



U.S. Department of Transportation
Office of the Under Secretary

Data Exchanges to Enable Automated Vehicle Integration



#AVS18

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Intelligent Transportation Systems

Joint Program Office (ITS JPO)

Session Agenda

Purpose

- Raise awareness of the USDOT AV Data Principles and Framework and how they can help identify and advance data exchange priorities
- Identify lessons from the Work Zone Data Exchange project that may apply to other efforts to increase voluntary data exchange to support AV integration

Agenda

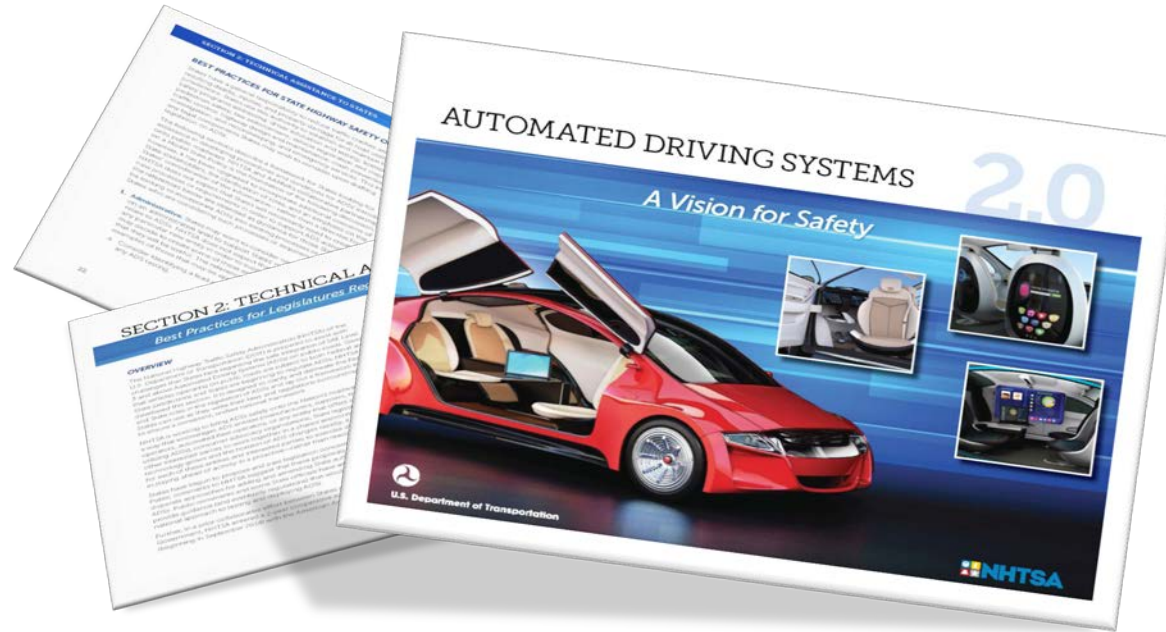
- U.S. DOT's Approach to AV Data
- Panel: The Principles and Framework in Action
- Panel: Applying the AV Data Principles and Framework Across the AV Ecosystem
- Conclusion

What is the *Data for Automated Vehicle Integration* Initiative?

