Federal Highway Administration
Cooperative Automated Vehicle (CAV) Update

AASHTO Committee on Traffic Engineering
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Office of Operations
Federal Highway Administration
June 19, 2018
Denver, Colorado
USDOT Strategic Plan for FY 2018-2022

- Safety
- Infrastructure
  - Integrating Automated Vehicles into roadway environment
- Innovation
  - Development of Automated Vehicle roadway integration innovation
  - Deployment of Automated Vehicle roadway integration innovation
- Accountability
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<thead>
<tr>
<th>Event</th>
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<th>Summary/Outcomes</th>
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• More information on ADS 2.0 is available on the NHTSA website: [https://www.nhtsa.gov/technology-innovation/automated-vehicles](https://www.nhtsa.gov/technology-innovation/automated-vehicles). |
| Roundtable on Data for Automated Vehicle Safety | December 7, 2017 | • Demonstrated multimodal alignment around “One DOT” approach to Federal automated vehicle policy.  
• Brought together over 60 participants from government, private sector, nonprofit organizations, universities, research centers.  
• Gathered feedback on USDOT’s Guiding Principles and Draft Framework.  
• Coordinated with FHWA Work Zone Data Initiative. |
| Automated Vehicles 3.0 announced | January 10, 2018 | • Secretary Chao announced work on a follow-up Automated Vehicles 3.0 document, with a release date in 2018. |
| Public Listening Summit on Automated Vehicle Policy | March 1, 2018 | • Stakeholder engagement summit with senior leadership at USDOT.  
• Focused on key cross-modal issues important to successful integration of automated vehicles. |
| National Dialogue Launch Webinar | May 8, 2018 | • Introductory webinar introducing the National Dialogue.  
• 360+ attendees.  
• Recording: [https://connectdot.connectsolutions.com/p52h2c59wp92/](https://connectdot.connectsolutions.com/p52h2c59wp92/). |
USDOT Modal Administrations released Requests for Information (RFIs) and Requests for Comment (RFCs) regarding automation and the specific areas of interest for their modes. These RFIs and their responses are posted on the Federal Register.

- Federal Highway Administration RFI on the Integration of Automated Driving Systems (ADS) into the Highway Transportation System – Closed March 5, 2018
- Federal Railroad Administration RFI on Automation in the Railroad Industry – Closed May 7, 2018
- Federal Transit Administration (FTA) RFC on Automated Transit Buses Research Program – Closed March 2, 2018
- FTA RFC on Removing Barriers to Transit Bus Automation – Closed March 2, 2018
- National Highway Traffic Safety Administration RFC on Removing Regulatory Barriers for ADS – Closed March 20, 2018
- Pipeline and Hazardous Materials Safety Administration RFI on Regulatory Challenges to Safely Transportation Hazardous Materials by Surface Modes in an Automated Vehicle Environment – Closed May 7, 2018
1. FHWA released a RFI on the Integration of Automated Driving Systems into the Highway Transportation System.

2. The purpose is to obtain input from a range of stakeholders on a variety of issues related to enabling safe and efficient automation on roadways, such as:

   - Infrastructure and roadway requirements
   - Research areas and priority issues
   - Data needs
   - Planning and investment
   - and others…..
1. Greater **uniformity and quality** in road markings and traffic control devices would enable automation.

2. All commenters suggested that **FHWA take a leadership role** in convening stakeholders to encourage collaboration.

3. Certain **data elements** around the roadway environment are useful for industry and State and local DOTs to share and could improve automation operations.

4. Conducting **pilots and supporting pilot testing** are important for facilitating learning, collaboration, and information sharing.

5. Uncertainty in **infrastructure investment** and allocation of **limited resources** is a key concern for State and local agencies.
Stakeholder engagement activities to discuss the role of FHWA in automation and explore issues of concern to FHWA and its stakeholders.

Goals:

1. Focus attention on highway automation readiness.
2. Catalyze nationwide engagement.
3. Evolve the national highway automation community.
4. Complement related USDOT summits and initiatives.
National Dialogue: Focus Areas

**Planning and Policy:** Explores relevant issues for the planning and policy community, such as travel demand changes from automation, land use implications, infrastructure systems funding, right-of-way use, automation legislation, and other topics.

**Digital Infrastructure and Data:** Considers strategies for broader integration of sensing, communications, analytics, and decision support technologies and systems. Includes data requirements and needs of automated vehicles (e.g., digital work zone maps, road closures, etc.) as well as collaboration between public agencies and industry for data sharing and safety.

**Infrastructure Design and Multimodal Safety:** Covers transportation infrastructure design requirements, standardization, and consistency for automation. They will highlight topics where automation technology developers and public agencies require collaboration to plan for locations where existing roadway infrastructure, road conditions, design features, and environments could lead to potential safety hazards.

