Autonomous and Connected Vehicle
Testing and Deployment Committee

2018
Report to the Governor

— Produced by the Idaho Transportation Department, November 2018 —

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Executive Summary

Established by Governor C.L. "Butch" Otter's Executive Order 2018-01, the Autonomous and Connected Vehicle Testing and Deployment Committee met in May, August, and October of 2018 to discuss and address the future of automated vehicles (AV) and connected vehicles (CV) in Idaho. The committee formed a Technical Advisory Subcommittee to provide expertise in detailed subjects such as safety, liability, infrastructure, and cybersecurity.

State and national experts gave presentations on a variety of topics, including state and national policy, infrastructure, security, privacy, and the testing and deployment of AV/CV in Idaho. Committee members identified several issues and concerns, including:

- The rapid pace of implementation for AV/CV technology.

- The difficulty of funding the needed infrastructure investments for AV/CV testing and deployment in a state that currently has a transportation-funding shortfall of $417 million per year for highway maintenance, safety, and capacity.

  Many experts believe most if not all automated vehicles (excluding large trucks) will be powered by electricity, not gas or diesel. As a result, Idaho will need to find new and innovative ways to fund the infrastructure improvements required for AV/CV testing and deployment in Idaho

Twenty-nine states have enacted legislation related to AVs. Several states are currently involved in moving testing and deployment beyond the advisory committee level using Executive Orders from their Governors. Several states have enacted legislation that allows for specific applications and testing of AV/CV. Four states (California, Florida, Michigan, and Nevada) have passed comprehensive regulations governing testing.

Recommendations:
The Autonomous and Connected Vehicle Testing and Deployment Committee developed several recommendations for Idaho, including the following:

- Encourage legislation to allow autonomous vehicle testing and deployment.

- Rather than amending all sections of motor vehicle or traffic law to include the use of Cooperative Automated Transportation (CAT), consider establishing regulatory or policy actions as a separate chapter of Idaho Code.

- Remain technology-neutral during testing and deployment.

- Monitor national trends and adopt those most conducive to deploying AV/CV in Idaho while ensuring public safety for citizens.

- Coordinate regulatory and policy decisions across state lines to improve regional harmonization.

- Facilitate a business-friendly environment that encourages industry partners to choose Idaho for developing and testing AV/CV technology, and incorporate relevant public and private agencies.

CHAPTER 1

Committee Appointment, Duties, and Members

Executive Order 2018-01
On January 2, 2018, Governor C.L. "Butch" Otter signed Executive Order 2018-01, establishing the Idaho Autonomous and Connected Vehicle Testing and Deployment Committee. The Executive Order cited several reasons for the creation of the committee, including:

- Idaho is uniquely positioned to assist in the development and deployment of AV/CV technology.
- The controlled testing and operation of AV/CV in a variety of real-world driving conditions on roads within the state will advance the safe and successful deployment of AV/CV.
- The removal of barriers to the testing and deployment of AV/CV technology in Idaho may produce significant social, economic, environmental, and innovative benefits, including enhancing mobility, creating jobs, and improving transportation safety and efficiency.

Duties
The Executive Order established a mission for the committee with four clear directives:

- Identify all agencies of the State of Idaho with pertinent jurisdiction to support the testing and deployment of AV/CV.
- Coordinate with the identified agencies and discuss how best to administer the testing of AV/CV on roads in relation to issues such as vehicle registration, licensing, insurance, traffic regulations, and vehicle owner or operator responsibilities and liabilities under current law.
- Review existing state statutes and administrative rules and identify existing laws or rules that impede the testing and deployment of AV/CV on roads.
- Identify strategic partnerships to leverage the social, economic, and environmental benefits of AV/CV.

The Executive Order directed the Idaho Transportation Department to produce reports containing the committee's findings and recommendations, and to submit the committee's first report to the Governor no later than November 1, 2018.

