Addressing Potential Barriers for Automated Driving Systems (ADS) - Equipped Vehicle Deployment

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WI AV Steering Committee Meeting

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AUTO ALLIANCE

DRIVING INNOVATION℠

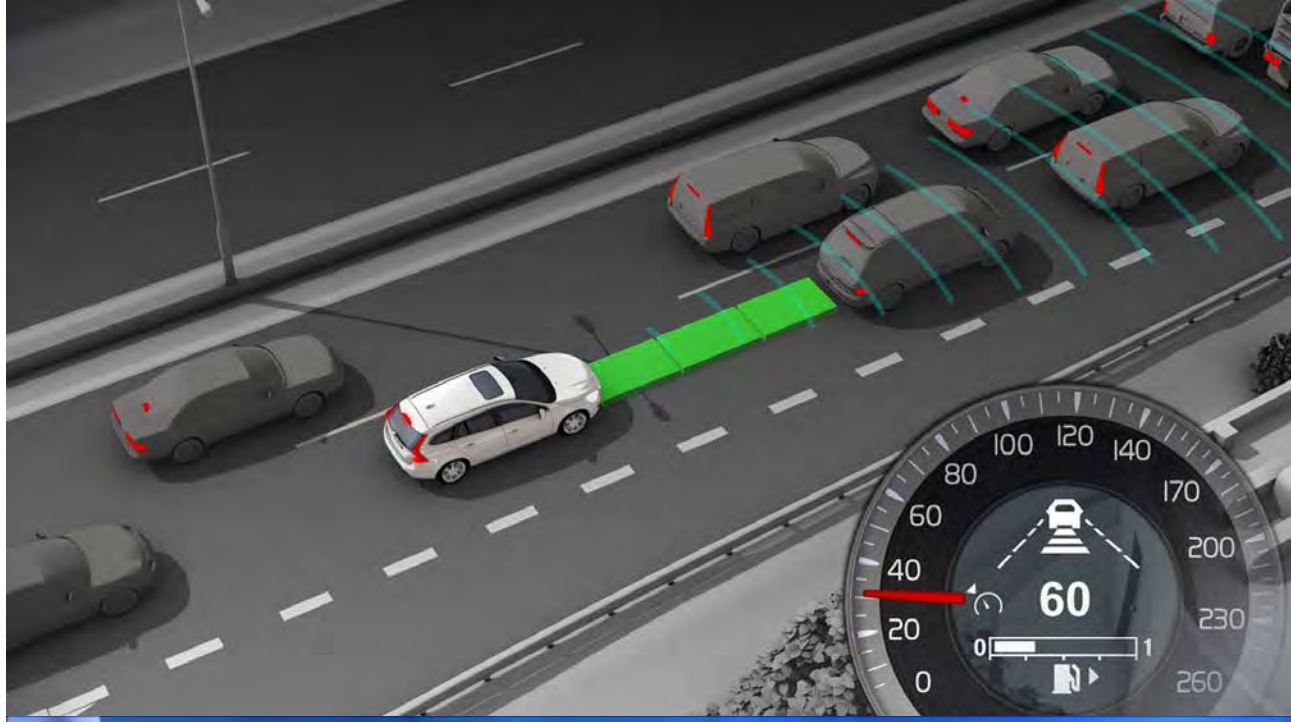
Advanced Driver Assist Systems (ADAS)

Blind Spot Monitoring

Lane Keeping Assistance

Adaptive Cruise Control

Parking Assist



What will future ADS-Equipped Vehicles look like?

GM Cruise AV is designed to operate safely on its own, with no driver, steering wheel, pedals or other manual controls when it goes on the road in 2019.

http://media.gm.com

Smart Vision EQ 2030 concept is fully autonomous, connected, battery-electric with a ride-sharing application.

http://Daimler.com/innovationspecials/iaa-2017/smart-vision-eq-2.html

Toyota e-Palette Concept Vehicle will be fully autonomous, battery-electric vehicle with open control interface to allow partner companies to install their own automated driving system.

http://corporatenews.pressroom.toyota.com/

Infrastructure Considerations

- Many of the infrastructure needs of AVs would also greatly benefit non-AVs, and are very cost effective considering the large safety benefit.
- Overall - Recommend consistency with the latest standards and recommendations from the Manual of Uniform Traffic Control Devices (MUTCD).
- **Lane markings:** This is a top priority. Lane markings should be clear and consistent. New markings should be protected from prior, erroneous markings.
- **Traffic signals and signs:** The most important factor to consider for traffic control devices is consistency (see MUTCD). It is important to have uniformity at local levels, not just state-to-state.
- **Construction zones:** Consistent implementation of the MUTCD is important to the operation of ADS. Real-time notification of infrastructure changes is useful to map-based ADS technologies.
- **Intersection crosswalks**: Decorative crosswalks should be avoided (i.e. unusual colors or shapes).
- **Speed bumps:** Signs or lane markings that precede speed bumps can help ADS systems to respond appropriately.

See Alliance comments submitted to FHWA Docket No. FHWA-2017-0049.

