Plan Overview

A Data Management Plan created using DMPTool

Title: Expand Work Zone Data Exchange to Local Roads in Wisconsin Using Smart Work Zone ITS

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Template: SMART Grants Stage 1 Data Management Plan (DMP)

Project abstract:

The project will expand the existing Wisconsin WZDx data model to incorporate local road work zone characteristics and prototype the capability on a select set of rural and urban projects in Wisconsin using smart work zone devices purchased through the project. The project will also evaluate the ability to scale the proposed solution to all WisDOT improvement projects statewide with local road work zone components. Lastly, this project will provide a model to incorporate other work zones along the local road network into the Wisconsin WZDx using smart work zone technology.

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Expand Work Zone Data Exchange to Local Roads in Wisconsin Using Smart Work Zone ITS

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1. Work zone event data for each pilot work zone deployment will be collected by the WisDOT Smart Grant project team from five sources:

- Planned lane closure event history from the Wisconsin Lane Closure System (WisLCS).
- Reported lane closure event data from the Wisconsin Work Zone Data Exchange (WZDx).
- Connected work zone device integration logs from the Advanced Traffic Management System (ATMS).
- Ground truth data collected through pilot work zone site visits by the WisDOT Smart Grant project team.
- Clarifying information from interviews with project stakeholders including work zone field staff, TMC staff, and project engineers.

This data will be analyzed by the WisDOT Smart Grant project team to evaluate the performance of the WZDx and ATMS connected device integration for each pilot deployment with respect to the technical performance measures described in the Evaluation Plan.

2. The expected nature, scope, and scale of data for each dataset is described below:

- The WisLCS provides a comprehensive description of planned lane closures in Wisconsin including type of work, roadway and lane level impacts, schedule, location, geometry, restrictions, and detours. It currently serves as the primary source for all highway lane closures statewide in the Wisconsin 511 traveler information system and the Wisconsin WZDX. The WisLCS will be enhanced at the start of the project to include additional attributes for local road lane closures. Closure history is available for download through WisLCS user interfaces. The Wisconsin Traffic Operations and Safety (TOPS) Laboratory at the University of Wisconsin-Madison maintains the WisLCS on behalf of WisDOT.
- The Wisconsin WZDx provides a standardized GeoJSON data feed containing up-date-information about active work zone events. The WZDx will be enhanced at the start of the project to incorporate field verified work zone status attributes through connected work zone device integration in the ATMS. It will also be enhanced to include additional attributes for local road lane closures. The UW TOPS Lab has an existing process that archives the WZDx GeoJSON data feed from the ATMS at 1-minute intervals. This archive is managed in a large scale PostgreSQL database.
- The ATMS vendor (Arcadis) will provide access to the connected device integration logs for purposes of this project.
- The WisDOT Smart Grant project team will conduct site visits to the pilot work zone locations to collect ground truth sample observations including: GPS measurements, logged observations, and recorded video.
- Clarifying information from pilot project staff and stakeholders will be in the form of written documents.

3.Data collected for this study will consist primarily of publicly available work zone event data. Additional data from device integration logs, work zone site visits, and stakeholder interviews will provide clarifying information

and/or additional technical details related to the work zone events. Data collected for this study is not expected to include personal identifying information (PII). For collaboration purposes, project results and data will be shared between the project team via a secure UW Box account.

4. Work zone event history from the WisLCS and WZDx is already archived at the TOPS Lab in collaboration with WisDOT due to its value for work zone related research, analysis, and performance management. Understanding the accuracy of these datasets is therefore a critical need. The additional project datasets generated by this project (ATMS logs, ground truth observations, and clarify interviews) will potentially serve as a future reference and template for evaluating Wisconsin work zone event data quality.

1. Anticipated file formats:

- WisLCS closure records are managed in an Oracle 19c relational database. Records are also available for download through the WisLCS in comma separated value (CSV) format. All data elements in the WisLCS are based on non-proprietary and/or open standards. Lane closure geometry is stored in GeoJSON format.
- Wisconsin WZDx data is based on the WZDx 4.2 specification. Data is collected at 1-minute intervals and archived in a PostgreSQL relational database in GeoJSON format.
- ATMS connected work zone device integration service logs are semi-structured timestamped plain text files.
- Ground truth data collected through pilot work zone site visits will include GPS measurements, logged observations, and recorded video.
- Clarifying information from pilot project staff and stakeholders will be in the form of written documents.
- Project results will be in the format of written documents and derived datasets.

2. How will the project use platform-independent and non-proprietary formats to ensure maximum utility of the data in the the future?

- All relational datasets are readily available in CSV or GeoJSON format. The technical analysis for this project will conducted primarily within PostgreSQL, a prevailing open source relational database system using standard SQL.
- Site visit field observations will be recorded in written documents or Excel files. Video recordings will be taken using GoPro devices and stored in MP4, a prevailing, non-proprietary format.

3. This project will use the Project Open Data Metadata Schema v1.1 (DCAT-US v1.1) to describe the datasets.

1. This project will not collect personal identifying information (PII), with the possible exception of the following:
    1. Video recordings from work zone pilot site visits may capture images of the research team members. Those images will either be removed before sharing or the research team members will sign a waiver of their release.
    2. After-action stakeholder interviews may capture the names of work zone field staff and/or TMC control room staff. References to individuals will be removed before sharing.
    3. Internal configuration details in the ATMS device logs that may lead to a security concern will be removed before sharing.
2. All PII will be removed or formally waived before releasing project data for public access.
3. There are no access restrictions to the data.
4. The TOPS Lab will retain an archive of the Smart Grant project datasets for three years from the date of final payment. Retention and access to project records will be in accordance with requirements established under 49 Code of Federal Regulations 18.42.

1. Intellectual property rights for data created or used:
    1. The Wisconsin WZDx data feed is owned by the Wisconsin Department of Transportation.
    2. The Wisconsin Lane Closure System database is owned by the University of Wisconsin-Madison.
    3. The Advanced Traffic Management System database is owned by Arcadis.
    4. All other data collected for this project will be owned by the respective research team members that performed the data collection.
2. All data created and used for this project will be transferred into a separate archive repository maintained by the TOPS Lab on behalf of the project. The Wisconsin Department of Transportation and the U.S. Department of Transportation (USDOT) shall have a non-exclusive, perpetual right to unlimited use of any and all datasets in the repository.
3. There are no licenses that apply to the datasets.

1. Project data will be archived by the TOPS Lab at the University of Wisconsin-Madison. This option has been chosen since the TOPS Lab maintains a mature data management platform (see bullet 4 below) that serves as the system of records for several large scale Wisconsin Department of Transportation datasets. The TOPS Lab will also conduct the data collection and analysis tasks for this project.
2. The project archive repository will be available from the following link: https://topslab.wisc.edu/research/.
3. Persistent identifiers are already incorporated in the WisLCS, WZDx, and ATMS for work zone events and connected devices. This concept will be extended to include all records in the project archive repository. The archive will also provide metadata per the DCAT-US v1.1 schema standard.
4. The TOPS Lab has a large-scale data management platform (WisTransPortal) that has been developed over the past 20 years through sponsorship of the Wisconsin Department of Transportation. The WisTransPortal infrastructure consists of a combination of virtual and on-premises servers and storage arrays managed by full-time TOPS Lab IT professional staff through the UW-Madison Division of Information Technology (DoIT) Campus Data Center. Technical data for this project will be managed in the TOPS Lab relational database cluster (Oracle and PostgreSQL) for retention, retrieval, analysis, and backups. All databases and servers are managed to meet or exceed campus network and data security requirements.