Composition of the Committee:

The Executive Order requires the Autonomous and Connected Vehicle Testing and Deployment Committee to be comprised of:

- The Director of the Transportation Department or designee
- The Director of the Department of Commerce or designee
- The Director of the Department of Insurance or designee
- The Director of the Idaho State Police or designee
- Legal counsel from the Office of the Governor
- Two members of the Idaho Legislature, one appointed by the Speaker of the House and one appointed by the President Pro Tempore of the Senate
- The Director of Information Security

The Executive Order states that the governor will, at a minimum, appoint the following to the committee:

- At least four representatives from the autonomous and connected vehicle technology sector, two of whom must be representatives of automobile manufacturers
- A representative from the Idaho Association of Highway Districts
- A representative from the Local Highway Technical Assistance Council
- A representative from the Idaho Sheriffs' Association
- A representative from the Idaho Chiefs of Police Association
- A representative from the American Automobile Association
- A representative from the Idaho Automobile Dealers Association
- A representative from the trucking industry

Standing Committee Members:

- Sen. Bert Brackett Idaho Senate

- Tom Donovan — Idaho Department of Insurance
- Sam Eaton — Office of the Governor
- Lt. Col. Sheldon Kelley — Idaho State Police
- Bobbi-Jo Meuleman — Idaho Department of Commerce
- Brian W. Ness — Idaho Transportation Department
- Jeffery Weak — Idaho Office of Information Security
- Rep. Rick Youngblood — Idaho House of Representatives

Governor-Appointed Committee Members:

- Jason Andrus — Doug Andrus Distributing, LLC
- Chief William Bones — Boise Police Department
- Matthew Conde — American Automobile Association
- Josh Fisher — Association of Global Automakers
- Ritchie Huang — Daimler Truck
- Linda Jones — Lincoln County Assessor
- Dr. Anne Marie Lewis — Alliance of Automobile Manufacturers
- David Lincoln — Golden Gate Highway District
- Jeff Miles — Local Highway Technical Assistance Council
- Bobby Petersen — Fairly Reliable Bob's, Inc.
- Jayson Ronk — Micron Technology, Inc.
- Sheriff David Sanders — Camas County Sheriff

Technical Advisory Subcommittee
The Technical Advisory Subcommittee members are:

- Ahmed Abdel-Rahim — University of Idaho
- Carmen Achabal — Idaho Department of Commerce
- Ed Bala — Idaho Transportation Department
- Don Kostelec — Idaho Walk Bike Alliance
- Greg Fredericksen — National Highway Transportation Safety Administration
- Eric Forsch — Idaho Department of Commerce
- Jennifer Gonzalez — Idaho Transportation Department
- Dale Higer — Uniform Law Commission Drafting Committee on Highly Automated Vehicles
- Rik Hinton — Idaho Transportation Department
- Stephen Hunt — Valley Regional Transit
- Axel Krings — University of Idaho
- Sydney Lewis — Idaho Transportation Department
- Aimee Loudenslager — Ada County Highway District
- Jeff Marker — Idaho Transportation Department
- Travis McGrath — Idaho Transportation Department
- Dave Meredith — Boise State University
- Matt Moore — Idaho Transportation Department
- Pete Palacios — Idaho Transportation Department
- James Pardy — City of Boise
- Lori Porreca — Federal Highway Administration
- Bob Ricketts — Ricketts and Associates Insurance Services
- Kenneth Rohde — Idaho National Laboratory
- Amy Smith — Idaho Transportation Department
- Tim Thomas — Idaho Office of the Attorney General
- John Tomlinson — Idaho Transportation Department
- Chris Victory — Idaho Transportation Department
- Richard York — Federal Motor Carrier Safety Administration

CHAPTER 2

Introduction to Autonomous and Connected Vehicles

The U.S. Department of Transportation is encouraging the safe development, testing, and deployment of automated vehicle technology by working with a coalition of partners from industry, academia, state and local government agencies, safety advocates, and transportation stakeholders.

This chapter is designed as an introduction to provide readers with a basic level of understanding about the technology and terminology associated with autonomous and connected vehicles.

Connected vehicles use wireless communication between vehicles, transportation infrastructure, and the personal communication devices of passengers and drivers. This can include vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication.

Autonomous vehicles use a combination of sensors, cameras, radar, and artificial intelligence to travel between destinations. The Society of Automotive Engineers (SAE) identifies six levels of automation. "At levels four and five, vehicles are fully operated by an automated driving system, and all driving tasks are controlled autonomously (see chart below). Currently, highly automated vehicles are not available for sale in the U.S. but are undergoing testing in many locations." For the purposes of this report, "fully automated vehicles" refers to SAE automation levels three, four, and five.

