

NYMTC Safety Advisory Working Group Public Forum

Safety and Connected/Automated Vehicles

October 18, 2022 | 1:00 – 2:30 PM



Agenda



- Welcome and Meeting Objectives
- Federal Overview with Q&A
– John Harding, USDOT/FHWA
- Roundtable
- Audience Polling

Meeting Objectives



Learning session,
discussion and
interactive polling
about connected and
automated vehicles

Federal Overview with Q&A

John Harding

USDOT/FHWA Office of
Transportation Management

Leads automated vehicle initiatives for
FHWA that support safe and effective
integration of automated vehicles into
the US roadway system





U.S. Department of Transportation
Federal Highway Administration

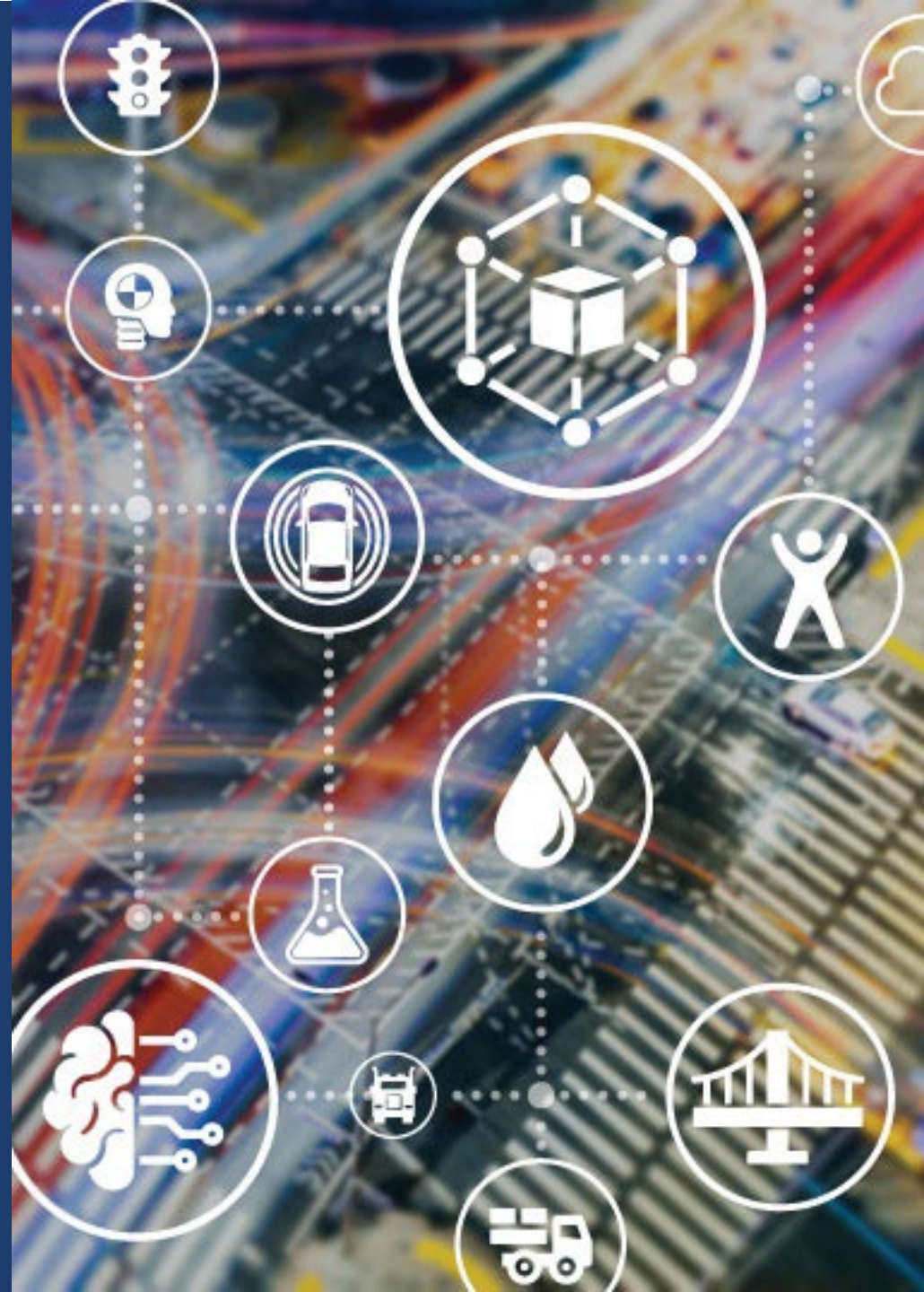
Roadway and Automated Driving Systems Integration

Research Today To Prepare Us for Tomorrow

John Harding, Team Leader
Connected/Automated and Emerging Technologies
Office of Operations

