

Plan Overview

A Data Management Plan created using DMP Tool

Title: Enabling Trust and Deployment Through Verified Connected Intersections

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Grant: 69A3552341007-SMARTFY22N1P1G53

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

Project abstract:

This project will create a mechanism for OEMs to trust that CIs deployed by infrastructure owner operators (IOOs) are broadcasting accurate, consistent, reliable, and secured messages that can support in-vehicle RLVW and other safety applications. Without a reproducible process to verify CIs, a coupling of this verification process to the issuance of security credentials, a process for detecting misbehavior and re-testing intersections, and a field deployment demonstrating verified broadcasts, production vehicles with these life-saving applications will be unable to operate. The five project goals for this effort are:

1. Complete a successful reference implementation corridor.

2. Develop a process for OEMs to trust CIs to have accurate, consistent, reliable, secure messages.
3. Establish ongoing collaboration between IOOs, OEMs, and Security Credential Management System (SCMS).
4. Conduct outreach and work with other deploying IOOs.
5. Make test tools, procedures, and verification processes publicly available.

Start date: 07-15-2023

End date: 01-15-2025

Last modified: 07-08-2024

Copyright information:

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Enabling Trust and Deployment Through Verified Connected Intersections

Dataset and Contact Information

Please provide as much of the the following information as possible:

1. Name of the project;
2. Grant number;
3. Name of the person submitting this DMP;
4. ORCID of the person submitting this DMP (need an ORCID? Register here: <https://orcid.org/>);
5. Email and phone number of the person submitting this DMP;
6. Name of the organization for which the person submitting this DMP is working;
7. Email and phone number for the organization;
8. Link to organization or project website, if applicable; and,
9. Date the DMP was written.

1. Project Name: "Enabling Trust and Deployment Through Verified Connected Intersections"
2. Grant number: 69A3552341007-SMARTFY22N1P1G53
3. Name of person submitting this DMP: Jeremy Schroeder
4. ORCID of person submitting this DMP: 0000-0002-5751-9861
5. Email and phone of person submitting DMP: schroeder@acconsultants.org, 2028091900
6. Name of organization for which the person submitting this DMP is working: Utah Department of Transportation
7. Email and phone number for the organization: bleonard@utah.gov, 8018873723
8. Link to the organization or project website, if applicable: <https://transportationtechnology.utah.gov/>
9. Date the DMP was written: 12/15/2023

Data Description

Please provide as much information as possible:

1. Provide a description of the data that you will be gathering in the course of your project or data from a third party that you will re-use, if any;
 1. If there will be no data collected or re-used from another source, state that this is case;
2. Address the expected nature, scope, and scale of the data that will be collected, as best as you can at this stage;
3. As best as you can, describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply;
 1. If data might be sensitive, please describe how you will protect privacy and security, if you know that now;
 2. You may need to update your DMP later to add more detail;
4. Discuss the expected value of the data over the long-term.

