U.S.Department of Transportation
Federal Highway Administration

Office of Safety and Operations
Research and Development

MULTIDISCIPLINARY DATA MANAGEMENT SUPPORT (MDMS) 101 OVERVIEW

WHAT IS THE MDMS?

The objectives of MDMS task order is to provide support to Federal Highway Administration (FHWA) Federal and contract project managers to manage their data and to provide access to and use of data from completed and current FHWA-sponsored projects. The purpose of this task order is twofold:

- To support the Turner-Fairbank Highway Research Center (TFHRC) Office of Safety and Operations Research and Development (HIRSI) project managers in managing their project data during all stages of their projects.
- To have a centralized data repository to enable easy identification and access to data that illustrates project benefits.

MDMS is a continuation of the Data Resources Testbed (DRT), and all projects under DRT will be stored in the MDMS for the duration of this task order.

WHAT DEPARTMENT OF TRANSPORTATION (DOT) ORGANIZATIONS AND PROJECT DATA RESIDE IN THE MDMS?

HRSO project data that need to be archived will reside in the MDMS until an official repository is identified for the data. The MDMS may provide long-term storage of critical data in rare cases when no repository is available that meets the requirements of the project or when project requirements do not include storing data in a DOT repository. HRSO projects may deal with data from the data collection stage to the data manipulation, reduction, and analysis stages. Then the sharing of data with other projects or the public stage begins. The final stage is archiving the collected and produced data. Depending on the research project, the generated or collected data may include foundational primary data (e.g., geometric data, traffic flow data, video data, and connected vehicle data) or derived data (e.g., traveler information data, traffic operations analysis data, safety analysis data). The MDMS stores numerous data types such as PDF (portable document format), txt (text), csv (Comma-Separated Values), JavaScript Object Notation, etc. (JSON[1]).

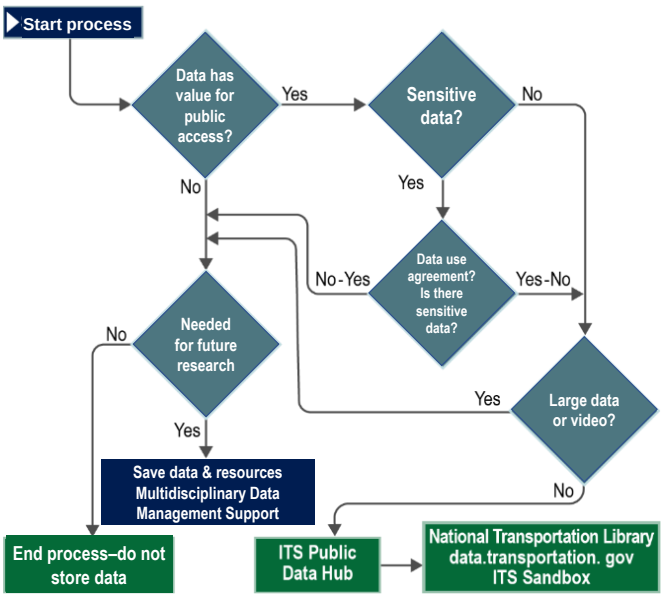
[1] JSON.org. 2002. *JSON* (software), https://www.json.org/jason-en.html, last accessed January 18, 2023.

WHERE IS THE MDMS?

Initially, the MDMS uses the local storage unit secured by the TFHRC information technology system. A cloud repository is being developed under MDMS task to store all current and future project data. Access to the cloud environment will be managed, granted, and supported by the MDMS support team.

HOW DO PROJECT MANAGERS DECIDE WHERE TO STORE THEIR PROJECT DATA?

Using figure 1 to map the decision process, the project manager first must determine if the data are valuable to the public, if they are sensitive, including containing personally identifiable information (PII), if a data use agreement exists, and, lastly, if it is a large dataset.



Source: FHWA.
ITS = intelligent transportation system.

Figure 1. Diagram. Data management decision process.

WHAT ARE THE REQUIREMENTS FOR STORING DATA IN THE MDMS?