October 18, 2022

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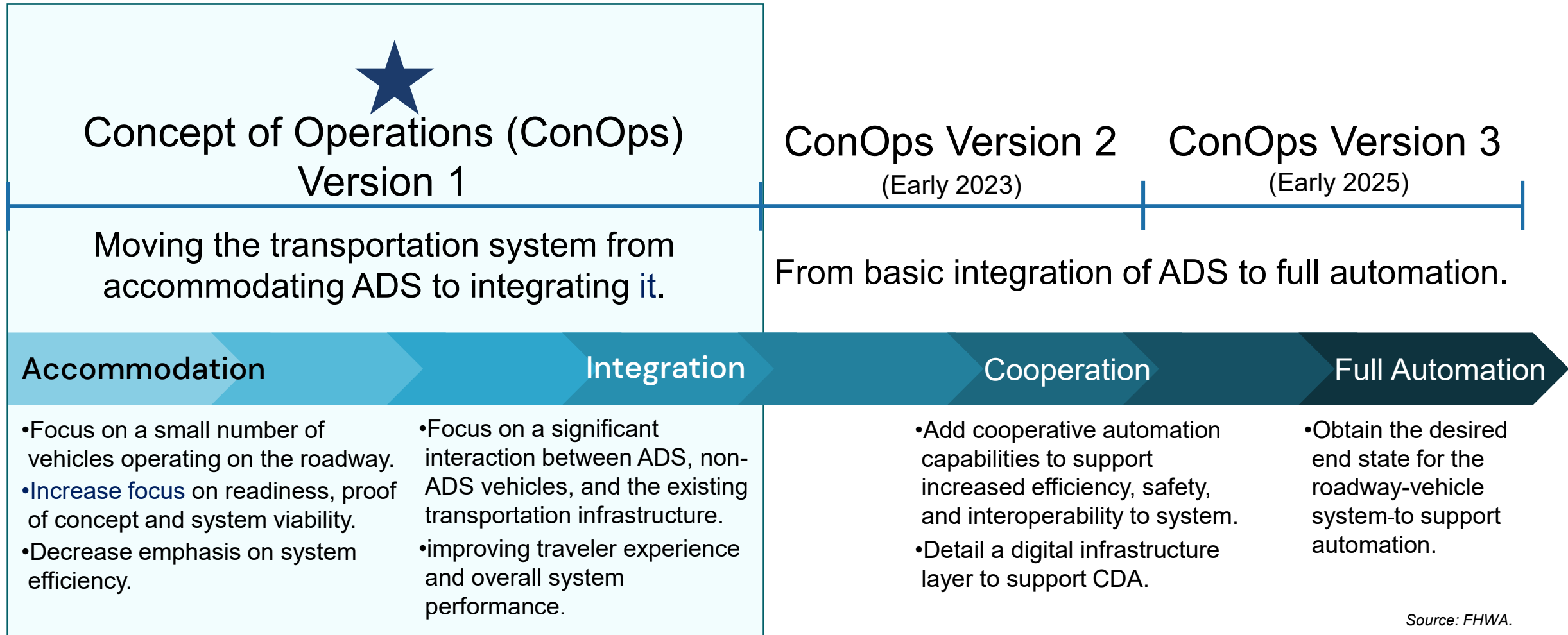


Presentation Outline

- ▶ Vision development
- ▶ Automated driving system (ADS) integration
- ▶ Cooperative driving automation (CDA)
- ▶ CARMASM ecosystem
- ▶ Roadway/Automated Vehicles (AV) analysis, modeling, simulation, and testing capabilities
- ▶ Safe System Approach
- ▶ Federal Highway Administration (FHWA) activities
- ▶ Study of impacts on roads from ADS



Developing the Vision

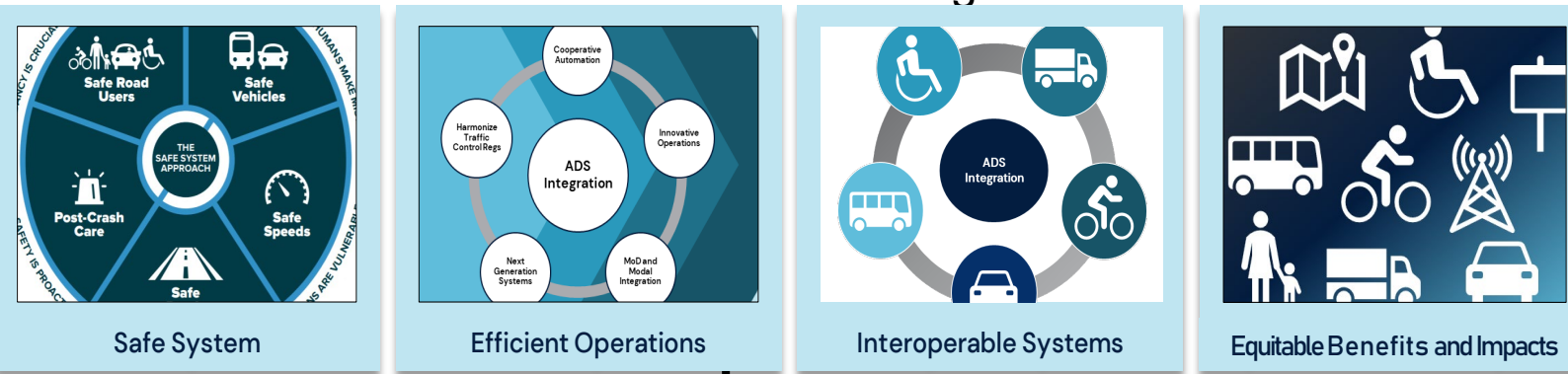


Source: FHWA.