Finch Fulton

Deputy Assistant Secretary for Transportation Policy, USDOT

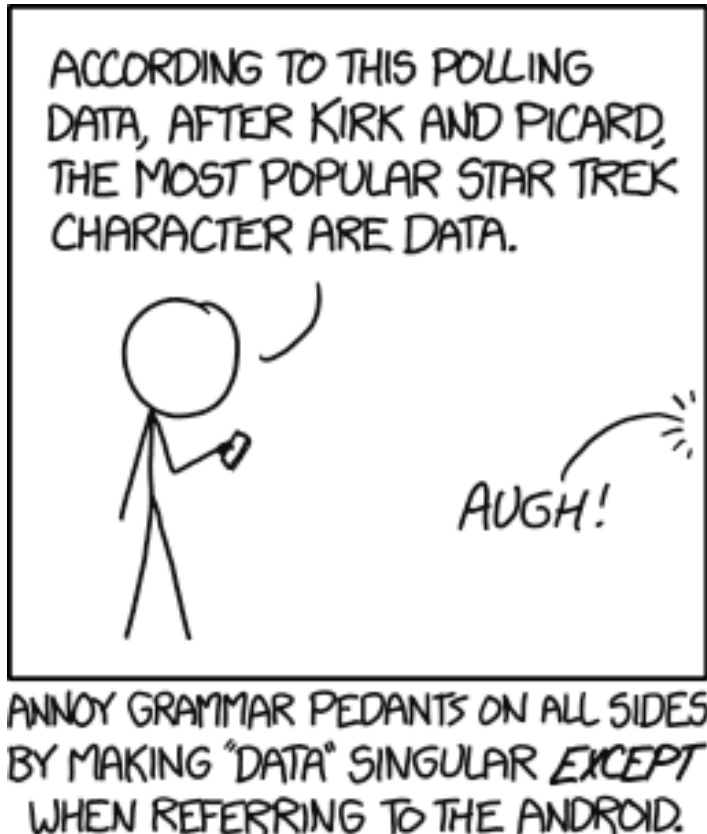
USDOT Automated Vehicles Activities



Learn more about USDOT Automated Vehicles (AV) activities at:

<https://www.transportation.gov/AV>

How to Take on a Cross-cutting Issue Like Data?



Access to data is a limiting factor for AV deployment. (It's also a sensitive topic.) One solution: *data exchanges*.

USDOT is using our *convening power* to understand critical use cases for data exchange and the appropriate federal role to enable them.

Graphic credit:
<https://xkcd.com/1429/>

Bringing Stakeholders Together for Meaningful Conversations

(IT'S REALLY HARD TO DO)

AV Data Guiding Principles (Beta)

1

Promote proactive, data-driven safety, cybersecurity, and privacy-protection practices.

2

Act as a facilitator to inspire and enable voluntary data exchanges.

3

Start small to demonstrate value, and scale what works toward a bigger vision.

4

Coordinate across modes to reduce costs, reduce industry burden, and accelerate action.

<https://www.transportation.gov/AV/Data>

AV Data Framework (Beta)

Category*	Goals
Business-to-Business (B2B)	<ul style="list-style-type: none">• Improve sector-to-sector cooperation• Improve industry-wide safety• Inform future insurance policies
Business-to-Government (B2G)	<ul style="list-style-type: none">• Understand performance of rapidly evolving tech• Inform policies and investments to encourage innovation and protect safety
Business-to-Infrastructure (B2I)	<ul style="list-style-type: none">• Help vehicles navigate safely around obstacles in all weather• Reduce system congestion• Help optimize infrastructure maintenance
Open Training Data (X2X)	<ul style="list-style-type: none">• Improve performance in common scenarios• Support basic research and education

*represents two-way data exchange

<https://www.transportation.gov/AV/Data>

AV Data Framework (Beta)

Category*	Specific Data to Exchange	Real-World Examples
Business-to-Business (B2B)	<ul style="list-style-type: none"> • Cybersecurity incidents • Edge cases • Near-miss events • Performance in safety-critical scenarios 	<ul style="list-style-type: none"> • Automotive Information Sharing and Analysis Center • ClinicalStudyDataRequest.com (CSDR)
Business-to-Government (B2G)	<ul style="list-style-type: none"> • Cybersecurity incidents • Near-miss events • Performance in safety-critical scenarios • Crash reconstruction 	<ul style="list-style-type: none"> • Aviation Safety Information Analysis and Sharing • Voluntary Safety Self-Assessments (Part of ADS 2.0)
Business-to-Infrastructure (B2I)	<ul style="list-style-type: none"> • Work zone activities and geometrics • Road weather information • Missing signage or broken infrastructure • Curb use rules and availability 	<ul style="list-style-type: none"> • National Transit Map • Waze Connected Citizens Program • Meteorological Assimilation Data Ingest System
Open Training Data (X2X)	<ul style="list-style-type: none"> • Road, signage, and other infrastructure imagery • Edge cases 	<ul style="list-style-type: none"> • ImageNet • Multimedia Commons • Nexar NEXET

*represents two-way data exchange

<https://www.transportation.gov/AV/Data>

Roundtable on Data for AV Safety

Outcomes

- Clarity on value of federal government as convener and facilitator
- Priority use cases for data exchange: work zones, scenarios, cybersecurity, others

Next Steps

- Enable voluntary data exchanges as “One DOT” via pilot projects
- Incorporate into AV policies
- Continue conversations



