Region 1

Autonomous and Connected Vehicles

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AAMVA
Society of Automotive Engineers (SAE) definitions of Automated Vehicles

Highly Automated Vehicles and AAMVA member collaboration

NHTSA’s Automated Vehicle Policy and the Model State Policy

It’s all about the Driver – but who is that?
As adopted by SAE, International:

<table>
<thead>
<tr>
<th>Level 0 – No Automation</th>
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<td>Level 1 – Driver Assistance</td>
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<td>Level 2 – Partial Automation</td>
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<td>Level 3 – Conditional Automation</td>
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<td>Level 4 – High Automation</td>
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<td>Level 5 – Full Automation</td>
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In vehicles available today Levels 0, 1 and 2

**Level 0 – No Automation**
The human driver does everything

**Level 1 – Driver Assistance**
An automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task.

**Level 2 – Partial Automation**
An automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving tasks.
Example: Lane departure warning system
Forward Collision Warning Systems
In testing and development today Levels 3, 4 and 5 = HAVs

**Level 3 – Conditional Automation**

An automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests.
An automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions.
Level 4 – High Automation
Level 5 – Full Automation

The automated system can perform all driving tasks, under all conditions that a human driver could perform them.
• **LIDAR** Laser Illuminating Detection and Ranging – or LIDAR – is used to build a 3D map and allow the car to “see”.

• **Radar** units allow the car to avoid impact by sending a signal to the on-board processor to apply the brakes, or move out of the way.

• **High-Powered Cameras** mounted to the exterior with slight separation in order to give an overlapping view of the car’s surroundings.

• **Sonar** narrow field of view and its relatively short effective range (about 6 meters).

• **Positioning** GPS data, and driving speed to accurately determine the precise position of each vehicle.

• **Sophisticated Software** processes all of the data in real-time as well as modeling behavioral dynamics of other drivers, pedestrians, and objects around the vehicle. While some data is hard-coded into the car, such as stopping at red lights, other responses are learned.
1. Autonomous Vehicle Information Sharing Group and Library

AV Information Sharing Group

- Established in December 2013.

- Group has held conference calls monthly to review state laws, studies, news articles and other relevant material.

- Started with about 20 people participating and has grown to 60 to 80 people. Representing jurisdictions, federal government and industry partners.

AV Information Library on AAMVA’s website to store information on AVs.

http://www.aamva.org/Autonomous-Vehicle-information-Library/
The AVWG The Working Group established fall 2014
• consists of 16 jurisdictional members, 2 Canadian reps, NHTSA and AAMVA staff
• NHTSA funded project for first 2 years
Three sub-groups focusing on issues impacting:
• Drivers: Licensing & Testing;
• Vehicles: Titling & Registration; and
• Law Enforcement: Concerns & Challenges
1. Provided significant input for the NHTSA Model State Policy - Published September 20, 2016

2. Concurrent with the Model State Policy development, the Working Group will complete *Guidelines for the Regulation of Highly Automated Vehicles*, a final piece of its work in support of the Model State Policy. Anticipated December 2017 or January 2018
Published September 2016 and can be found at www.transportation.gov/AV

Section 1 – Vehicle Performance Guidance for Automated Vehicles (outlines best practices for safe pre-deployment development and testing prior to commercial sale; sets USDOT expectations of industry).

The Guidance includes a 15-Point Safety Assessment to set clear expectations for manufacturers developing and deploying automated vehicle technologies.
Section 2 – Model State Policy
Recognizes states’ sovereignty while encouraging a consistent national framework rather than a patchwork of inconsistent laws. References partnership with AAMVA.

✓ Federal Responsibilities
✓ State Responsibilities
✓ The Model State Policy
Federal responsibilities include:

- Setting safety standards for new motor vehicles and motor vehicle equipment; Enforcing compliance with the safety standards;
- Investigating and managing the recall and remedy of non-compliances and safety-related motor vehicle defects on a nationwide basis;
- Communicating with and educating the public about motor vehicle safety issues; and
- When necessary, issuing guidance to achieve national safety goals.
State responsibilities include:

• Licensing (human) drivers and registering motor vehicles in their jurisdictions;
• Enacting and enforcing traffic laws and regulations;
• Conducting safety inspections, when States choose to do so; and
• Regulating motor vehicle insurance and liability.
The intent is for states that wish to regulate procedures and conditions for testing, deployment and operation of HAVs.