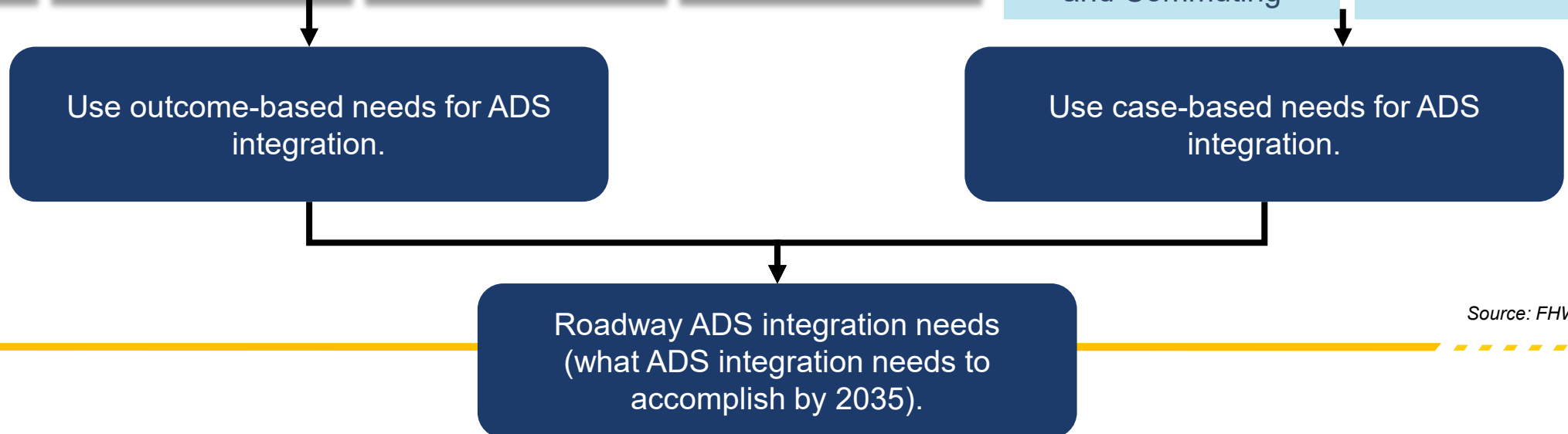


Need for ADS Integration

The concept of operations (ConOps) defines four overarching target outcomes for ADS integration:



The ConOps defines eight ADS vehicle use cases (arranged in four categories):



Source: FHWA.



Cooperative Automation Research Program



Automated vehicles working together and with roadway infrastructure to increase safety and improve operational efficiency.



Reduce fuel consumption by 20 percent at intersections.



Double the capacity of existing lanes.

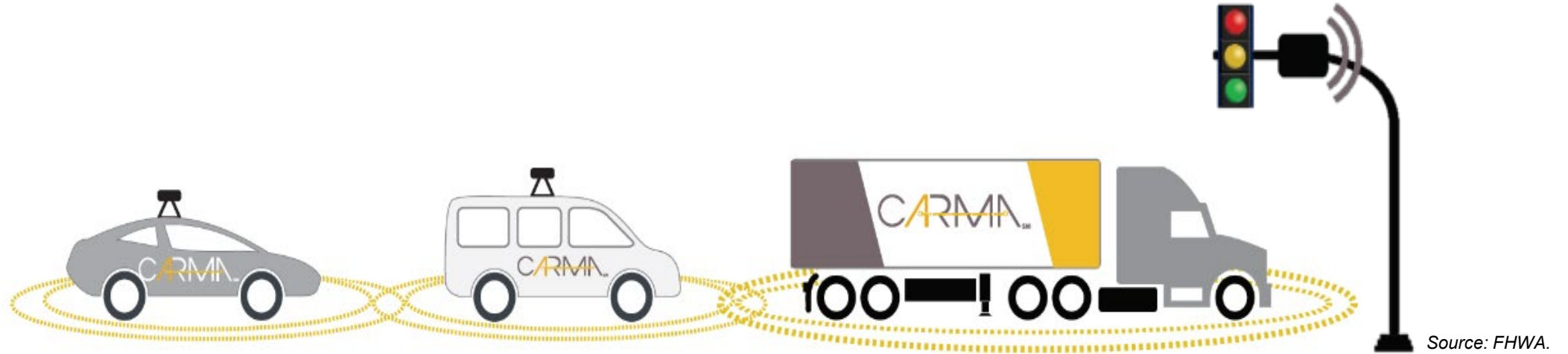


Achieve fuel savings of 10 percent.

All images source: FHWA.



Cooperative Driving Automation (CDA)



**SAE
International
Standard
J3216_202005**

CDA can be defined as automation that uses machine-to-machine communication to enable cooperation among two or more entities with capable communications technology and is intended to facilitate the safer, more efficient movement of road users, including enhancing performance of the dynamic driving task for a vehicle with driving automation feature(s) engaged.⁽¹⁾

⁽¹⁾SAE International. 2020. *Taxonomy and Definitions for Terms Related to Cooperative Driving Automation for On-Road Motor Vehicles*. SAE J3216_202005. Warrendale, PA: SAE International. https://www.sae.org/standards/content/j3216_202005/, last accessed October 19, 2020.

