OUTLINE

- Next Generation Transportation Management
- Connectivity
- Cooperative Automation
- Analysis, Modeling, and Simulation (AMS)
- Mobility Innovation
- Developing the Workforce
NEXT GENERATION TRANSPORTATION MANAGEMENT

Transportation Management Centers (TMC)

- Collecting and processing freeway system data and fusing with other operational and control data.
- Producing information and distributing to stakeholders including the traveling public and other agencies.
- TMC monitors information and initiates control strategies to make changes in freeway network.
- Using Artificial Intelligence (AI) for incident detection for TMC operations as opposed to conventional algorithms.

Source: FHWA
Connectivity
Important for Managing Our Transportation System

TMC: Traffic Management Center.

Today – Expensive Infrastructure

Tomorrow – Connectivity

Source: FHWA.
Safely improve the operational efficiency and maximize capacity of our Nation’s urban and rural roadways.

Reduce fuel consumption at intersections by 20 percent. Fuels savings of 10 percent. Double capacity of existing lanes.

Source: FHWA.
Use Case Areas

1. Basic Travel
   - Example scenarios:
     - Engage in a platoon defined by a geofence.
     - Leader maintains safe time gap.
     - Followers maintain interplatoon time gap.
     - Platoon size of two to five cars per lane.
     - Possible maneuvers with other CADS-equipped vehicles.

2. Work Zones
   - Example scenarios:
     - Reduced command speed entering work zone.
     - Defined by a stationary geofence.
     - Lane change assignment prior to entering work zone.
     - Maintain safe time gap thought the work zone.
     - Possible maneuvers with other CADS-equipped vehicles.

3. Weather
   - Example scenarios:
     - Reduced command speed entering low visibility weather.
     - Defined by a dynamic geofence.
     - Engage in larger time gap.
     - Maintain lane guidance.
     - Possible maneuvers with other CADS-equipped vehicles.

4. Traffic Incident Management (TIM)
   - Example scenarios:
     - Reduced command speed entering traffic incident event.
     - Determined by infield geofence.
     - Lane change to provide space for first responders.
     - Possible maneuvers with other CADS-equipped vehicles.
Expand cooperative automation capabilities.
Develop proofs of concept to support TSMO use cases.
Collaborate with Infrastructure Owner-Operator (IOO)/Original Equipment Manufacturers (OEM) community.

Leverage Autoware OSS development.
Enable automated driving systems (ADS) Level 2–3 capabilities.
Engage ADS community.
Existing CARMA2 Fleet

New CARMA3 Fleet
OPEN SOURCE Collaboration Vision
ADVANCE COOPERATIVE AUTOMATION RESEARCH

GitHub

CARMA Platform Repository
CARMA Cloud (TMSO) Repository
ODE Repository

PULL
PUSH

Development
U.S. Department of Transportation
Federal Highway Administration
STOL
Saxton Transportation Operations Laboratory

Partners
Infrastructure Owner-Operators (IOOs)
Private Industry
Public Agencies
Academia

BUILD
DEPLOY

COLLABORATE

ODE: Operational Data Environment.
Source: FHWA.
2020 Target: 13 users of CARMA/Autoware from 10 states

Engaging New Users

Adds 9 users +5 New States
The Challenge:

- Simulation tools are considered to be matured, but are often applied incorrectly due to a combination of factors (e.g., insufficient data available, time/resource constraints, lack of guidance).

Our Solutions:

- Improving engagement with internal and external stakeholders.
  - FHWA Traffic Analysis Tools Team.
  - Traffic Analysis and Simulation Pooled Fund Study.
- Collecting robust, high-resolution datasets for public dissemination.
- Developing new methods to incorporate driver heterogeneity in microsimulation models.
- Developing improved methods for microsimulation model calibration.
**Analysis, Modeling, and Simulation (AMS)**

**Future Needs**

- **Demand Effects**: Household and Firms Activity and Travel Choices.
- **Supply Changes**: Mobility as a Service Shared Fleet Operations.
- **Network Integration**: Traveler Assignment, Multiagent Behavior, Interactions, and Equilibration.

**The Challenge:**

- Agencies need a low-cost approach to quantify impacts of CAV deployments to make intelligent investment decisions.
- Traffic modeling and simulation tools provide an efficient approach to evaluate a new technology or strategy prior to implementation.
- Current modeling and simulation tools are not suited to evaluating CAV.

**Our Solutions:**

2018

- Development of a CAV AMS Framework.

2019

- Four CAV AMS Case Studies.

2020 & Beyond

- Developing Improved CAV AMS Tools.
Shared Services
- Enhancing transportation accessibility.
- Increasing multimodality.
- Reducing vehicle ownership.
- New ways to access goods and services.

Core Services
- Car Rental
- Shuttles
- Public Transit
- Taxis
- Pedicabs

Innovative Services
- Bikesharing
- Carsharing
- Ridesourcing
- Scooter Sharing

Curb Space Assessment
- Maximize mobility by meeting the needs of multiple curb demands from:
  - Shared Services.
  - Pedestrians.
  - Bicyclists.
The Complete Trip:

- Goal: Consider accessibility from origin to destination.
  - Trip planning.
  - Travel to station.
  - Station/stop use.
  - Vehicle boarding and unboarding.
  - Stops or transfers.
  - Travel to destination after leaving the station/stop.

- Work with system operators and the stakeholder community to address all parts of the travel chain.

- Allowing individuals with disabilities independent access to multiple locations.
Every Day Counts (EDC-5)

- Expanding on adoptions of proven innovations and new technologies and processes that save time, resources, money and lives.

- Identifies state-based proven innovations with a goal of:
  - Shortening project delivery.
  - Enhancing roadway safety.
  - Reducing congestion,
  - Improving environmental sustainability.

**Education Connection**

Strategic Highway Research Program (SHRP2)

- Universities identified to receive funding to incorporate SHRP2 products into transportation classwork, bringing state-of-the-practice solutions into the classroom.

**Transportation Student Capabilities**

- Traditional Civil and Transportation Engineering.
- Identify data sources.
- Absorb and process data for decision making.
- Collaboration and networking.