Design-based research of integrated automated mobility services

A Data Management Plan created using DMPonline.be

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Project abstract:

With the emergence of automated driving technology, the transport and mobility sector faces a period of significant transformation with automated mobility services (AMS) entering our multimodal systems. While many existing studies have explored conceptually simple AMS scenarios benchmarking the impact of a single one-fits-all AMS (like shared taxis), this project aims for a fundamentally ‘deeper’ type of exploration: one that considers which AMS and traditional mobility services may co-exist, tailored the diverse mixture of spatio-temporal markets and population segments and the unique local context of spatial planning, demographic, political, economic, and cultural boundary conditions. We use the innovative design-based research method supported by multimodal transport modelling to co-create such refined AMS scenarios together with local mobility stakeholders while providing them feedback through KPI dashboards. We drive the development of the approach by piloting it on some typical Flemish case studies that, at the same time, will deliver thought-provoking future scenarios that call for constructive debate and further valorization of our design method.

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Design-based research of integrated automated mobility services FWO DMP (Flemish Standard DMP)

1. 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.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
		Please choose from the following options: • Generate new data • Reuse existing data	*Please choose from the following options:* • Digital • Physical	*Please choose from the following options:* • Observational • Experimental • Compiled/aggregated data • Simulation data • Software • Other • NA	*Please choose from the following options:* • .por, .xml, .tab, .cvs,.pdf, .txt, .rtf, .dwg, .gml, … • NA	*Please choose from the following options:* • <100MB • <1GB • <100GB • <1TB • <5TB • <10TB • <50TB • >50TB • NA	
OD matrices	The Origin Destination matrices generated by the Flemish Traffic Model including an estimate of the number of trips between each origin-destination pair. This data is provided by the department of "Mobiliteit en Openbare Werken" (MOW).	Reuse existing data	Digital	Simulation data	tabular data in .csv, metadata in .txt, license in .pdf	<1GB	
Zonering	The zoning used in the Flemish Traffic Model.	Reuse existing data	Digital	Simulation data	geospatial data in .shp, license in .pdf	<1GB	
LOS skims	The Level Of Service skims coming from the Flemish traffic model.	Reuse existing data	Digital	Simulation data	tabular data in .csv, metadata in .txt, license in .pdf	<10GB	

PTV Visum	Traffic simulation software	Generate new data + reuse existing data	Digital	Software	models (version files) of different settings and cities in .ver. Results of these model simulations will be stored in tabular format in .csv, .xslx and further analysed and processed via code in .py	<1GB	
Research codes	Research codes developed within the research unit (stored in ITScrealab on Gitlab) or found online as open-source code	Generate new data + reuse existing data	Digital	Software	code in .py	<1GB	
OSM	OpenStreetMap data	reuse existing data	Digital	Compiled/aggregated data	online database in .osm, can be extracted and stored in tabular format in .csv	<10 GB	

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:

- All data from the Flemish Traffic Model are stored on a server hosted by MOW which I can access via remote access through my personal account
- Multimodale verkeersplanning & macroscopische verkeerssimulaties | PTV Visum (ptvgroup.com)
- ITSCreaLab · GitLab (kuleuven.be)
- Export | OpenStreetMap

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

- No

Will you process personal data? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

- 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.

- Yes

The research codes and the model setups (for the simulation of developed scenarios) might have the potential for commercial valorization. We work with open source licenses with the restriction that everyone who uses our data or tools/code must also make their tools/code or data available open source as well. For commercial use or other use types that are excluded from the open-source license, the license needs to be negotiated with KUL/LRD.

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/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.

- Yes

Data of the Flemish Traffic Model made available by the department of "Mobiliteit en Openbare Werken" is used under license restricting the use only within the research group for research or student projects.

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

Data of the Flemish Traffic Model made available by the department of "Mobiliteit en Openbare Werken" is used under license restricting the use only within the research group for research or student projects. No IP.

2. Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data 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).

- All data extracted from the Flemish Traffic model will be stored together with the documentation provided by MOW in .txt files.
- Research codes will be accompanied by a readme file (.md). Codes will be annotated with documentation/explanatory comments. This will include a description of what the code does, required inputs, generated outputs, and unit of measurement used, ...
- The used OSM data will be stored together with a text file specifying the query used to download the data.
- Datasets will be accompanied by references to the related publications.

