“Combined Structural Health Monitoring and an Information Modelling Framework for Complex Structures

A Data Management Plan created using DMPonline.be

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Project abstract:

This research aims to develop an integrated building information model (BIM) assisted by autonomous structural health monitoring system (SHM), for operational management and dynamic data access of damage prone structures. Unmanned aeriel vehicle (UAV) equipped with vision camera and ultrasonic sensor and using convolutional neural network (CNN) algorithm would be implemented for automatic damgage detection detection. The SHM framework will also be assisted with additional sensors for other parameters such as stains, displacements and accelerations in the structure. The sensors data would be integrated with BIM, which would allow for a user-friendly interface to communicate with the planners and stakeholders about the operational conditions and maintenance requirement of existing structures.

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Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

Data Type	New or reuse	Digital or Physical data	File format	Data volume	Physical volume
Material properties and geometric dimensions of RC beams	New	Digital	Spreadsheets (.csv), images (.png)	<1 GB	NA
Raw and processed ultrasonic data (experimental)	New	Digital	Databases (.lms, .mat), images (.png), graphs (.fig)	<1 GB	NA
Dataset describing the size and boundary conditions of test bridge	New	Digital	Spreadsheets (.csv), images (.png)	<1 GB	
Vibration and acoustic measurement data (experimental)	New	Digital	Databases (.lms, .mat), images (.png), graphs (.fig)	<10 GB	NA

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

NA

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- No

Will you process personal data? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).

- No

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or Data transfer agreements, Research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keepdata understandable and usable, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, codebook.tsv etc. where this information is recorded).

In order to make sure the collection and storage of the data will be reliable, a text document describing the sizes of specimens, mix design of concrete, date and time of measurement, instruments used and test location will be written. This text file will be kept in the same folder as data. Description of materials used for preparation of test specimens will be added to allow reuse of data used.

Will a metadata standard be used to make it easier tofind and reuse the data?
If so, please specify which metadata standard will be used.

If not, please specify which metadata will be created to make the data easier to find and reuse.

- Yes

The choice of metadata standard is not decided at this stage of research. We will consider several schemes and update our DMP accordingly.

Data Storage & Back-up during the Research Project

Where will the data be stored?

- ManGO
- OneDrive (KU Leuven)
- Sharepoint online

How will the data be backed up?

- Personal back-ups I make (specify below)
- Standard back-up provided by KU Leuven ICTS for my storage solution

Additionally, regular personal backup will be carried out on physical hard drives to avoid data loss.

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

As such no sensitive data are envisioned to be used in this research. The cloud and ICTS based storage are only accessible to authorized personal, which is centrally managed. The physical hard drives would be password protected to avoid unwanted access.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

University's central network freely provides up to 2 TB capacity on OneDrive. The envisioned data is expected to be in the limit at this stage.

Data Preservation after the end of the Research Project

Which data will be retained for 10 years (or longer, in agreement with other retention policies that are applicable) after the end of the project?

In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

- All data will be preserved for 10 years according to KU Leuven RDM policy

Where will these data be archived (stored and curated for the long-term)?

- KU Leuven RDR
- Large Volume Storage (longterm for large volumes)

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

The cost for preserving data are quite moderate and will be covered by research group.

Data Sharing and Reuse

Will the data (or part of the data) be made available for reuse after/during the project?
Please explain per dataset or data type which data will be made available.

- Yes, as open data
- Yes, as restricted data (upon approval, or institutional access only)

If access is restricted, please specify who will be able to access the data and under what conditions.

Commercial partners will be granted access to data upon drawing up a data transfer agreement.

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

Please explain per dataset or data type where appropriate.

- No

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)

When will the data be made available?

- Upon publication of research results

Which data usage licenses are you going to provide?

If none, please explain why.

- CC-BY 4.0 (data)

- Data Transfer Agreement (restricted data)

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please provide it here.

- Yes, a PID will be added upon deposit in a data repository

What are the expected costs for data sharing? How will these costs be covered?

Costs will be covered from research budget.

Responsibilities

Who will manage data documentation and metadata during the research project?

The applicant will be responsible for data documentation and metadata.

Who will manage data storage and backup during the research project?

Researcher will be responsible for data storage and backup, with the support of KU Leuven central and local IT.

Who will manage data preservation and sharing?

The applicant will manage the preservation and sharing aspect of the data during project. At the project end, another personal will be assigned with consultation of promoter.

Who will update and implement this DMP?

The researcher holds the responsibility for updating and implementing this DMP.