Work Zone Data Exchange for Automated Vehicle Safety

Purpose

The future of transportation is increasingly data driven and reliant upon reliable, consistent, standardized, up-to-date information about dynamic conditions occurring on the roads. Construction events, and information on accompanying work zone traffic controls, are one such dynamic roadway activity for which accurate data drives safety, mobility, and organizational efficiency for all stakeholders from infrastructure owners and operators (IOOs) to the traveling public. Many IOOs maintain data on work zone activity, but lack of common data standards and convening mechanisms makes it difficult and costly for third parties – including original equipment manufacturers (OEMs) and digital infrastructure providers – to access and use these data across various jurisdictions. Looking forward, developing an ecosystem of reliable, consistent, real-time data on work zone activity is crucial to ensuring organizational readiness for the integration of automated vehicles (AVs) in the national traffic fleet.

The goal of this project is to enable a critical mass of IOOs to voluntarily make harmonized work zone data available for third party use in a decentralized model that can scale. The final draft of the initial "Version 1" data specification reached concurrence on September 10th, 2018.

Background

The USDOT is supporting development of a minimum viable product (MVP) of harmonized work zone data exchange to accelerate the safe deployment of AVs. This MVP is a deliverable from the multimodal *Roundtable on Data for Automated Vehicle Safety* (Roundtable) USDOT hosted on December 7, 2017.

The Roundtable was a key step toward developing a shared understanding about what data various experts in this field believe need to be collected and exchanged, for what purpose, and the Federal government's unique role in making voluntary data exchanges happen.

The Department is working to enable the highest priority data exchanges identified by Roundtable participants: work zones, scenarios (edge cases & near crashes), and cybersecurity. These "stakes in the ground" were communicated in a memo to S1 in December 2017:

- In the next 180 days, USDOT will work with the AV data ecosystem to specify edge case and near-crash data exchanges. In addition, USDOT will facilitate the first exchange (or, "minimum viable product") of work zone data among "beta users" in industry and non-federal government.

Meeting these objectives was expected to be a multimodal effort executed on behalf of the Office of the Secretary (OST), coordinated through the ITS JPO and FHWA with support from the Volpe Center. To streamline and enable execution, we built upon existing initiatives and created multimodal execution teams with clear reporting structure, resources, and milestones.

Outcomes

By July 2018, this project aimed to see a minimum of three states (or other local jurisdictions) make available an active work zone data feed using a common, non-proprietary specification. In addition, a minimum of three non-government developers (e.g., navigation applications) was to use that data in a meaningful way – thus establishing a MVP of voluntary data exchange for work zone data. While slightly delayed, the project stakeholders have reached concurrence on a final, "Version 1" data specification for harmonized work zone data as of September 10, 2018. The first active feed formatted according to the Version 1 specification was made available by Kentucky DOT on October 12, 2018, and other IOOs expect to make active feeds available within the next four to eight weeks to achieve a MVP.

This project also aims to produce a repeatable approach to accelerate harmonization of other local data sources across the country, and a sustainable model for stakeholders to expand and maintain such open specifications over the long-term without direct USDOT intervention.

Approach

USDOT has acted as a convener and facilitator to help industry and non-federal governments reach agreement on common data formats that lower the cost of data exchange. This process for rapid deployment of an open data specification has been modeled on the General Transit Feed Specification, which enables third parties and the USDOT to access consistent transit data across the nation. This model encourages an incremental adoption of data elements from the broader specification documented in the *Work Zone Activity Data Dictionary* developed through FHWA's Work Zone Data Initiative, which addresses the role of this data in use cases spanning the entire project delivery life-cycle. This project has built upon existing FHWA and FMCSA initiatives aimed at increasing availability and use of work zone-type data. It has used an agile development process to develop the V1 data specification collaboratively and in the open. The final version of the V1 spec is available on transportation.gov.

Team Composition

The following organizations have provided staff and other resources to deliver the project.

- Project Coordination Team
    - ITS JPO: Ariel Gold (co-lead)
    - FHWA: Todd Peterson (co-lead)
    - Volpe Center: Nate Deshmukh Towery (co-lead)
- Federal Multimodal Team
    - FTA: Christina Gikakis
    - FMCSA: Thomas Kelly

Several external data producers and users have voluntarily participated in this project, including:

- Data Producers
    - Colorado Department of Transportation
    - Iowa Department of Transportation
    - Kentucky Department of Transportation

        - Michigan Department of Transportation
        - Pennsylvania Turnpike Authority (also representing the Smart Belt Coalition)
        - Virginia Department of Transportation
- Data Users
    - HERE
    - Waze
    - Panasonic
    - Uber
    - Embark

While we have limited the number of formal participants in MVP development, the specification has been developed in the open, and other organizations have observed and commented on our progress. The project team has also maintained communication with appropriate industry and government associations.