SAE AUTOMATION LEVELS[1]

0 No Automation
The full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems.

1 Driver Assistance
The *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*.

2 Partial Automation
The *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*.

3 Conditional Automation
The *driving mode*-specific performance by an *automated driving system* of all aspects of the *dynamic driving task* with the expectation that the *human driver* will respond appropriately to a *request to intervene*.

4 High Automation
The *driving mode*-specific performance by an *automated driving system* of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*.

5 Full Automation
The full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*.

1 SAE International, J3016_201806: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (Warrendale: SAE International, 15 June 2018), https://www.sae.org/standards/content/j3016_201806/.

The federal government is working on legislation to aid in the implementation of AV/CV technology. The U.S. House and Senate have initiated bills (no laws are yet in place) restricting states from adopting, maintaining, or enforcing rules or standards limiting a driver's ability to operate highly automated vehicles. This includes restricting a state's ability to deny issuance of a driver license for the operation or use of a highly automated vehicle in a manner that discriminates on the basis of disability, and establishing limits on the number of automated vehicles manufactured annually.

The American Association of State Highway and Transportation Officials (AASHTO) uses the phrase "Cooperative Automated Transportation" (CAT) rather than "Automated and Connected Vehicles." They do so because "Cooperative Automated Transportation" places the focus on the entire AV/CV transportation system—not just the vehicles. This committee will use that phrase where appropriate and applicable in this document to match AASHTO and other states.

The list on the following page defines the most-common acronyms the committee will be using when discussing this new and emerging technology.

ACRONYMS:

- AAMVA American Association of Motor Vehicle Administrators
- ADS Automated Driving Systems
- AV Automated Vehicle
- CAT Cooperative Automated Transportation
- CAV Connected and Automated Vehicles
- CV Connected Vehicle
- C-V2I Cellular Vehicle to Infrastructure
- C-V2X Cellular-Based Vehicle-to- "Other"
- DC Driverless Car
- DSRC Dedicated Short Range Communications
- FHWA Federal Highway Administration
- FMCSA Federal Motor Carrier Safety Administration
- FMVSS Federal Motor Vehicle Safety Standards
- GIS Geographic Information System
- GPS Global Positioning System
- HAV Highly Automated Vehicle
- ITD Idaho Transportation Department
- ITS Intelligent Transportation Systems
- LIDAR Light Detection and Ranging
- MaaS Mobility as a Service
- NCSL National Conference of State Legislators
- NHTSA National Highway Traffic Safety Administration
- OEM Original Equipment Manufacturer
- RSU Roadside Unit
- SAE Society of Automotive Engineers
- SPaT Signal Phase and Timing
- TOC Transportation Operations Center
- U.S. DOT United States Department of Transportation
- V2I Vehicle-to-Infrastructure
- V2N Vehicle-to-Network
- V2V Vehicle-to-Vehicle
- V2X Vehicle-to- "Other"
- VMT Vehicle Miles Traveled
- Wi-Fi Wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections

CHAPTER 3

Policy

Regional and National Consistency

On September 12, 2017, the National Highway Traffic Safety Administration (NHTSA) released new federal guidelines for Automated Driving Systems (ADS) titled "A Vision for Safety 2.0." NHTSA reviewed draft state legislation and identified common components that states should consider, including in legislation, and included the following safety-related best practices to consider when crafting ADS legislation:

- Provide a "technology-neutral" environment — States should not place unnecessary burdens on competition and innovation by limiting ADS testing or deployment to motor vehicle manufacturers only. All entities that meet federal and state law prerequisites for testing or deployment should have the ability to operate in the state.

- Provide licensing and registration procedures — States are responsible for driver licensing and vehicle registration procedures. To support these efforts, NHTSA recommends:

  - Defining "motor vehicle" under ADS laws to include any vehicle operating on the roads and state highways.

  - Licensing ADS entities and testing operators for ADS.

  - Registering all vehicles equipped with ADS and establishing proof of financial responsibility requirements in the form of surety bonds or self-insurance.

