



# FMCSA Research Activities

Council of Deputy Ministers Responsible for Transportation and Highway Safety

Task Force on Vehicle Weights and Dimensions Policy

November 29, 2017

SAE Automation Levels 3 – 5

# **AUTOMATED COMMERCIAL VEHICLES AND ADAS TECHNOLOGIES**

# Automated Vehicles State Legislation

- Many states are writing legislation allowing testing of automated CMVs
- Risk management for testing of advanced CMVs with ADAS should be considered by developers and the States

# Federal Automated Policy

## Version 2.0

[Released September 12, 2017]

- Voluntary Guidance for the operations of ADAS
- Intended to support stakeholders as they consider and design practices relative to the testing and deployment of AV technologies
- Listed FMCSA requirement for driver-monitored operations unless a waiver or exemption is granted

## Version 3.0

[Scheduled for release in 2018]

- Broader; DOT-wide
- Focus on the safe integration of road vehicles into the transportation system
- Topics may change if Congress passes its AV legislation

# Potential Automated CMV Research Opportunities

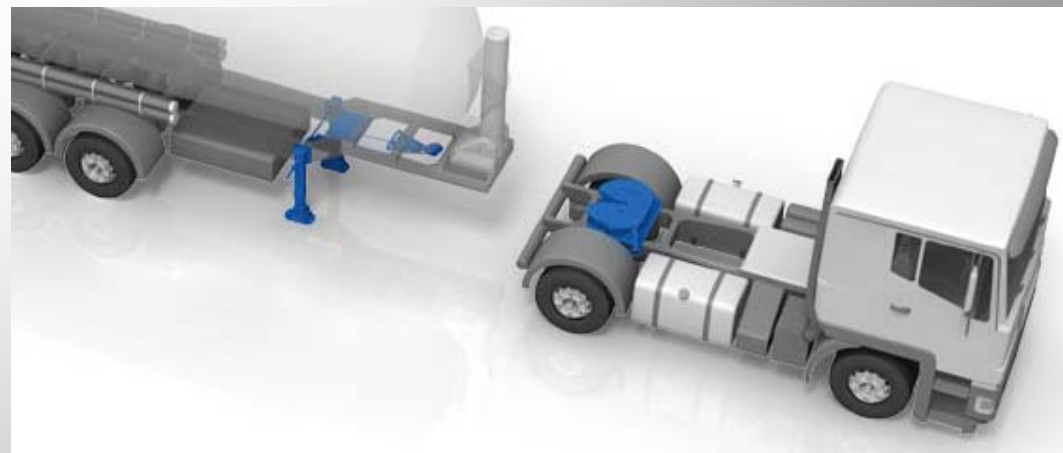
- Initiative to accelerate market penetration of ADAS technologies using innovative incentives
- Development of ADAS technology performance metrics
  - Naturalistic comparisons
  - Highly automated CMV testing oversight and support activities
- Facilitation of research, demonstrations, and model deployment for integration of ADAS technologies into ADS
- Determination of limitations for drivers of highly automated ADS-equipped CMVs

# Known CMV-ADS Developers

- Uber Advanced Technologies Group (Previously OTTO MOTTO)
- Embark (Varden Labs Inc.)
- Starsky Robotics
- Drive.ai
- Meritor WABCO
- Bendix Wingman
- Tesla Inc.
- NVidia
- Daimler Trucks North America (DTNA)
  - Freightliner Inspiration

# JOST Sensor Coupling System

- Automatic fifth wheel coupling
  - Including air and electrical connections
- Remote-controlled by driver from the cab
- Three sensors for optimum safety when connecting
- The fifth wheel coupling can still be operated mechanically







Driver-Monitored

# **CONNECTED VEHICLE PLATOONING**

# FHWA/FMCSA Platoon Demo

[September 14-15, 2017]

- 3-truck platoon
- Cooperative ACC (CACC)
- Driver-monitored operations
- 55mph
- Selectable headways:
  - 1.2 seconds
  - 0.75 seconds
  - 0.6 seconds
- 3-5 mile route on I-66 in Virginia
- Pre-trip inspection conducted by FMCSA and Virginia State Police