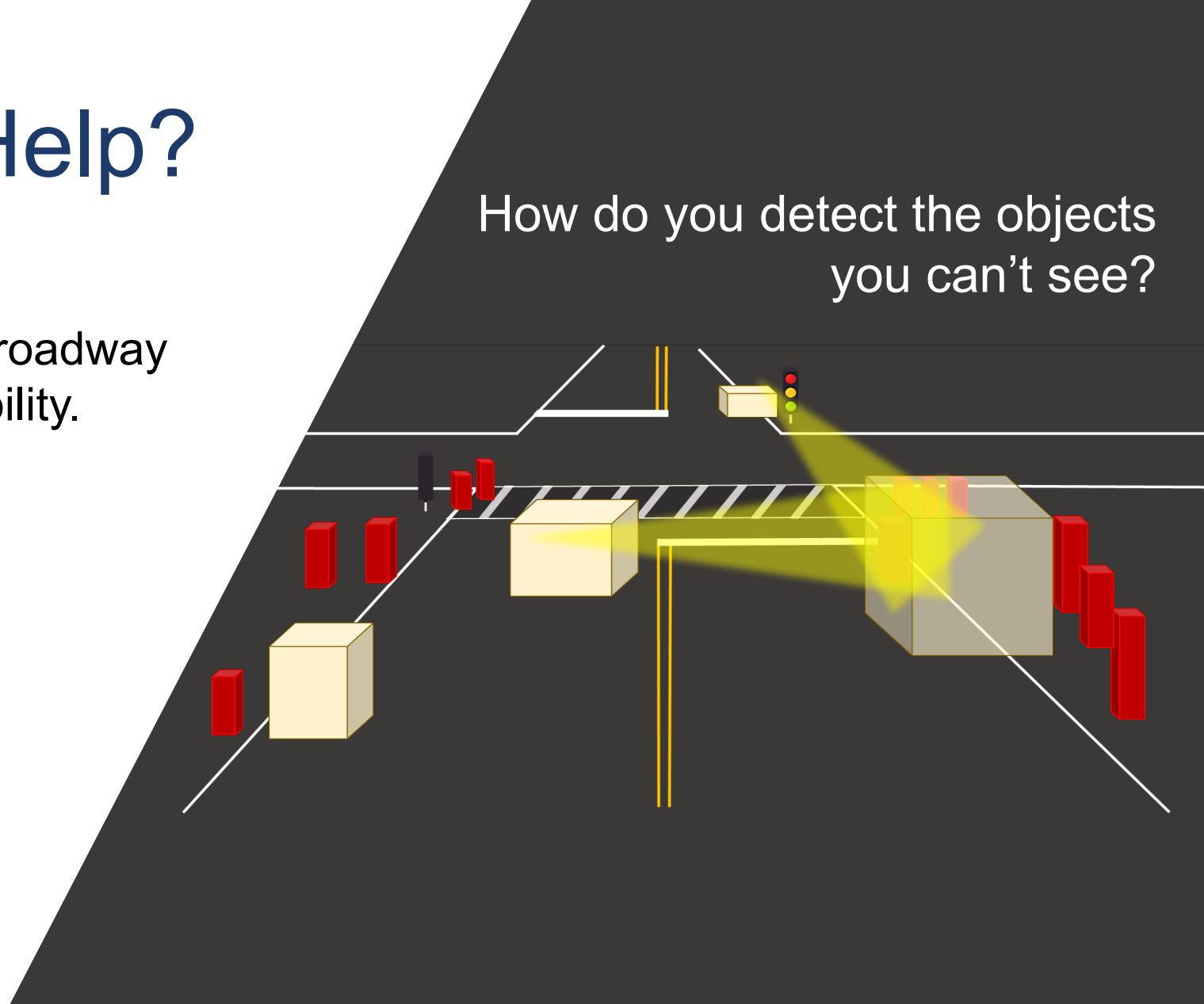
How Can CDA Help?

CDA leverages information from infrastructure and all connected roadway users to improve safety and mobility.

It provides, for example:

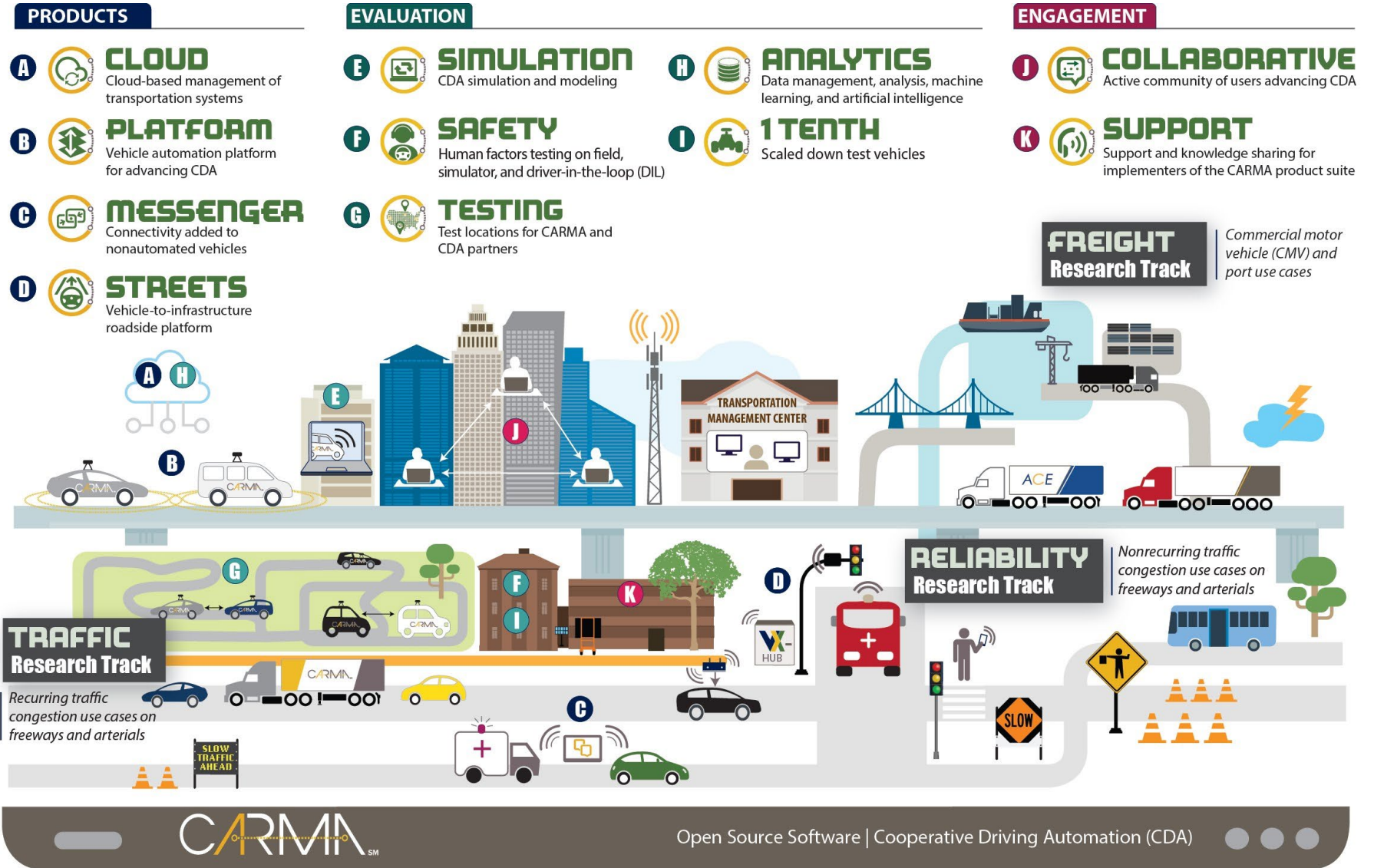
- ▶ Object enhanced sensing.
- ▶ Intersection optimization.
- ▶ Congestion mitigation for:
 - ▷ Work zones.
 - ▷ Traffic incidents.
 - ▷ Weather.

How do you detect the objects you can't see?



CARMA Ecosystem

A network of open-source software and support services focusing on how infrastructure can move traffic more efficiently by advancing transportation systems management and operations strategies.



Source: FHWA.



U.S. Department of Transportation
Federal Highway Administration

CARMA Testing—Vehicle Research Fleet



All photos source: FHWA.



CARMA 1tenth

Coming Soon | Ask how you can work with us to develop CARMA 1tenth.

- ▶ Scaled-down ADS cars with hardware for autonomous driving are built by a community of ADS developers.
- ▶ Cost-efficient ADS research, with a customized platform, created to aid CDA development.
- ▶ Capability to engage a larger research community and enable faster learning of CDA research.



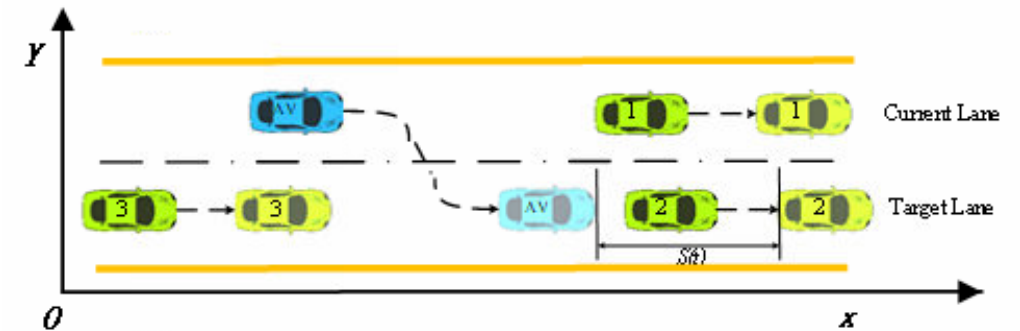
Source: FHWA.



Analysis Modeling and Simulation (AMS) of Connected and Automated Vehicles

► The challenge:

- ▷ Transportation agencies need a low-cost approach to quantify the impacts of CV and AV deployments.
- ▷ AMS tools were built to model human driving behavior, not CV and AVs.



Source: FHWA.

► Our solution:

- ▷ Collect real-world data of CVs and AVs and surrounding traffic.
- ▷ Use these data to improve models.
- ▷ Use improved models to assess transportation impacts of CVs and AVs and potential strategies to leverage CVs and AVs to improve traffic efficiency.