Photo credit: Dan Morgan



Summary Report available via:
<https://www.transportation.gov/AV/Data>

Work Zone Data Exchange Project

THE LOCAL DATA CHALLENGE

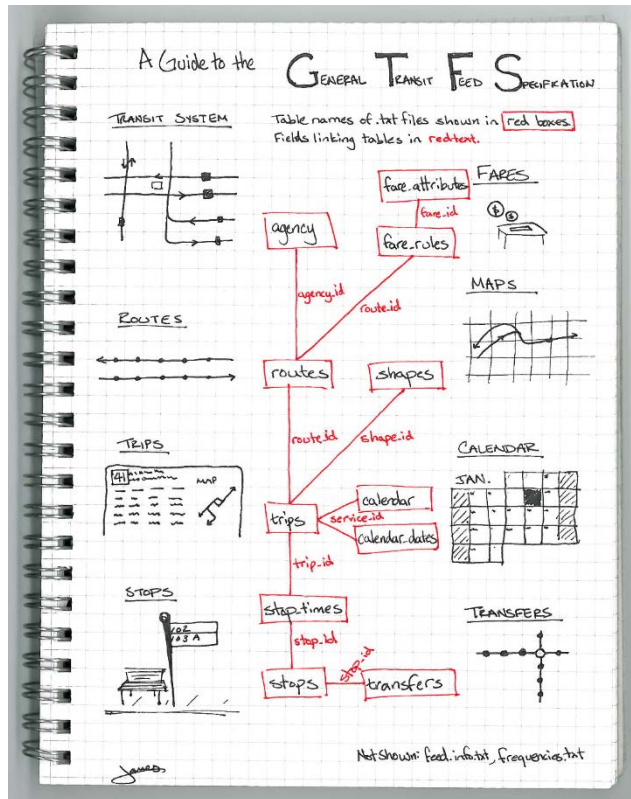
The Local Data Challenge

Up-to-date information about dynamic conditions occurring on the roads – such as construction events – can help AVs navigate safely and efficiently.

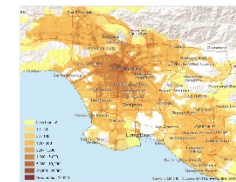
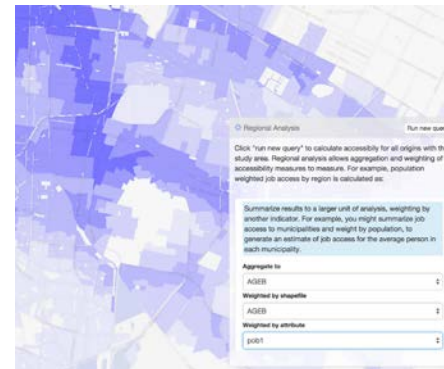
Many infrastructure owners and operators (IOOs) maintain data on work zone activity, but lack of common data standards and convening mechanisms makes it difficult and costly for third parties – including original equipment manufacturers (OEMs) and navigation applications – to access and use these data across various jurisdictions.

Learning from the Open Transit Data Story

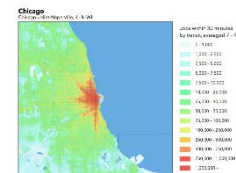
A simple specification...



