



Position Paper

Scope

The consortium addresses the research area of innovative materials and their impact on human health and the environment. Innovative materials include nanomaterials as well as other materials that exhibit novel properties independent of a defined size-range. They might possess deviating toxicological profiles compared to those of conventional materials. This requires strategies to assess and predict potential hazard and risk along their life-cycle as only safe materials applications can support sustainable innovations. The topic demands contributions from various disciplines. Correspondingly, the consortium works on an interdisciplinary basis and comprises members from the fields of chemistry, physics, materials science, toxicology, medicine, biology, and information sciences. The research field of materials safety is hallmarked by a vast variety of material types and approaches to characterise their intrinsic and toxicological properties. There is an urgent need to develop appropriate test systems and testing schemes supporting scientific understanding, appropriate materials design as well as regulatory needs. Consolidation of research data and their efficient use/re-use are mandatory for the further advancement of the field. Major challenge in this interdisciplinary and heterogeneous field is the establishment of community-wide accepted standards for acquisition, description, curation, and storage of research data.

Vision

Our vision is to support the design and advanced risk assessment of innovative materials through data-rich concepts like “safe by design”, adverse outcome pathways, computational modelling, and meta-analyses. To this end, we will establish a reliable and sustainable research data infrastructure which interlinks datasets along the data flow in the field of innovative materials safety.

Objectives

- Establishing community-approved metadata standards, vocabularies and ontologies as well as quality criteria for research data in the field of innovative material safety.
- Enabling seamless access to both high quality data and machine-readable operating procedures, furthering data reuse and efficient experimental design.
- Supporting the digital transformation of all processes in the research workflow from material design up to toxicological assessment.
- Promoting RDM and FAIR data as relevant competencies within the community and as an integral part of professional curricula.

- Creating an ethical and legal framework with a focus on community-specific aspects of intellectual property rights, animal studies, and genetic engineering.

We strive to provide reliable data for evaluation, decision-making and regulation throughout the data lifecycle according to the FAIR principles. This will allow users across disciplines to access, store and reuse quality-assured data and information anytime and anywhere.

The consortium brings together experts in the field of innovative materials safety, working at the different phases from materials research to regulatory aspects. InnoMatSafety covers toxicological and regulatory issues which are not addressed in any other consortium so far. Researchers participating in the InnoMatSafety consortium are involved in risk assessment and are appointed members of the MAK as well as the SKLM Commission ensuring close cooperation with these bodies. The consortium has close links to the Leibniz Research Alliances NanoSafety, currently reorganising itself as Leibniz-Research Alliance Advanced Materials Safety, and Health Technologies. Expertise in research data management is provided by FIZ Karlsruhe, Goethe University Frankfurt and fdm.nrw. Several members cooperate in the BMBF-funded project NanoS-QM. Learned societies and professional organisations such as DECHEMA and the German Society of Toxicology provide links to the various scientific communities represented in the consortium. BfR and BAM will ensure the link to regulation and availability of materials. Some InnoMatSafety partners are co-applicants in other related NFDI consortia (4Chem, 4MatWerk and 4Ing).

The consortium aligns to and complements other NFDI consortia (4Chem, 4Health, 4MatWerk, 4Cat, 4Immuno, Neuroscience, 4BIOIMAGE and DeBioData) with which a close exchange is planned with regard to data formats, metadata standards, data structures, programming interfaces and tooling/services (e.g. ELNs, interfacing with laboratory equipment). InnoMatSafety will harmonise interfaces and description standards with the providers of eNanoMapper, ToxCast, Open TG-GATEs, OpenRiskNet and NanoObservatory and link these databases both into the envisioned data federation and EOSC. Nationally and internationally, InnoMatSafety will cooperate with the Organization for Economic Co-operation and Development (OECD), the European Chemical Agency (ECHA) and the European Food Safety Authority (EFSA), the EU NanoSafety Cluster and the DaNa project.

Task Areas

TA #	TA Name	TA core responsibility
1	Governance/Management	Providing guidance to the consortium and supporting the task area leaders in fulfilling their objectives; promoting cross-cutting development and providing legal support within the consortium
2	Description standards and quality criteria	Providing modular-based and interoperable description standards and a comprehensive concept

		for research data quality assurance and guidance on minimal data requirements and completeness
3	Digitized (meta-)data acquisition and documentation/transfer ("smart lab"), including (Standard) operating procedures	Providing machine-readable (S)OPs, APIs for seamless lab-device to ELN data transfer and machine-readable (S)OP and lab-devices integration
4	Networked repositories and databases	Developing a federated network of repositories/databases within the framework of the NFDI
5	Training and Dissemination, Community involvement	Enabling the cultural change in collecting and re-using data by communicating the goals, services, and results of the initiative, by adapting to the community needs, educating next and current generation researchers, and facilitating cross-disciplinary networking across the community