Workforce Development: CAVe-in-a-Box and CARMA 1/10th

Mobile Kit



Infrastructure Kit



For more information, visit
<https://www.pcb.its.dot.gov/CAVEducation.aspx>.

All images source: FHWA.



Virtual Open Innovation Collaborative Environment for Safety (VOICES)

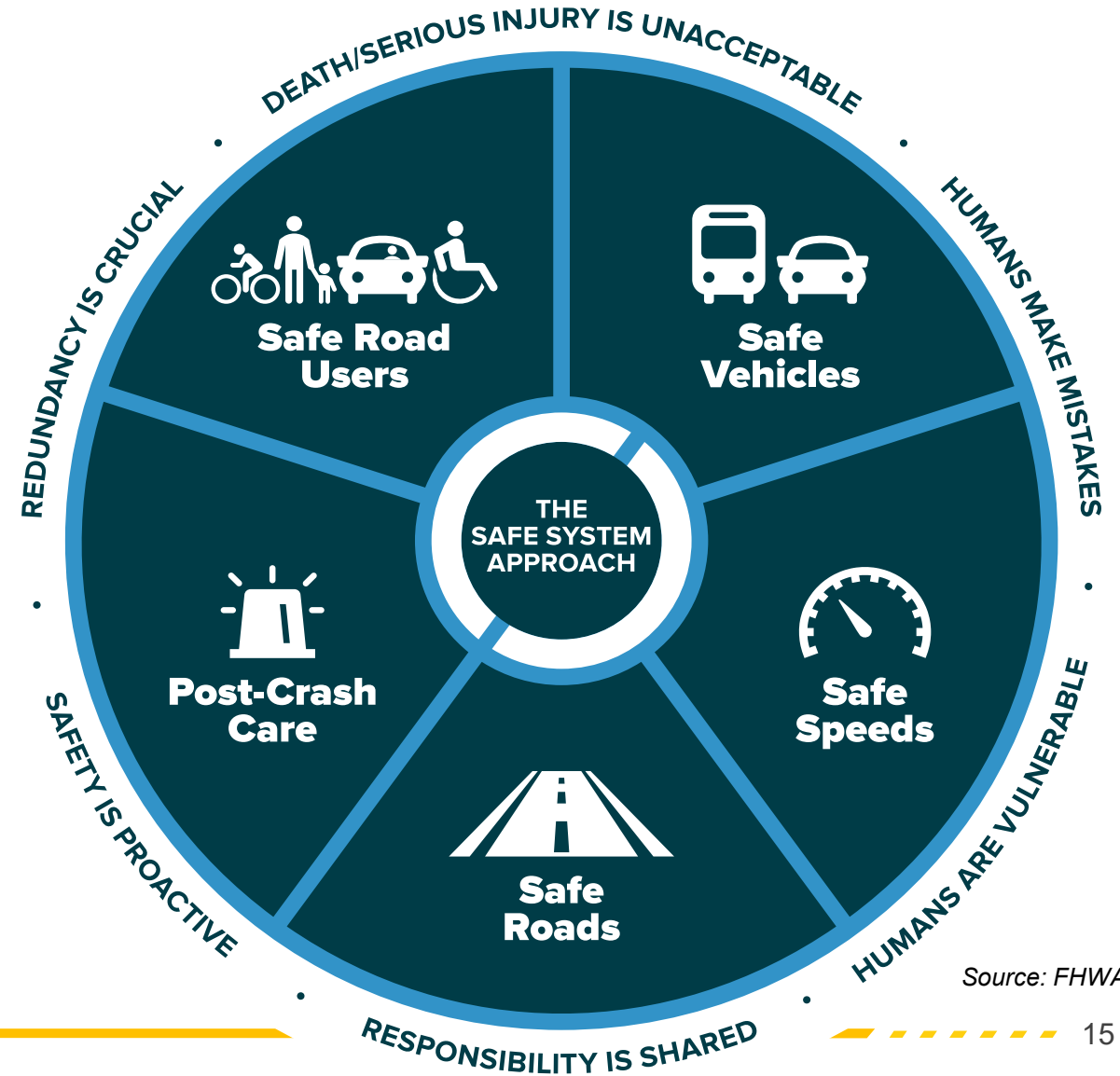
- ▶ VOICES will modify an existing virtual environment developed by the U.S. Department of Defense for the transportation industry.
- ▶ VOICES is expected to assist industry in developing, testing, and validating cooperative driving capabilities while protecting their intellectual property.
- ▶ VOICES is developed in part by an extensive community of practice that helps guide capability requirements.



A New Paradigm

The Safe System Approach aims to eliminate fatal and serious injuries for all road users by:

- ▶ Accommodating human mistakes.
- ▶ Keeping impacts on the human body at tolerable levels.



Source: FHWA.



Safety Countermeasures Optimization for AVs

Current countermeasures should be reviewed for their effectiveness in providing safety as the transition to an AV environment occurs. Countermeasures are:

- ▶ Expected to maintain its safety effectiveness without modifications.
- ▶ Enhanced with modifications (e.g., connectivity and smart features).
- ▶ Used until levels 4 and 5⁽²⁾ of the SAE Levels of Driving Automation™ are reached (due to technological advancements and CAV saturation).
- ▶ Regarded as redundant/less effective due to connected vehicle (CVs) and AVs.
- ▶ Considered beneficial once no longer effective for safety.



