NFDI4Ing brings together all engineering research communities by supporting the collection, compilation, and qualification of data. We make research data sustainably accessible in accordance with the FAIR principles, i.e., in citable form and under licences as open as possible. We focus on three aspects: first, data literacy education from the very beginning; second, developing and testing a governance concept for the handling of research data; and third, ensuring broad availability of technologies and services for machine-actionable data and its metadata.

1.3 URL of the consortium website and repositories used for publishing output

Website of the consortium: <https://nfdi4ing.de/>

NFDI4Ing Zenodo community: <https://zenodo.org/communities/nfdi4ing/>

GitLab repository: <https://git.rwth-aachen.de/nfdi4ing/>

Project data sheet & repository at RWTH Publications: [https://publications.rwth-aachen.de/search?p=pid:%22G:\(GEPRIS\)442146713%22](https://publications.rwth-aachen.de/search?p=pid:%22G:(GEPRIS)442146713%22)



2 Summary

NFDI4Ing addresses the diverse dimensions of engineering in research methodologies, activities, professions, and disciplines. This diversity has shaped the structure of NFDI4Ing with its three task area categories of ARCHETYPES, BASE SERVICES, and COMMUNITY CLUSTERS.

Seven ARCHETYPES abstract and harmonise the methodological needs of the engineering sciences regarding Research Data Management (RDM) by clustering typical research methods and workflows. With the help of representative use cases, the ARCHETYPE task areas address these needs for further developing the state of the art of RDM practices applied to the respective research workflows. The task area BASE SERVICES addresses the development of products for RDM in a more overarching manner. It receives input both from the ARCHETYPES with their methodology-based approach (technology push) and via the communities involved (market pull). The BASE SERVICES measures focus on quality assurance & metrics, research software development, terminologies & metadata, repositories & storage, data security & sovereignty, training, and data & knowledge discovery. Finally, the task area COMMUNITY CLUSTERS (CCs) connect to different sub-communities of the engineering sciences. The subdivision is based on the corresponding DFG classification into subject areas and ranges from CC41 (Mechanical & Industrial Engineering) to CC45 (Construction Engineering & Architecture). The CCs are our most important channel for connecting to and engaging with key stakeholders.

Community activities include the annual NFDI4Ing conference, five annual community meetings (one for each subject area), a regular community survey, and more. While the conferences have a broader target audience aimed at all engineering researchers around the globe, community meetings consist of experts discussing the latest and most specific developments and use cases in RDM in their domain. This is also reflected in the number of participants. While the conferences attract between 250 and 300 attendees each year, the community meetings gather around 40 attendees each.

Internationality has become more important as the reach of NFDI4Ing grows. 2022's conference attendees and contributors consisted of approximately 16 % internationals. The scientific quality of the conference is rising every year along with the percentage of satisfied participants (2021: 80 %, 2022: 88 %).

In addition to the activities of the CCs, there are also specialised meetings orchestrated by Special Interest Groups (SIGs) that foster community collaboration. The SIGs are established to address specific, cross-cutting RDM topics, and serve to identify demands, disseminate developments, and gather feedback from the community. They operate in a manner similar to the larger NFDI sections.



NFDI4Ing is very active in the overarching NFDI. The consortium is leading the section EduTrain (Training & Education) and is involved in all other currently active sections. However, the international networking of NFDI4Ing is not limited to the NFDI and its consortia. NFDI4Ing is active in 27 international research data community forums and initiatives, including the RDA, IDSA, CESAER, AARC2, DataCite e.V., EOSC Association, EUDAT CDI, OpenAire and others.

The tangible outcomes of NFDI4Ing's efforts can be divided into the three product categories: software tools, (web-)services and infrastructure, and concepts. Software tools range from complete metadata crawlers, to specialised assistants like Betty's (Re)Search Engine. NFDI4Ing also addresses the growing demand for (web-)services and infrastructures which allow, e.g., exchanging or accessing distributed data and facilitating collaborative work without requiring a local installation. Examples of such services are graph-based applications like the Open Research Knowledge Graph for Engineering and the SciMesh service, which allow for the representation of scientific results in the form of knowledge graphs. Other service examples are the KaDI4Mat workflow system, which provides a comprehensive solution for simulation and sample tracking, and the newly founded journal for RDM in engineering sciences, ing.grid, which offers an innovative platform for publishing peer-reviewed manuscripts as well as data and software. As a third category, several conceptual products such as training materials and guidelines are produced. Examples are the Guidelines for Text and Data Mining for Research Purposes in Germany, the Knowledge Base for replicable & reproducible software-based experiments, and a Data Quality Metrics website.