**Operations:** Surveys the range of operations challenges from highway automation and initiate a discussion on what further research is necessary to address them. These challenges may include incident management and system inefficiency that may have implications on traffic patterns and roadway capacity.

**Freight:** Deals with truck platooning applications and automated truck freight delivery issues. It will cover possible implications on traffic patterns and operations, as well as potential infrastructure considerations.
# National Dialogue: Tentative Schedule

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<th>No</th>
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<tr>
<td>1</td>
<td>June 7</td>
<td><strong>National Dialogue Launch Workshop</strong></td>
<td>Cobo Center, Detroit, MI</td>
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| 2  | June 26-27       | **National Workshop 1**  
Planning and Policy Considerations for Highway Automation | Science History Institute Philadelphia, PA     |
| 3  | July 12          | **Automated Vehicle Symposium**  
FMCSA-FHWA Truck Automation Listening Session | San Francisco, CA                             |
| 4  | Week of July 30  | **National Workshop 2**  
Digital Infrastructure and Data Considerations for Highway Automation | Seattle, WA                                   |
| 5  | Week of September 5 | **National Workshop 3**  
Freight Considerations for Highway Automation  | Chicago, IL                                   |
| 6  | TBD              | **National Workshop 4**  
Multimodal Safety and Infrastructure Design Considerations for Highway Automation | Austin, TX                                    |
| 7  | October 24-25    | **National Workshop 5**  
Operations Considerations for Highway Automation | Phoenix, AZ                                   |
Cooperative Automated Driving Systems Research (CADS)

Research Focused on Arterial and Freeways

Arterial system V2I - reduces fuel consumption at intersections by 20%.

Light vehicle platooning - doubles lane capacity

Truck platooning - 10% fuel savings
Cooperative Automated Driving Technology
Single vehicle ADS vs Multi-Vehicle CADS: Platooning (SAE Level 1)

Preliminary Results and Benefits

Cooperative Automated Vehicle (AV) Testing
with Virginia DOT and Transurban

Objective:
Investigate the combination of speed harmonization, vehicle platooning, and cooperative merging at an entrance ramp for a single-lane, managed facility with access limited to cooperative automated vehicles.

Google Maps Images of the Sites for the Cooperative Automated Vehicle Testing
Modeling provides an economic and efficient way to analyze different AV scenarios.
Human Factors Research

• Human factors issues associated with cooperative adaptive cruise control (CACC).

• Results suggest CACC has strong potential to improve driver safety by reducing the risk of forward collisions in an extreme braking event.
Scenario Planning for Connected and Automated Vehicles: 2017-2018

Purpose: To equip agencies with information and tools to consider the uncertainties of CV/AV deployment.

- Created scenarios of potential CV/AV deployment.
- Conducted workshops to refine test scenarios.
- Assessed overarching scenario impacts and implications.
• Transportation Symposium Series
  • Provides a formalized information resource for FHWA to gain insight and perspectives on key transportation policy questions from experts from associations, industry, academia, and government during day-long discussions.

• Access to Smart City Transportation Symposium: 2017
  • Purpose: To address policy solutions to transportation challenges and how smart technology will change the transportation landscape.
  • Addressed societal issues related to the implementation of smart systems, as well as governmental and institutional roles and responsibilities.

• Transportation Data Policy and Governance Symposium: 2018
  • Purpose: To identify emerging challenges and opportunities for government to use transportation data for sound policy, planning, investment, and system management.
  • Discussed the current and evolving role of data in FHWA’s mission and how to help transportation agencies access, analyze, and apply data to strategic and performance objectives.
Cooperative Automated Transportation (CAT) Coalition

CAT Executive Committee

Policy, Legislative and Regulatory Working Group
Planning Working Group
Infrastructure Industry Working Group
IOO/OEM Forum
Strategic Initiatives Working Group
Technical Resources Working Group
Peer Exchange & Outreach Working Group

CAV-ELT – Phase 2
- Collaboration of IOOs, OEMs, Technology and Service Providers, IOT & Suppliers
- Focus on Connected and Automated Vehicle policies and their convergence
- Address future business models, data and information systems, organizational and workforce requirements
- Scenario planning
- To be further discussed and modified at the Executive Committee

V2I Deployment Coalition - Phase 2
- Collaboration of public, private, & academic groups
- Focus on V2I systems to assist drivers and Automated Driving Systems (ADS)
- Communications “medium agnostic” - focus on support for deployable technologies
- Emphasis areas such as, but not limited to; Intersection safety (SpaT Challenge), Work Zones, and Eco Arrival/Departure, Freight, transformational technologies and others

CAV
V2I
FURTHER INFORMATION…

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Federal Highway Administration • Office of Operations