Infrastructure Considerations

- **Digital infrastructure:** V2I, V2V and V2X should not be thought of as necessary, or as a replacement for, the base detection and classification technologies upon which ADS performance relies.
- However, could provide benefits such as:
  - Communicate planned construction and temporary or permanent changes to roadways, e.g. intersection geometry, traffic pattern changes (time- dependent right of way)
  - Share information regarding weather and traffic flow conditions
  - Provide notifications from police and emergency vehicles to other road users
  - V2I communication of Signal Phase and Timing (SPAT) - *[Note SPAT Challenge, led by the American Association of State Highway Transportation Official ("AASHTO"), Institute of Traffic Engineers ("ITE") and ITS America]*
- Wireless standards and protocols
  - e.g. SAE's Communications for Mobility Committee and on the topics of V2X, machine readability, and Road Safety Message

See Alliance comments submitted to FHWA Docket No. FHWA-2017-0049.

Potential Policy Barriers in Wisconsin

- Generally, provisions that assume that every motor vehicle has a human driver are potentially problematic.
- *"The driver shall…"*

- **Licensing**: no person may operate a motor vehicle unless the person has a valid driver license
- **Accident scene requirements:** vehicle operator or an occupant must quickly notify law enforcement of certain crashes and provide driver's license information
- **Seatbelt requirement:** no person may operate a vehicle unless "the person" is properly restrained in a safety belt
- **Unattended vehicle:** no person may leave a vehicle unattended such that it appears abandoned

Update on Federal activity regarding ADS-equipped vehicles

- **NHTSA Request for Comments** on potential FMVSS barriers for ADS-equipped vehicles
  - Comment deadline: March 20, 2018
  - See Alliance comments submitted to Docket No. NHTSA-2018-0009
- **NHTSA Public Meeting** on potential FMVSS barriers for ADS-equipped vehicles (March 6)
- **FHWA Request for Comments** on potential FMVSS barriers for ADS-equipped vehicles
  - Comment deadline: March 5, 2018
  - See Alliance comments submitted to Docket No. FHWA-2017-0049
- **FTA Request for Comments** on potential FMVSS barriers for ADS-equipped vehicles
  - Comment deadline: March 2, 2018

- **Upcoming events…**
  - US DOT Stakeholder Meeting on addressing the FMVSS barriers, April 3-4, 2018
  - FHWA hosted meetings between ADS industry stakeholders and Infrastructure Owners and Operators, date(s) TBD

Congruence with the current motor vehicle safety assurance framework

- Self-certification framework includes 73 FMVSS that focus on crash avoidance, crashworthiness, and post-crash survivability.
  - → ***Many of these assume or require a human driver and human operated driving controls.***

- Traditionally, new technologies that cannot meet or be tested to current FMVSS have been enabled via interpretations, Part 555 exemptions and/or FMVSS rulemaking.

- Current FMVSS pose barriers for ADS-equipped Vehicles:
  - Wording/text changes
  - Warning telltales intended to alert a human driver of a status/malfunction condition
  - Test procedures
  - Non-traditional seating configurations
  - Other FMVSS requirements that serve no safety purpose in this context

Quantifying FMVSS Barriers

Toyota Concept-i Ride, 2018 CES

- 2016 Volpe Report: *Review of FMVSS for Automated Vehicles*
  - 33 FMVSS reference a driver
  - 32 FMVSS contain performance specifications, test procedures or equipment requirements that are barriers
- 2017 Alliance-led industry Work Group* to address FMVSS barriers. The Work Group identified 9 additional FMVSS that are potential barriers (32+9=41):
  - 1 ESC for heavy duty vehicles
  - 5 related to new seating configurations (dummies)
  - 3 for school buses

