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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Results

Caltrans Traffic Operations Data Standards Implementation Recommendations

Provide guidance for the California Department of Transportation (Caltrans) within the state to improve data and system interoperability across the transportation system. The project will focus on improving standardization of traffic operations data communications across California's transportation infrastructure.

Traffic Operations

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Project Title: Caltrans Traffic Operations Data Standards Implementation Recommendations

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WHAT WAS THE NEED?

Transportation data standards are an increasingly complex topic, particularly as the types and volume of data becoming available is exploding. New data sources, private data providers, and uses for data are exploding. Data standards could provide significant benefits, including the ability to integrate different systems and different vendor products, improve and ease data analysis, and enable Transportation Systems Management and Operations (TSMO) and many cross-jurisdictional and cooperative solutions and strategies. Without data standards, these benefits could not be realized.

However, data standards are not always universal, are constantly evolving with transportation technology and information technology advances and are not always implemented universally and in the same manner across the vendor community. Resulting patchwork solutions increase costs, undermine integration efforts, and invite opportunities for wasted effort.

California needed a roadmap for data standardization, ensuring that it had a universal set of standards for all its contractual systems integration efforts and that those standards were implemented in the same manner across its vendor community.

WHAT WAS OUR GOAL?

Provided guidance for Caltrans within the state to improve data and system interoperability across the transportation system. The project focused on improving standardization

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system.

of traffic operations data communications across California's transportation infrastructure.

WHAT DID WE DO?

This project reviewed the current information technology and standards landscape, currently used by Caltrans Division of Traffic Operations, and provided practical guidance. Analysis and recommendations addressed the following:

- A list of data standards and their usage to be applied to various information technology related projects.
- An analysis, where information was available, of implementation of selected standards across multiple vendor products, identifying similarities and differences in implementations.
- Roadblocks to standardize the implementation of selected data standards.
- Review of various data semantics, temporal differences, and other data characteristics that could hinder standardization.

WHAT WAS THE OUTCOME?

The project ended in June 2025, and the final report was received from the research team. This project guided Caltrans in improving data and system interoperability across California's transportation system.

The final report provided an investigation of the standards landscape in the context of transportation digital infrastructure and priorities for transportation data exchange use cases. In addition, it proposed both general recommendations as well as specific recommendations pertaining to work zone information and connected work zones (CWZ).

Effective use of work zone data involves multiple systems, and multiple standards to provide a complete service. For example, the location of the work zone had to be registered, perhaps in the Lane Closure System (LCS). Work zone activity needed to be updated, perhaps through a smartphone app onsite or from some centralized system. That data needed to be published to a data exchange system such as 511 or a registered Work Zone Data Exchange (WZDx) feed. Finally, that data needed to be served to travelers, perhaps through a Roadside Unit (RSU), perhaps via SiriusXM radio, or perhaps via a routing app from Google, Apple, or Waze. Some of the standards of relevance in this chain of communication included WZDx, CWZ, J2735, J2945/4, and Traffic Management Data Dictionary (TMDD). Therefore, data standards overlap was an increasingly important consideration in Caltrans Intelligent Transportation Systems (ITS) projects that involved data exchange, and these efforts may have benefited from heightened awareness of the data standards relevant to their deployment.

The challenge of work zones and work zone-related information using the CWZ standard was selected as a particularly important use case for near-term attention. There were a few organizational challenges that needed to be overcome to upgrade the existing LCS into a system that could provide satisfactory CWZ feed. These challenges were a perfect opportunity to align the business processes with the data and the systems used to share that data.

WHAT IS THE BENEFIT?

The project focuses on improving standardization of traffic operations data communications across California's transportation infrastructure with the following benefits:

- Improve systems integration effort success and reduce integration costs.
- Improve ability to access, analyze, and utilize data.
- Increase opportunities for new systems capabilities and related benefits.
- Improve the ability to connect all elements of the California transportation system.

- Cultivate a marketplace where vendors develop compatible components according to a public set of common data standards and common implementation of those standards.