1. Data for this evaluation will include data outputs from signal controllers at connected intersections (CIs) and data broadcast by the CIs, as well as the data reported by testing tools developed by a combination of this project and the SAE Connected Transportation Interoperability Committee (CTIC) Phase 2 project efforts. The data gathered and retained in this project will be the final datasets collected during the Field Validation “runs” that are conducted to assess the CI compliance with requirements that project partners agree are acceptable for nationwide CI deployment and V2X communications (note that any data used or collected during tool development will not be retained or archived). Data that will be collected on CI corridors for testing and verification include:
 - Field Validation of SPaT will consist of:
 - Signal Controller Output (approximately 21 data elements output from the signal controller, Metadata format: as defined in the National Transportation Communications for Intelligent Transportation Systems Protocol (NTCIP) 1202 Standard, Data format: JSON files or .csv files)
 - RSU SPaT Output (approximately 12 data elements describing the broadcast by the RSU), Metadata format: as defined in the SAE V2X Communications Message Set Dictionary J2735_2023 Standard, Data format: JSON files and/or .csv files)
 - Output of SPaT Test Tool (Still in development. Data to be defined as tool is developed)
 - Field Validation of the MAP Message will consist of:
 - MAP message data (approximately 23 data elements. Encoded in ASN.1; output in .csv for comparison, Metadata format: as defined in the SAE V2X Communications Message Set Dictionary J2735 MAP message standard)
 - Field collected lane data (approximately 6 data elements. Meta data as defined in the SAE V2X Communications Message Set Dictionary J2735 MAP message standard)
 - Output of MAP Test Tool (Still in development. Data to be defined as tool is developed).
 - No additional data from other sources beyond this project are anticipated at this time.
2. The data to be collected and retained in this effort will be collected only for the short periods of time when testing tools are active and the project team is conducting test “runs” to compare data broadcasts by the CIs as compared to the actual data (i.e., signal controller data and infrastructure position data). The number of “runs” collected and retained will depend on the number of attempts to fully validate the intersection(s) and understand the readiness of test tools and processes. Only data used by the final test tools will be retained; any data collected or used during test development will not be retained.
3. A significant amount of data from this effort is generated by public infrastructure operated by Utah DOT. The only remaining data will be from testing tools that are either developed within this project or developed by the USDOT funded SAE CTIC. There are no expectations that the outputs of these tools will represent sensitive data.
4. Test results will be used to assess both test tools and CI performance. Reports will describe the test results. There is no significant long-term value anticipated from the data itself. The value will be in the availability of the test tools for other agencies to use in validating CIs.

Data Format and Metadata Standards Employed

Please provide as much information as you can:

1. Describe the anticipated file formats of your data and related files;
 2. To the maximum extent practicable, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future;
 1. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.
 3. Identify the metadata standards you will use to describe the data.
 1. At least one metadata file should be a DCAT-US v1.1 (<https://resources.data.gov/resources/dcat-us/>) .JSON file, the federal standard for data search and discovery.
1. Data file formats that are used and retained for this effort are expected to be as follows:
 - Signal Controller Output, Data format: JSON or .csv files;
 - RSU SPaT Output, Data format: JSON or .csv files;
 - Output of SPaT Test Tool: anticipated to be .csv files (Still in development. Data to be defined as tool is developed);
 - MAP message data: Encoded in ASN.1; output in .csv for comparison;
 - Field collected lane data: not known at this time; and
 - Output of MAP Test Tool: anticipated to be JSON or .csv files (Still in development. Data to be defined as tool is developed).
 2. The project team anticipates using existing and widely accepted standards as the basis for the metadata, including those developed by SAE, NEMA, AASHTO, and ITE to ensure maximum data utility and expanded use by others.
 3. Metadata standards to describe the data are expected to be as follows:
 - Signal Controller Output, Metadata format: as defined in the National Transportation Communications for Intelligent Transportation Systems Protocol (NTCIP) 1202 Standard
 - RSU SPaT Output, Metadata format: as defined in the SAE V2X Communications Message Set Dictionary J2735_2023 Standard)
 - Output of SPaT Test Tool (Still in development. Data to be defined as tool is developed)
 - MAP message data, Metadata format: as defined in the SAE V2X Communications Message Set Dictionary J2735 MAP message standard
 - Field collected lane data, Meta data as defined in the SAE V2X Communications Message Set Dictionary J2735 MAP message standard
 - Output of MAP Test Tool (Still in development. Data to be defined as tool is developed).
 - One metadata file will be a DCAT-US v1.1 (<https://resources.data.gov/resources/dcat-us/>) .JSON file, the Federal standard for data search and discovery.

Access Policies

In general, data from DOT-funded projects must be made publicly accessible. Exceptions to this policy are: data that contain personally identifiable information (PII) that cannot be anonymized; confidential business information; or classified information. Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take to protect privacy and confidentiality prior to archiving your data, and any additional concerns. In general, in matters of human subject research, your DMP should describe how your informed

consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality. Additionally, when working with, or conducting research that includes Indigenous populations or Tribal communities, researcher will adhere to the CARE Principles for Indigenous Data Governance <https://www.gida-global.org/care> and make an explicit statement to that effect in this portion of the DMP.

