
In-situ Materials Mechanics Infrastructure

A Data Management Plan created using DMPTuuli

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Funder: Academy of Finland

Template: Academy of Finland data management plan guidelines

Project abstract:

The In-situ Materials Mechanics Infrastructure (IMMI) aims to combine the existing research infrastructures on in-situ mechanical testing at Tampere University (TaU), Aalto University (Aalto), University of Oulu (UOulu) and Tampere University of Applied Sciences (TAMK) under a single umbrella. In addition to this consolidation, the proposed research infrastructure will establish the next generation of materials mechanical testing infrastructure in Finland focused on multi-scale, in-situ mechanical testing covering all materials systems and deformation conditions. The IMMI will provide world-class materials mechanical testing environment to researchers and technology developers in both academia and industry. For the first time, it will provide easy access to all the relevant players and partners in the country. The infrastructure is relevant to all research groups and companies that work on materials design problems and will help accelerate materials development cycle. It actively supports the previous infrastructure initiatives by Academy of Finland.

ID: 11340

Last modified: 28-04-2021

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1. General description of data

1.1 What kinds of data is your research based on? What data will be collected, produced or reused? What file formats will the data be in? Also give a rough estimate of the size of the data produced or collected?

The research data comprises of experimental results from involving mechanical testing of materials from a central user facility. The experimental data will be mostly on mechanical deformation behavior, optical and electron microscopy data and multi-physics experimental results (current, magnetic fields, etc.). The data is collected by the computers controlling the respective instruments/equipments. It is accessible over secured network connections within the university. The mechanical deformation behavior data will be in an open format that increases its circulation and ease of data use between collaborators. File format of the research data will be selected in such a way that the data is easily accessible in future. We plan to avoid using closed softwares that are license dependent to run them.

Our research does not use any data collected from persons nor does it involve handling biology related data.

1.2 How will the consistency and quality of data be controlled?

The data will be documented into electrical form to promote its future accessibility. In documentation, it is crucial to use appropriate metadata style. Data will be systematically named (e.g. date_issue_id), listed and stored. According to metadata policies, descriptions of measured quantities, variables, factors, units of data will be attached to documentation, so that each research data folder will include specific descriptions for its data.

2. Ethical and legal compliance

2.1 What ethical issues are related to your data management, for example, in handling sensitive data, protecting the identity of participants, or gaining consent for data sharing?

The execution of the proposed research project does not include any threat to animals, involvement of developing countries or handling of personal information, therefore no special ethical issues will be raised. The data generated from the research infrastructure belongs to the user of the instrument.

Tampere University's (and broadly the three other participating universities') data management plan states that the primary research material/data will be acquired by the research group to serve as background information. Open research does not basically require having a commercial license to third party material, and there is no restriction on using such material. The research group shall not use any proprietary background information, which might restrict the publication of the research. All materials will be used in accordance with ethical academic practices to implement the objectives. In the use of the proposed research infrastructure, no ethical issues are expected. The project does not gather any sensitive personal data.

2.2 How will data ownership, copyright and IPR issues be managed? Are there any copyrights, licences or other restrictions that prevent you from using or sharing the data?

The data belongs to the user of the research facility. We do not anticipate any IPR issues among the collaborators since these are open research instruments used by multiple users on a daily basis. Typically, IPR generated during the project is owned by the university, but commercial exploitation by the university is not intended and the rights are returned to the researchers. The university also reserves a non-exclusive license to use the results in academic research and education. The research materials are stored for 15 years. In case of multi-university collaboration, these aspects will be discussed in advance with the users of the research facility.

All users will be encouraged to publish their research results using open access scientific publishing. When allowed by the original publisher of the research articles, TUTCRIS, the institutional repository of Tampere University, will be used to offer free online access to the publications in order to increase the visibility of the work, promote open access to scientific publication and preserve digital material. Similar mechanisms are in place in the other three participating universities. Users will be made aware that experimental datasets, used in publication, can be uploaded to Zenodo data

repository from CERN.

3. Documentation and metadata

3.1 How will you document your data to make them findable, accessible, interoperable and reusable for you and others? What kinds of metadata standards, README files or other documentation will you use to help others understand and use your data?

Users of the research infrastructure will be encouraged to systematically name their datasets (e.g. date_issue_id) which can be further listed, stored, searched and retrieved. According to metadata policies, descriptions of measured quantities, variables, factors, units of data will be attached to documentation, so that each research data folder will include specific descriptions for its data. Digital data will mostly be created in form of digital pictures and raw file formats (jpg, tiff, etc) and experimental data will be created in raw file formats (ASCII, XML, etc.).

4. Storage and backup during the research project

4.1 Where will your data be stored, and how will they be backed up?

Data will be stored on secure network drives. The users within the university will get the access to the folders. In case of outside university users, remote access to "safe drives for sharing" will be provided. The respective co-PIs are responsible for backup and recovery. Data will be backed up every 2 weeks.

4.2 Who will be responsible for controlling access to your data, and how will secured access be controlled?

The PI, co-PIs and the respective staff scientists will give access to the collected experimental data. IT support from respective universities will assist for securing the data and its storage management. The staff scientists responsible for the respective instruments will be responsible for controlling access to data.

5. Opening, publishing and archiving the data after the research project

5.1 What part of the data can be made openly available or published? Where and when will the data, or their metadata, be made available?

The users of the research facility will be encouraged to publish their experimental data in international scientific journals. The choice of opening the data for sharing and its reuse rests with the user of the research facility who collected the experimental data. The users will be encouraged to open up their data only after publications. Experimental data can be uploaded to Zenodo to enable its widespread use.

5.2 Where will data with long-term value be archived, and for how long?

Generally, research materials are stored for 15 years by Tampere University (and other universities) while final reports are preserved permanently. Tampere University researchers have a possibility to use IDA research data storage services offered by the Ministry of Education and Culture to higher education institutions for data preservations and management. Data will be available and cited in publication. Researchers will be able to contact the PI for access to data. Data will be maintained in an open XML format to enable open re-use of the data.

6. Data management responsibilities and resources

6.1. Who will be responsible for specific tasks of data management during the research project life cycle? Estimate also the resources (e.g. financial, time and effort) required for data management.

The users of this research facility will be encouraged to use free of charge research data storage services, e.g. IDA offered by the Ministry of Education and Culture to higher education institutions and EUDAT, for data and metadata preservation, management and subsequent use.