Source: FHWA.⁽³⁾



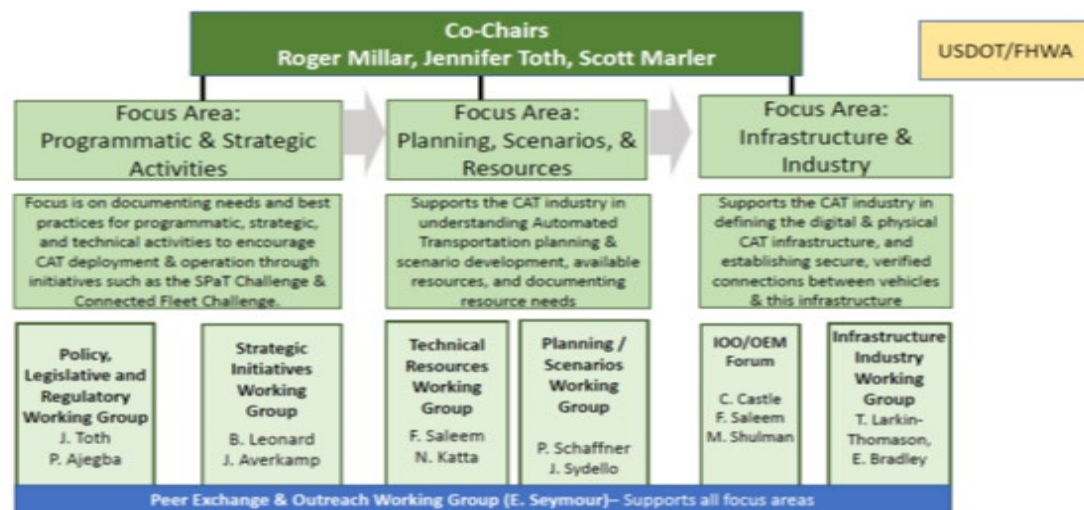
⁽²⁾SAE International. 2021. "SAE Levels of Driving Automation™ Refined for Clarity and International Audience" (web page). <https://www.sae.org/blog/sae-j3016-update>, last accessed November 29, 2021.

⁽³⁾Federal Highway Administration. 2021. "Proven Safety Countermeasures" (web page). <https://safety.fhwa.dot.gov/provencountermeasures/>, last accessed November 29, 2021.

Other FHWA Activities (1/3)

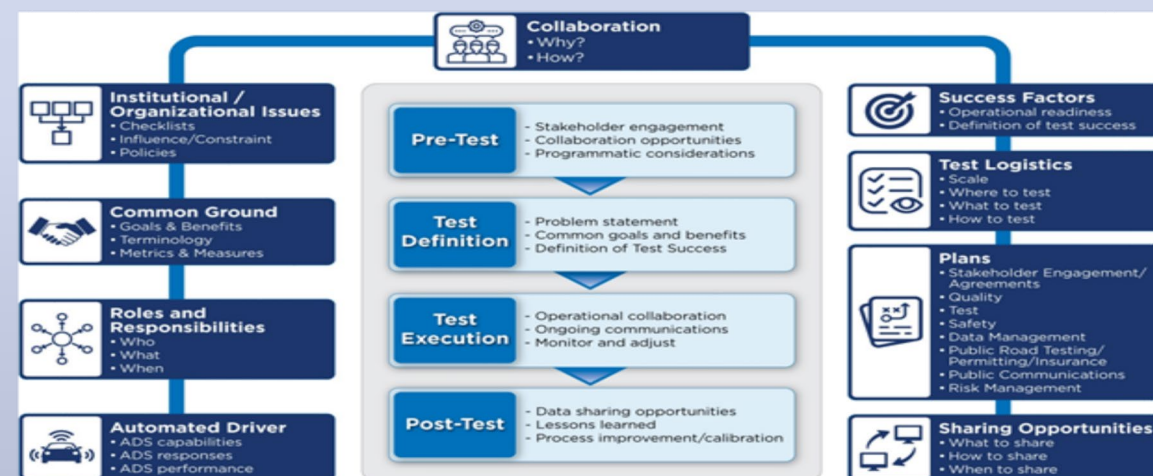
Cooperative Automated Transportation Coalition

CAT Coalition – Organization (October 2021)



Source: FHWA.

Collaborative Research Framework for ADS Developers and Infrastructure Owner Operators