Create sufficient consistency of laws and policies to avoid a patchwork of inconsistent laws that could impede innovation and the widespread distribution of safety enhancing automated vehicles technologies.
Deeper Dive into the Model framework - covers 8 areas:

1. Administrative structure and processes that States can set up to administer requirements regarding the use of public roads for HAV testing and deployment in their States;

2. Application by manufacturers or other entities to test HAVs on public roads;

3. Jurisdictional permission to test;

4. Testing by the manufacturer or other entities;
Model framework areas covered (continued)

5. Drivers of deployed vehicles;

6. Registration and titling of deployed vehicles;

7. Law enforcement considerations; and

8. Liability and insurance
• Identify a lead agency responsible (DMV, DOT State Police, etc.)

• Create a Highly Automated Vehicle Committee that includes representatives:
  - State agencies DMV, DOT, State Police, Highway Safety Office, OIT, Insurance regulation, toll and transit authorities and the agency representing the aging and disabled.
  - Governor's office, Legislators, and local government agencies
Committee should consult as appropriate with:

- Industry
- Research Institutes
- Groups representing pedestrians, bicyclists, consumers
- and other interested parties
Support the safe testing, deployment and operation of Highly Automated Vehicles

• Understand the HAV technology
• Understand impact on highway safety, highway safety programs, infrastructure, enforcement, traffic laws, economic development and the general public
• Develop a state strategy for addressing manufacture’s testing on public roadways
• Review current state statutes; draft proposed legislation
• Provide a forum for communication, guidance and resources related to the evolution of HAVs
• Monitor federal activities; comment on federal polices and reports
Lead agency - develop an internal process for addressing testing by manufacturers or other entities.

Create an application to test that:

✓ Identifies the testing entity
✓ Identifies each vehicle that will be used
✓ Identifies driver/operators and their driver’s license information
✓ Includes a safety plan and a testing plan
✓ Surety bond or proof of self insurance for no less than 5 million dollars.
✓ Summary of training the drivers/operators have received
Lead Agency:

- Review application and consults with the state law enforcement agency
- Communicate with State HAV committee
- When satisfied, issue letter of authorization to test and vehicle specific permits; may choose to add certain restrictions or limitations;
- May want the ability to suspend for just cause
- May want to require periodic renewal
- Test vehicles should be properly registered and titled
• Complying with federal, state and local laws

• Ensuring the test vehicle is operated solely by licensed operators that have had a background check, and have been designated on the application and properly trained

• Report crashes in accordance with state law
Registration and title record and database should indicate that it is a highly automated vehicle.

- Law Enforcement may need to know when stopping a vehicle.

- Consumers should know what technology is on a used vehicle and when it was added; may have been after manufacture.

- New federal labeling may be needed.
Driver education, training and testing will be impacted.

- When and how should new driver be tested on the use of the technology
- At what point and for what vehicles will a license no longer be required?
Law Enforcement Considerations

- Some of these issues are raised in the NHTSA policy, others will be discussed in the Working Group’s guidance document
- Crash and Incident Reporting
- Criminal Activities
- Distracted Driving
- Enforcement/Penalties
- First Responder Safety
- Law Enforcement and First Responder Training
- Vehicle Response to Emergency Vehicles, Manual Traffic Controls, and Atypical Road Conditions
- System Misuse and Abuse
- Vehicle Identification
- Violation Codes Programming
- Rules of the Road
• Raises the issue of liability; human or machine

• Insurance model may change in the future

• How and when do product liabilities laws apply?

• NHTSA suggests there needs to be a study done involving the insurance industry and stakeholders.
Section 3 – NHTSA’s Current Regulatory Tools
(being expanded to include streamlined review and exemption request processes).

Section 4 – New Tools and Authorities (Identifies potential new tools, authorities and regulatory structure to enable safe and expeditious deployment of new technologies).
Who is the Driver?

- Experienced Drivers – how and when will they learn to use the new technology and understand its limitations

- New Drivers – how will they be tested to handle Level 3 vehicles if appear in level 2 vehicle

- MyCarDoesWhat.org
• At what point and for what vehicles will a license no longer be required?

• Need to consider the roles of driver vs operator vs occupant

• Uniform Law Commission

• Rules of the Road/Traffic laws under review
  Transportation Research Board
NCHRP 20-102(07) Implications of Automation for Motor Vehicle Codes:

**OBJECTIVE:** to provide state departments of transportation (DOTs) and motor vehicle departments with guidance and resources to assist with the legal changes that will be needed from the roll out of connected and automated vehicles.

A project to watch, more information will be available in the future. Anticipate report to be available in summer 2018.
• Iterative consideration how best to enable deployment of innovative (potentially life-saving) technologies with current public safety demands

• Develop and sustain collaborative effort among government officials, stakeholders and industry
National Highway Traffic Safety Administration

Uniform Law Commission
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