Will a metadata standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

- No
- Research codes and model setups will be accompanied by a readme file (.md). Codes will be annotated with documentation/explanatory comments. This will include a description of what the code does, required inputs, generated outputs, and unit of measurement used, ...
- These will be made available on the Gitlab in the ITScrealab.

3. Data storage & back-up during the research project

Where will the data be stored?

- Local storage on managed PC/laptop (with automatic backup on OneDrive)
- OneDrive for Business cloud storage provided via KU Leuven
- Shared network drive hosted by KU Leuven
- ITScrealab on Gitlab managed via KU Leuven
- The data of the Flemish Traffic Model is stored on an external server hosted by MOW.

How will the data be backed up?

All data stored locally on by KU Leuven-managed laptop will be automatically backed up on OneDrive. Develop codes will be backed up in the ITScrealab on Gitlab (includes versioning). The KU Leuven provided Gitlab and OneDrive have adequate backup strategies in place. In case of data loss or damage, we can easily revert to (older versions) of our software or data.

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely.
If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

- Yes

KUL OneDrive and Gitlab quota are sufficient for the entirety of the project.

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

- On Gitlab an access management system is in place which is restrictive. Different access rights/permission levels need to be given explicitly to individuals. For non-public repositories people from outside KU Leuven can only access by requesting a visitor account. This account can give different permission levels for a specified period of time.
- OneDrive can only be accessed via my personal account. Files can be shared publicly or with specific people (via url, email) with different permission levels. Access can always be revoked.
- Both the Gitlab and OneDrive are offered via KUL. KUL works with multi-factor authentication and KUL is permanently monitoring and updating its web security performance and policy. (see Identity en Access Management - ICTS (kuleuven.be))
- The data provided by MOW of the Flemish Traffic Model is stored on a server hosted by MOW which can only be accessed remotely via my personal account which requires my password and has an extra layer of security with two-factor authentication.

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

Existing quota are sufficient. No extra costs are expected.

4. Data preservation after the end of the research project

Which data will be retained for at least five 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...).

KU Leuven research data management policy stipulates that all relevant data generated are retained for a period of minimally 10 years after the end of the project. This will be followed.
The GitLab repository of the group including all the developed codes stays in tact irrespective of people finishing their research and moving on to other projects. All data related to publications will necessarily be retained along with other important unpublished data.
The possibility of publication of open-source tools as formal publications with permanent public
identifier is currently being examined for other packages in the group and will become our standard for open-science publishing.

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

On the GitLab repository, KU Leuven shared drive and as a backup, the work computer/hard drive of the researcher will be submitted.

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

Negligible costs covered by resources of the research group.

5. Data sharing and reuse

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

- Yes, in a restricted access repository (after approval, institutional access only, …)

The developed codes can be shared with restricted access on request via Gitlab.
The OSM data is openly available for everyone to use.
Depending on journal expectations all data related to publications (e.g. Visum model setups as well as their results (csv, xls)) can be made publicly available.
The data of the Flemish Traffic Model can not be shared under the current license.

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

Upon request (restricted) access can be given to the Gitlab.
The data of the Flemish Traffic Model can only be accessed by Lotte Notelaers via her personal account including two-factor authentication. If this data should be made publicly available for publication purposes, this should be discussed with MOW.

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 in the comment section per dataset or data type where appropriate.

- Yes, Other

Data of the Flemish Traffic Model made available by the department of "Mobiliteit en Openbare Werken" is used under license restricting the use only within the research group for research or student projects.

Where will the data be made available? If already known, please provide a repository per dataset or data type.

OSM data is openly available via Export | OpenStreetMap
The Visum model setups and results and, the research codes will be made available on ITSCreaLab · GitLab (kuleuven.be).

When will the data be made available?

- Immediately after the end of the project
- Upon publication of the research results
- Upon request

Which data usage licenses are you going to provide? If none, please explain why.

Datasets will be published under GNU General Public License version 3 (https://www.gnu.org/licenses/gpl-3.0.en.html) which is an open source software license. It has the restriction that everyone who uses our data or tools must also make their tools or data available open source as well. For commercial use or other use types that are excluded from the open-source license, license needs to be negotiated with KUL/LRD.

Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, you have the option to provide it in the comment section.

- No

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

None costs expected.

6. Responsibilities

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

Lotte Notelaers

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

Lotte Notelaers

Who will manage data preservation and sharing?

Chris Tampère (supervisor)

Who will update and implement this DMP?

Lotte Notelaers and Chris Tampère