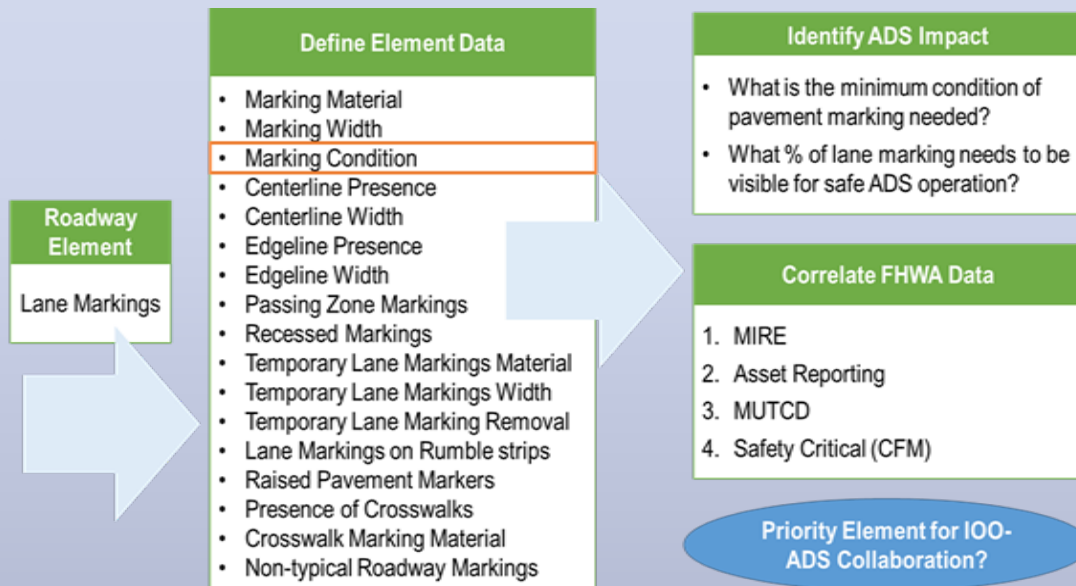


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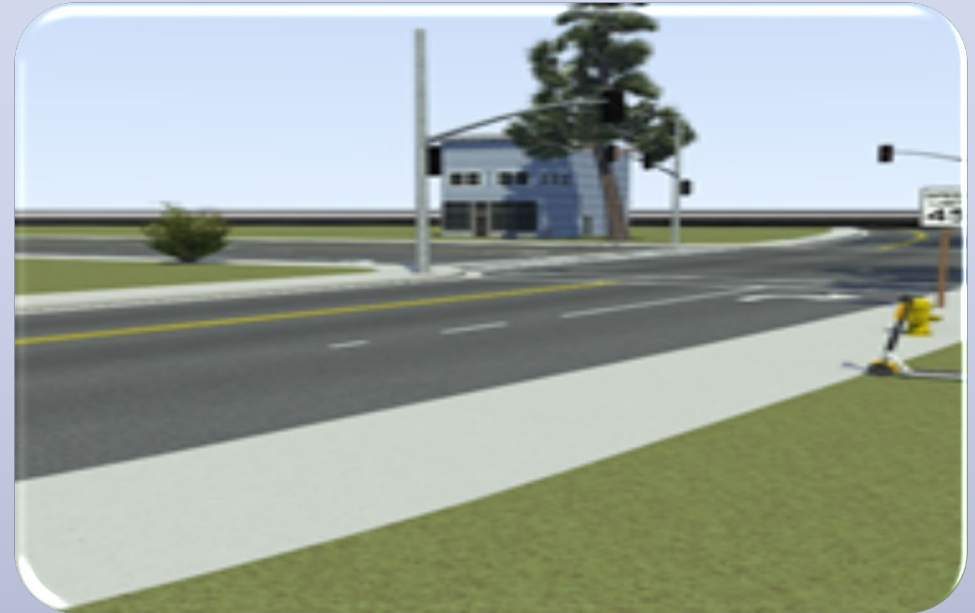
Other FHWA Activities (2/3)

Roadway elements framework, inventory, and assessment methodologies



Source: FHWA.

Feasibility of changeable road environment capabilities



Source: FHWA



Other FHWA Activities (3/3)

Automated Driving Systems and Traffic Regulations



Source: FHWA.

Digital Infrastructure Framework



Source: FHWA.



New Study: Impacts on Roads from Automated Driving Systems

Section 11504 of the 2021 Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the “Bipartisan Infrastructure Law” (or BIL) calls for a *“study on the existing and future impacts of self-driving vehicles to transportation infrastructure, mobility, the environment, and safety.”*⁽⁴⁾

⁽⁴⁾Section 11504 of the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the “Bipartisan Infrastructure Law” (BIL). 2021



Study Scope

- ▶ Study shall consider existing and future impacts on:
 - ▷ Interstate system.
 - ▷ Urban roads.
 - ▷ Rural roads.
 - ▷ Corridors with heavy traffic congestion.
 - ▷ Transportation systems optimization.
- ▶ Focus is on ADS (SAE Levels 3-5).
- ▶ Should consider “...the need for and recommend any policy changes to be undertaken by the Federal Highway Administration...”⁽²⁾
- ▶ Completion within 1 year of being initiated.



Considers a Range of Impacts



macrovector © 123RF.com.

Roadway infrastructure

Commercial and private traffic flows

Congestion and vehicle miles traveled

Environment

Mobility

Safety



Stakeholder Engagement: Expert Panel

- ▶ Operators and users of the Interstate System
- ▶ States and State departments of transportation
- ▶ Metropolitan planning organizations
- ▶ Motor carrier industry
- ▶ Representatives of public transportation agencies and organizations
- ▶ Highway safety and academic groups
- ▶ Nonprofit entities with experience in transportation policy
- ▶ National laboratories
- ▶ Environmental stakeholders
- ▶ ADS producers, manufacturers, and technology developers



Contact Information

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Office of Operations



U.S. Department of Transportation
Federal Highway Administration

Roundtable Discussion

State and Local Perspectives



Interactive Polling Session





Further Questions or Discussion?



Thank you!