Please provide as much information as possible:

1. Describe any sensitive data that may be collected or used;
2. Describe how you will protect PII or other sensitive data, including IRB review, application of CARE Principles guidelines, or other ethical norms and practices;
 1. If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use;
3. Describe any access restrictions that may apply to your data;
4. If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators or other project staff.

No sensitive data will be collected or used for this effort. The project team is discussing the inclusion of data from the Connected Vehicle Pooled Fund Study (CV PFS) Connected Intersection Message Monitoring System (CIMMS); if this is used, the proper handling, use, and processing of any sensitive data will be addressed at the time. No access restrictions identified at this time.

Re-use, Redistribution, and Derivatives Products Policies

Recipients are reminded:

1. Data, as a collection of facts, cannot be copyrighted under US copyright law;
2. Projects carried out under a US DOT SMART Grants is federally funded; therefore, as stated in grant language:
 1. Recipients must comply with the US DOT Public Access Plan, meaning, among other requirements, project data must be shared with the public, either by the researchers or by US DOT;
 2. That by accepting US DOT funding through this grant, recipients have granted to US DOT a comprehensive non-exclusive, paid-up, royalty-free copyright license for all project outputs (publications, datasets, software, code, etc.). This includes all rights under copyright, including, but not limited to the rights to copy, distribute, prepare derivative works, and the right to display and/or perform a work in public; and,
 3. In accordance with Chapter 18 of Title 35 of the United States Code, also known as the Bayh-Dole Act, where grant recipients elect to retain title to any invention developed under this grant, US DOT retains a statutory nonexclusive, nontransferrable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any such invention throughout the world.

Please provide as much information as possible:

- 1. Describe who will hold the intellectual property rights for the data created or used during the project;**
- 2. Describe whether you will transfer those rights to a data archive, if appropriate;**
- 3. Identify whether any licenses apply to the data;**
 - 1. If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP;**
- 4. Describe any other legal requirements that might need to be addressed.**

1. Intellectual property rights are described here for two data types:
 - Infrastructure-generated data: Signal controller output data, and RSU SPaT output and MAP message data will be generated by public infrastructure, so they are the intellectual property of Utah DOT and will be made available for public use.
 - Field collected lane data: not known at this time. Note that research is underway to determine this, but it is expected that the output of any systems would be non-proprietary; this will be finalized pending selection of the final research approach.
 - Test tool-generated data: The project team anticipates using test tools and approaches developed by the SAE CTIC Project, which is Federally funded; therefore, this output of SPaT Test Tool and MAP Test Tool data is understood to be available for public use.
2. No transfer of rights to a data archive is anticipated to be needed at this time.
3. No licenses are expected to be used.
4. Products developed from the USDOT-sponsored SAE CTIC project will be used, which may result in the re-use or regeneration of outputs from that effort.

Archiving and Preservation Plan

Please provide as much information as possible:

- 1. State where you intend to archive your data and why you have chosen that particular option;**
 - 2. Provide a link to the repository;**
 - 3. You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability;**
 - 1. Whatever archive option you choose, that archive should support the capture and provision of the US Federal Government DCAT-US Metadata Schema <https://resources.data.gov/resources/dcat-us/>**
 - 4. In addition, the archive you choose should support the creation and maintenance of persistent identifiers (e.g., DOIs, handles, etc.) and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data;**
 - 5. Your plan should address how your archiving and preservation choices meet these requirements.**
1. Data will be archived at a public facing website operated by Utah DOT and publicly accessible. As the size and number of datasets is better understood, the capacity of existing Utah DOT websites will be assessed and an alternate identified, if necessary.
 2. The expected repository will be the Utah DOT Transportation Technology website (<https://transportationtechnology.utah.gov/>). Sub-directory folders to be determined as this approach is finalized. Note: An alternate site might be identified to house data collected in this project.

3. Metadata will be based on the national standards definitions of the datasets, including the US Federal Government DCAT-US Metadata Schema <https://resources.data.gov/resources/dcat-us/>.
 4. Per the US DOT Public Access plan and all final data will be assigned a persistent identifier that points to its publicly accessible location.
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