...with a wide range of uses

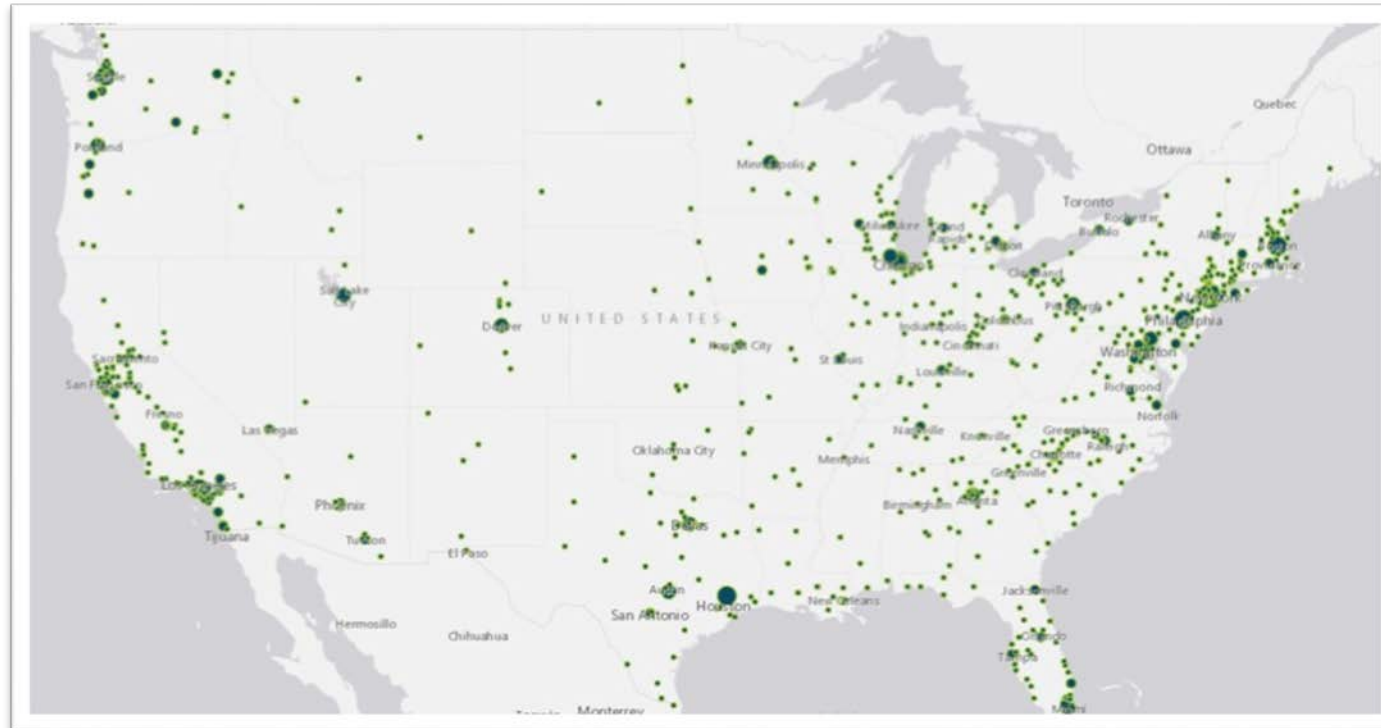


Line	Station	Count
36	Midway - North Rid Station	1
32	Midway - South Rid Station	17
31	Midway - Foggy Bottom Station	17
38B	Midway - Farragut Square	24
38B	Midway - Harrison Station	3
D5	Midway - Sangamon Rd	8
31	Midway - Pershing - Heights Station	14
M	Midway - Grand	1
M	Midway - State	1
M	Midway - Grand	3
M	Midway - State	5
M	Midway - Grand	8
M	Midway - State	10



A Federated “Front Door” to Transit Data

Now, **basic transit data** is easy to find and use nationwide;
transit agencies and their users **continue to collaborate** on the spec



Work Zone Data Exchange Project (Overview)

Purpose

- To jumpstart voluntary adoption of a basic work zone data specification
- To enable collaborative maintenance and expansion of the spec

Outcomes within 6 months

- **Data producers** make available an active work zone data feed using a common, non-proprietary specification
- **Non-government developers** use that data in a meaningful way – thus establishing an MVP of voluntary data exchange for work zone data

Big Picture Outcome

- Repeatable approach to accelerate harmonization of local data sources

Work Zone Data Exchange Project (Overview)

Approach

- Data producers and users:
 - Agree on common data specification that meets their minimal needs
 - Leverage existing published and *de facto* standards
 - Work collaboratively and in the open using an agile process
- USDOT:
 - Facilitates and convenes
 - Provides technical inputs
 - Sets up to scale after 6-month mark

Work Zone Data Exchange Project

(Notional timeline)

Feb 2018:

Charter project

May 2018:

USDOT synthesizes inputs from data providers and produces strawman data dictionary based on existing data sources

July 2018:

Users validate sample data; lock in data dictionary v1

Aug 2018:

Promote broadly; Start process of adding new fields for v2

Mar 2018:

Kick off

June 2018:

Reach consensus on data dictionary (common core, extensible fields for future) and encoding spec

July 2018:

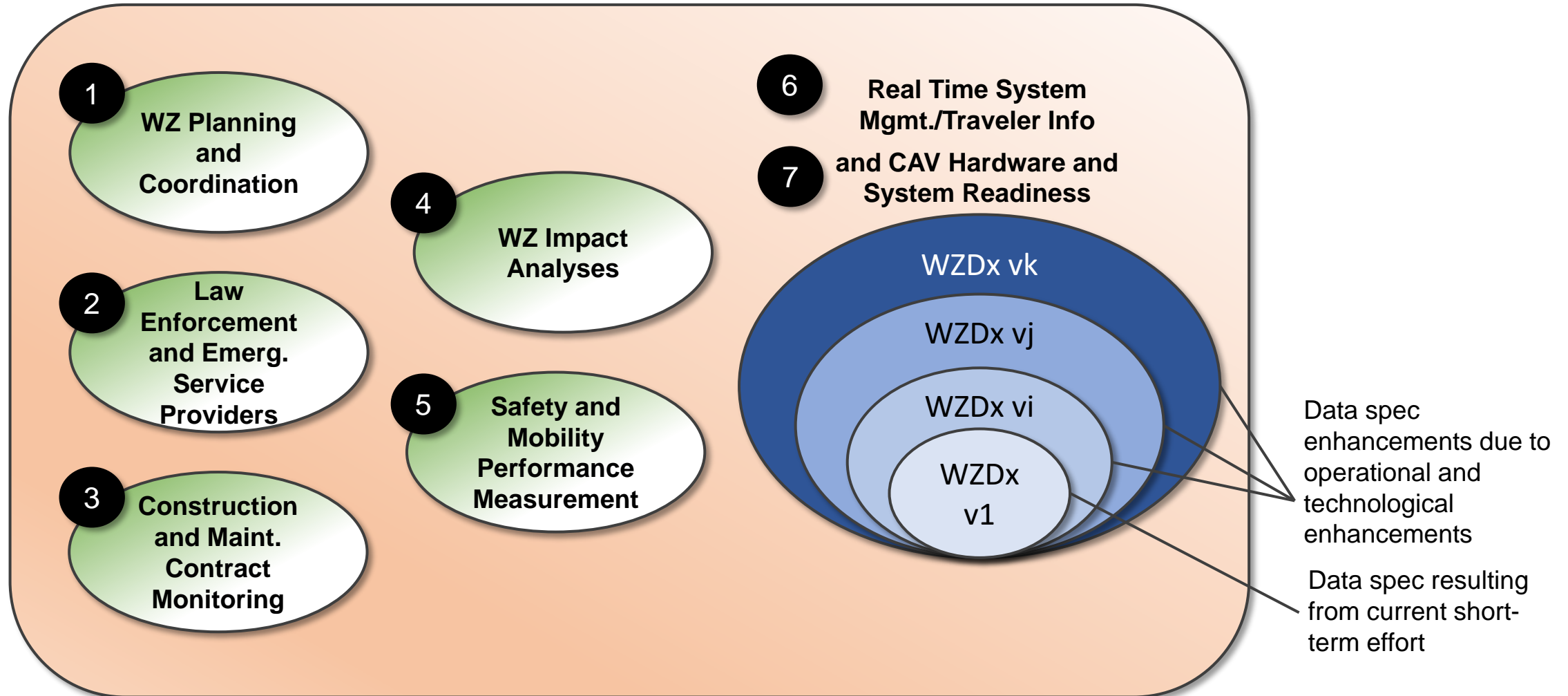
Data providers implement the common spec; data users demonstrate use of the data

Technical assistance (immediate, and TBD longer term)

Discover AV-specific needs that go beyond current data feeds

Establish mechanism to maintain and expand spec in future

Longer-term Needs Discovery (FHWA Work Zone Data Initiative)



Panel Discussion: The Principles and Framework in Action

- **Jennifer Carter**, Senior Manager, Government Solutions, HERE Technologies
- **Neal Hawkins**, Associate Director, Institute for Transportation, Iowa State University
- **Peter Kozinski**, Director, RoadX Program, Colorado DOT
- **Paul Pisano**, Team Leader, Road Weather and Work Zone Management, Federal Highway Administration
- **Moderated by Ariel Gold**, Data Program Manager, Intelligent Transportation Systems Joint Program Office (ITS JPO)

Panel Discussion: Applying the AV Data Principles and Framework Across the AV Ecosystem

- **Tilly Chang**, Executive Director, San Francisco County Transportation Authority
- **David Kidd**, Senior Research Scientist, Highway Loss Data Institute
- **Steve Boyd**, Co-founder, VP of External Affairs, Peloton Technology
- **Ritchie Huang**, Manager, Engineering & Safety, Daimler
- **Jeff Loftus**, Division Chief, Office of Technology, Federal Motor Carrier Safety Administration
- **Moderated by Ariel Gold**, Data Program Manager, Intelligent Transportation Systems Joint Program Office (ITS JPO)



Thank You!

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