Although many tasks have been addressed by NFDI4Ing during the current term, it is necessary to continue to expand our portfolio, to adapt to requirements, to stabilise, and to harmonise with the efforts of the NFDI as a whole. Growing our user base, disseminating foundational knowledge, and functional improvements are continuing tasks for the second half of the project phase. Reliance on service providers, their strategies, and their infrastructure also remains a major challenge.

In conclusion, utilising a functional structure where ARCHETYPES, BASE SERVICES, and COMMUNITY CLUSTERS are organised within a matrix framework, NFDI4Ing effectively caters to the RDM requirements of the engineering community. Two-way communication with the community is facilitated through multiple channels, helping us to concentrate on pertinent scientific subjects and empowering NFDI4Ing to offer appropriate solutions to its community.



3 Composition of the consortium

Applicant institution

Applicant institution	Location	Duration
RWTH Aachen University (RWTH)	Aachen	10/2020-

Spokesperson

Spokesperson	Institution, location	Duration
Robert Schmitt	RWTH, Aachen	10/2020-

Co-applicant institutions

Co-applicant institutions	Location	Duration
Technische Universität Braunschweig (TUBS)	Braunschweig	10/2020-
Technische Universität Darmstadt (TUDA)	Darmstadt	10/2020-
Technische Universität Dresden (TUD)	Dresden	10/2020-
Leibniz Universität Hannover (LUH)	Hannover	10/2020-
Technische Informationsbibliothek (TIB)	Hannover	10/2020-
Forschungszentrum Jülich (FZJ)	Jülich	10/2020-
Karlsruher Institut für Technologie (KIT)	Karlsruhe	10/2020-
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	Köln	10/2020-
Technische Universität München (TUM)	München	10/2020-
Universität Stuttgart (US)	Stuttgart	10/2020-

Co-spokespersons

(Co-)spokesperson, ORCID	Institution, location	Task area(s)	Duration
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Participants

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Bundesanstalt für Materialforschung und -prüfung (BAM)	Berlin	10/2020-
Technische Universität Berlin (TUB)	Berlin	10/2020-
Verein zur Förderung eines Deutschen Forschungsnetzes e.V. (DFN e.V.)	Berlin	11/2022-
Physikalisch-Technische Bundesanstalt (PTB)	Braunschweig	10/2020-
TUBS Universitätsbibliothek	Braunschweig	07/2023-08/2023
Universität Bremen	Bremen	10/2020-
Technische Universität Clausthal (TUC)	Clausthal-Zellerfeld	10/2020-
Hochschule Darmstadt	Darmstadt	10/2020-
International Data Spaces Association (IDSA)	Dortmund	10/2020-
Technische Universität Dortmund (TUDO)	Dortmund	03/2023-
Hochschule für Technik und Wirtschaft Dresden	Dresden	10/2020-
Sächsische Landesbibliothek – Staats- und Universitätsbibliothek Dresden	Dresden	10/2020-
Universität Duisburg-Essen	Duisburg	10/2020-
Hochschule Fulda	Fulda	10/2020-
Wissenschaftliche Gesellschaft für Produktentwicklung – WiGeP	Garbsen	10/2020-
Leibniz Supercomputing Centre Irz (LRZ)	Garching	10/2020-
Helmholtz-Zentrum hereon GmbH (hereon)	Geesthacht	03/2023-
Justus-Liebig-Universität Gießen (JLU)	Gießen	10/2020-
Gesellschaft für wissenschaftliche Datenverarbeitung mbH	Göttingen	10/2020-
Leibniz-Institut für Plasmaforschung und Technologie e.V. (INP)	Greifswald	03/2023-
DataCite - International Data Citation Initiative e.V.	Hannover	10/2020-
Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI)	Kaiserslautern	10/2020-
Hochschule Karlsruhe – Technik und Wirtschaft	Karlsruhe	10/2020-
Technische Hochschule Köln	Köln	10/2020-
Universität Paderborn	Paderborn	11/2022-
Universität des Saarlandes (UdS)	Saarbrücken	10/2020-
Fraunhofer-Institut Informationszentrum Raum und Bau	Stuttgart	10/2020-
Hochschule für Technik Stuttgart	Stuttgart	10/2020-



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DARL c/o Bauhaus-Universität Weimar Fakultät Architektur und Urbanistik/Dekanat	Weimar	10/2020-
Hochschule RheinMain	Wiesbaden	10/2020-
Vereinigung der Landesdenkmalpfleger c/o Landesamt für Denkmalpflege Hessen	Wiesbaden	10/2020-
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