Brake application    Vehicle disconnected

# Platooning Pilot Program Considerations

<p><b>Time of day/ Lighting condition</b></p> <ul style="list-style-type: none"> <li>• Daylight</li> <li>• Dawn/ Dusk</li> <li>• Dark (lighted/ not lighted)</li> </ul>	<p><b>Weather condition</b></p> <ul style="list-style-type: none"> <li>• Clear</li> <li>• Bright sun; High glare</li> <li>• Cloudy</li> <li>• Rain</li> <li>• Sleet; Hail</li> <li>• Snow</li> <li>• Fog; Smog; Smoke</li> <li>• Severe crosswinds</li> </ul>	<p><b>Road type/ Location</b></p> <ul style="list-style-type: none"> <li>• Highway/ Freeway (rural)</li> <li>• Entrance/ Exit ramps</li> <li>• Town road</li> <li>• City road</li> </ul>	<p><b>Traffic density/ Flow</b></p> <ul style="list-style-type: none"> <li>• No other vehicles</li> <li>• Light traffic</li> <li>• Medium traffic</li> <li>• Heavy traffic</li> </ul> <p><b>Travel time of day</b></p> <ul style="list-style-type: none"> <li>• Off-peak light</li> <li>• Off-peak medium</li> <li>• Peak</li> </ul>	<p><b>Equivalent level of safety</b></p> <ul style="list-style-type: none"> <li>• Naturalistic vs Actual performance of the vehicle <ul style="list-style-type: none"> <li>• Crashes</li> <li>• Fatalities</li> <li>• Incidents</li> <li>• Events</li> </ul> </li> <li>• Naturalistic vs Actual performance of the driver <ul style="list-style-type: none"> <li>• Exceeding speed limit</li> <li>• Lane deviations</li> <li>• Emergency braking</li> <li>• Emergency steering</li> </ul> </li> <li>• ADAS-only considerations <ul style="list-style-type: none"> <li>• LKA activations</li> <li>• CIB activations</li> <li>• Minimal Risk Condition activations</li> </ul> </li> <li>• Programmed/ Certified Minimal Risk Conditions</li> </ul>
<p><b>Trip duration</b></p> <ul style="list-style-type: none"> <li>• Up to X hours</li> </ul>	<p><b>Load type</b></p> <ul style="list-style-type: none"> <li>• Unladen</li> <li>• Freight</li> <li>• Adult passengers</li> <li>• Children passengers</li> <li>• Hazardous materials</li> </ul>	<p><b>Vehicle type</b></p> <ul style="list-style-type: none"> <li>• Tractor-only</li> <li>• Tractor-trailer</li> <li>• Straight truck</li> <li>• Motorcoach</li> <li>• Bus</li> <li>• School bus</li> </ul>	<p><b>Risk management protocols</b></p> <ul style="list-style-type: none"> <li>• Human-monitored operation</li> <li>• Human is Minimal Risk Condition</li> <li>• Driver alertness assistance</li> <li>• Driver inattention/fatigue alert</li> <li>• EDR with video</li> </ul>	

# Potential CV Platooning Research Opportunities

- Development of uniform Interstate standards for truck platoon deployments
- Development of brake performance standards for safe truck platoons
- Development of a Second-Generation Performance Brake Tester
- Dynamic Onboard Brake Assessment (DOBBA) Technology
- Naturalistic following distance study

# Known Platooning System Developers

- Peloton Technology Inc.
- Bendix Wingman
- Daimler Trucks North America (DTNA)
  - Freightliner Inspiration
- Volvo Trucks



# **ADAS INSPECTION CONSIDERATIONS**

# Potential ADAS Inspection Research Opportunities

- FMCSA's CMV Technology Evaluation Program (formerly FAST DASH)
- Future roadside technology requirements and Integrated Inspection Management System (IIMS) support
- CMV Roadside Technology Consortium (CMVRTC)
- Telematic – Advanced Safety Message Set

**OTHER COMPONENTS/  
TECHNOLOGIES**

# Other Potential Research Opportunities

- Brake-by-Wire (electrically-controlled brake) systems in North American CMVs
- ELD business case cost-benefit analysis
- Hydraulic-hybrid commercial vehicle safety
- Linking fleet management system to truck parking
- Study of truck side guards to reduce pedestrian fatalities
- Update to the FMCSRs and FMCSA systems due to NHTSA's impending ESC mandate

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