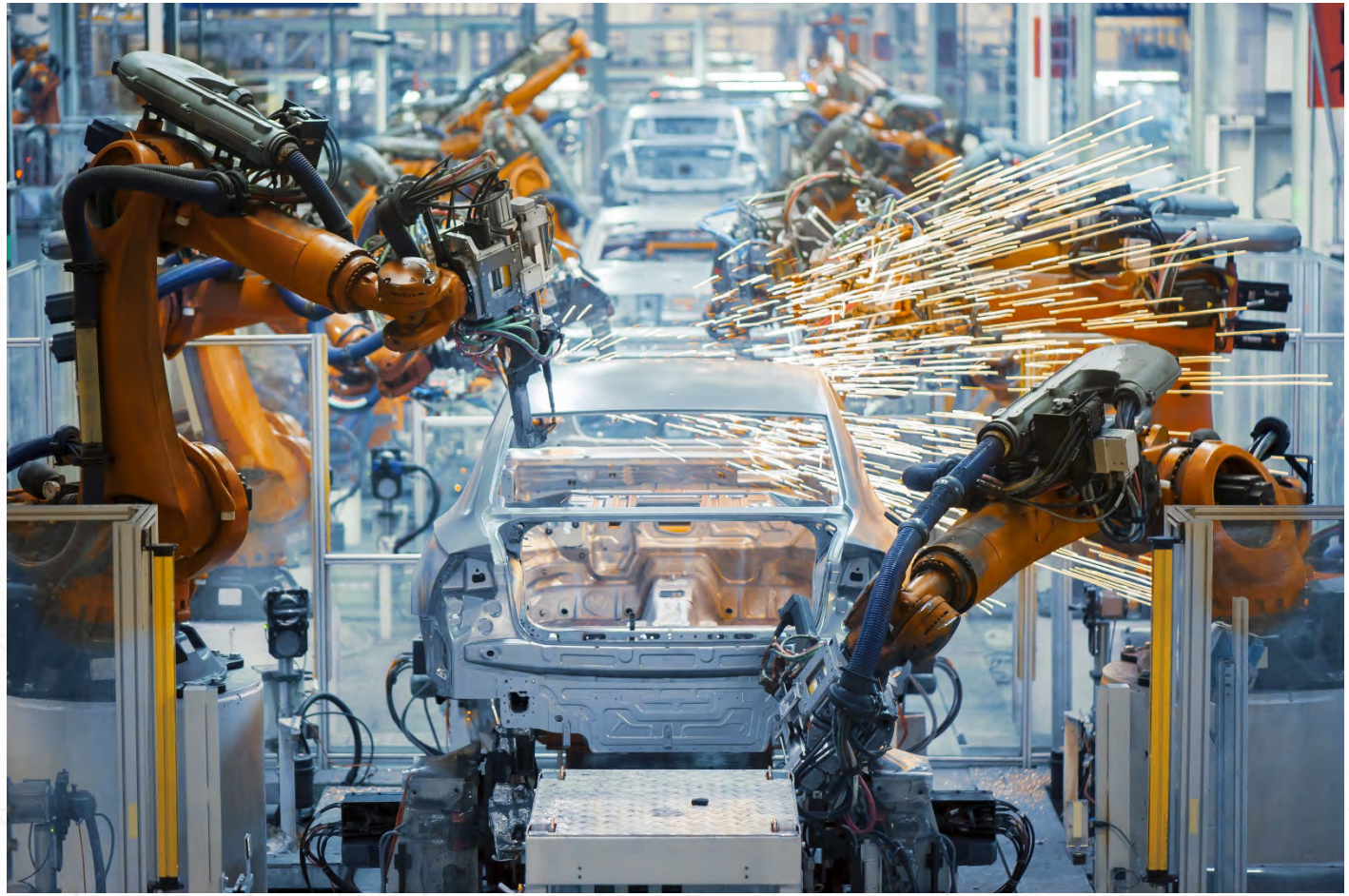
*Auto Alliance/Global Automakers/MEMA/EMA/Tesla/Waymo/Uber

What are the options?

- While a longer-term future safety assurance framework is unknown, manufacturers are required to self-certify their vehicles today.

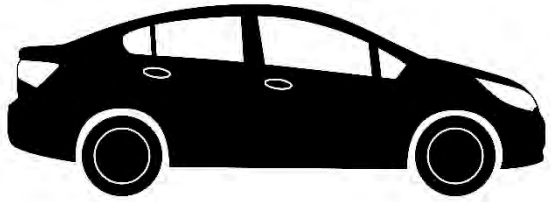
- Near-term action:
  - Interpretations/Guidance
  - Technical documentation
  - Part 555 exemptions

- Mid-term action:
  - Rulemaking to codify interpretations and incorporate new learnings into the regulations
  - International harmonization where possible



NHTSA Research – FMVSS Technical Translations

- NHTSA has contracted with VTTI to develop recommended changes to FMVSS to accommodate ADS-equipped Vehicles. The Alliance is participating as a stakeholder on this project.
- To date the Alliance has reviewed and provided input on 30 FMVSS.
- The Alliance is participating along with other stakeholders in the upcoming US DOT Stakeholder Meeting, April 3-4.



translator

FMVSS Technical Translations – Observations to Date

- How do you balance the need to provide specificity while ensuring the language is also broad enough to include future technologies/designs?
  - E.g. Replacing “driver’s side” with “left side” may not be so simple
  - E.g. Should notifications/warnings be audible, visual, or both, and where should they be located?

- Many test procedures require the vehicle to be driven. For ADS-Equipped Vehicles, this may require the design of a universal testing apparatus. However, this approach may be time-intensive.

FMVSS Technical Translations: Auto Alliance Next Steps

- **Continued engagement** in industry/government collaboration on this topic.
- Throughout our work, important to keep in mind S. 30111 of the Motor Vehicle Safety Act: *Each standard shall be **practicable**, meet the need for motor vehicle **safety**, and be stated in **objective terms**.*
- In addition to updating the FMVSS, the associated **Test Procedures** should also be updated. Any potential new FMVSS addressing performance of ADS-equipped Vehicles require input from **real world vehicle data**.
- In addition to the four concept vehicles currently being addressed in the NHTSA Research project, a **more comprehensive set of ADS-equipped Vehicle concepts** will ultimately need to be addressed.
- **Alternative performance criteria** need to be developed to support diverse alternative seating configurations.
- For some FMVSS, it will be important to address aspects beyond just the test procedures, i.e. **performance requirements**.

Update: Event Data Recorder SAE J1698

- Currently being updated to account for parameters uniquely related to Automated Driving Systems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THANK YOU!
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