Resources are being developed to assist FHWA staff with managing data and determining what data may be appropriate to save, where those data could be archived, and who may be allowed to access and use the data and resources. The resources include:

- Detailed criteria on what data to save and for how long, as well as procedures for how to archive and access data stored in the MDMS.
- Project checklist to assist with identifying the lifecycle of data throughout the duration of the research project.
- Scope of work requirements and issues to consider during procurement of documents for research projects involving the collection, storage, and availability of data.
- Data management plan (DMP) template.
- Metadata document (e.g., data structure and documentation).
- Data sharing agreement template.
- Quality assurance/Quality control document.

WHAT ARE METADATA, DMP, QUALITY ASSURANCE DOCUMENT, AND DATA SHARING AGREEMENT?

Metadata Checklist: provides information about one or more aspects of the data. It is used to summarize basic information about data that can make tracking and working with specific data easy.

DMP: documents the lifecycle of the data. The DMP details the data to be produced, managed, and stored, and standards to use during the project as well as an access authorization procedures and ways to handle and protect data during and after the completion of the project.

Quality Assurance/Quality Control: considers everything in data collection that could go wrong ahead of time and plans to preempt these issues.

Data Sharing Agreement: provides an overview of recommended data collection and management practices, FHWA policies, and other resources available to support Federal staff and their project teams.

WHAT ARE THE DOT PUBLIC DATA REPOSITORIES?

The following list shows where specific types of data can be accessed publicly on DOT and FHWA websites:

- **Intelligent Transportation Systems (ITS) Public Data Hub**: Point of entry to search and access all ITS and Operations related data publicly available on U.S. DOT's portals. https://www.its.dot.gov/data/
- **National Transportation Library**: Portal for technical reports and derived transportation data. https://ntl.bts.gov/
- **Data.Transportation.gov**: Portal for primary research data. https://data.transportation.gov/
- **Secure Data Commons**: A cloud-based analytics platform that enables traffic engineers, researchers, and data scientists to access transportation-related datasets that are not eligible to be placed on an open portal. https://its.dot.gov/data/secure

WHAT HAPPENS TO DATA?

Once project data have been stored in the MDMS cloud repository, CloudTrail[2] tracking is enabled to provide status updates on activity. The MDMS support team will work with project managers to either transfer their data to a public repository or keep it on the MDMS cloud repository. The MDMS provides security as well as access to the data stored on the MDMS cloud repository.

HOW DO WE ENSURE DATA IS SECURE IN THE MDMS?

The MDMS follows the SP 800-53 guidelines published by National Institute of Standards and Technology (NIST)[3]. A disaster and recovery plan has been developed to recover all vital information. The Design Engagement Review Team requires a security system plan in accordance with NIST guidelines to identify and provide information security protections for information systems that process, store, or transmit controlled unclassified information (CUI). The system security plan focuses on protecting the confidentiality of CUI in nonfederal systems and organizations using security control baselines published in SP 800-53 based on CUI regulation.

HOW DO WE MANAGE ACCESS TO THE DATA STORED ON MDMS?

Project managers whose data are stored on the MDMS repository are responsible for determining if their data will be accessible to users external to HRSO. Based on those decisions, the MDMS will provide access to authorized parties, track use of the

[2] Amazon Web Services. n.d. "Secure Standardized Logging Service - AWS CloudTrail" (web page). https://aws.amazon.com/cloudtrail/, last accessed January 18, 2023.

[3] National Institute of Standards and Technology. 2020. *Security and Privacy Controls for Information Systems and Organizations*. SP 800-53 Rev. 5. Gaithersburg, MD: National Institute of Standards and Technology.https://csrc.nist.gov/publications/detail/sp/800-53/rev-5/final, last accessed January 18, 2023.

data, and share that information with project managers. Users will be encouraged to share any further development of the data with the MDMS, project managers, and with other users who are interested in the same data.

TFHRC has 15 laboratories for research in the following areas: safety and operations, including ITS materials technology; pavements; structures; and human-centered systems. The expertise of TFHRC scientists and engineers covers more than 20 transportation-related disciplines. These laboratories are vital resources for advancing this body of knowledge created and nurtured by TFHRC researchers.

FHWA's Office of Research, Development, and Technology operates and manages TFHRC to conduct innovative research to provide solutions to transportation problems both nationwide and internationally. TFHRC is located at 6300 Georgetown Pike, McLean, VA 22101

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