- Provide reporting and communication methods for Public Safety Officials — States can take steps to monitor safe ADS operation through reporting and communications mechanisms with public safety agencies.

- Review traffic laws and regulations that may serve as barriers to operation of ADS — For example, some states require a human operator to have one hand on the steering wheel at all times—this would pose a barrier to Level Three through Level Five ADS.

SELF Drive Act

On September 6, 2017, the U.S. House of Representatives passed the SELF Drive Act (H.R. 3388), impacting AVs in several ways, including:

- Expansion of Federal Preemption — Expands sole federal jurisdiction beyond the traditional role of motor vehicle safety to encompass motor vehicle operations, and would prohibit states from regulating operators of highly automated vehicles.

- Updating Federal Motor Vehicle Safety Standards (FMVSS) —Begins the process of updating vehicle safety standards to address new types of motor vehicles.

- FMVSS Exemptions —Provides updates on how the federal government will grant exemptions from certain safety standards for companies wishing to develop AVs. Current exemptions from safety standards are limited to 2,500 per year, although the bill will gradually raise this to 100,000.

- Advisory Council —Establishes a highly automated vehicle advisory council to help guide and provide recommendations to the Department of Transportation (DOT) on highly automated vehicles (HAVs).

AV START Act

On September 28, 2017, the U.S. Senate Commerce Committee unveiled legislation regarding AVs, the "American Vision for Safer Transportation Through Advancement of Revolutionary Technologies (AV START) Act". The AV START Act addresses:

- Preemption —Includes a preemption section identical to the SELF Drive Act passed by the House. It preempts states from regulating the performance of ADS and enacting any "unreasonable restrictions" for registration, licensing, driving education and training, insurance, law enforcement, crash investigations, safety and emissions inspections, congestion management of vehicles on the street within a state or political subdivision of a state, or traffic.

- Updating FMVSS —Begins the process of updating vehicle safety standards for a new type of motor vehicle.

- FMVSS Exemptions —Updates how the federal government will provide exemptions from certain federal safety standards for companies wishing to develop AVs.

- Safety Evaluation Report —Requires HAV and ADS manufacturers to submit a safety evaluation report to the DOT detailing how the manufacturer is addressing the following nine subject areas, through documented testing, validation, and assessment:

  - System Safety

  - Data Recording

  - Cybersecurity

  - Human-Machine Interface

  - Crashworthiness

  - Documentation of Capabilities

- Post-Crash Behavior

- Account for Applicable Laws

- Automation Function

- Advisory Council —Establishes an HAV technical committee.

- Traffic Safety and Law Enforcement —Directs the U.S. DOT Secretary to work with state and local governments and law enforcement agencies to research how HAVs will impact law enforcement and traffic safety as well as how to improve crash data regarding HAVs.

- Cybersecurity —Requires HAV and ADS manufacturers to develop and execute a written plan for identifying and reducing cybersecurity risks.

State Legislation and Executive Orders
As of August 27, 2018, the National Conference of State Legislators (NCSL) reported the following AV activity among the states:

- To date, 33 states have introduced legislation.

- Twenty-nine states (Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maine, Michigan, Mississippi, Nebraska, New York, Nevada, North Carolina, North Dakota, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Vermont, Washington and Wisconsin) and Washington D.C. have enacted legislation related to AVs.

- Governors in Arizona, Delaware, Hawaii, Idaho, Maine, Massachusetts, Minnesota, Ohio, Washington and Wisconsin have issued executive orders related to AVs.

NCSL has an AV legislative database that provides up-to-date information about state AV that has been introduced in the 50 states and the District of Columbia.

Several states are involved in moving AV testing and deployment beyond the advisory committee level using Executive Orders from their Governors, including:

- Arizona's Governor Doug Ducey signed an executive order in 2015 directing various agencies to "undertake any necessary steps to support the testing and operation of self-driving vehicles on public roads within Arizona." He also ordered the enabling of pilot programs at selected universities and developed rules to be followed by the programs. The order established a Self-Driving Vehicle Oversight Committee within the Governor's Office. On March 1, 2018, Governor Ducey added to the 2015 Executive Order with Executive Order 2018-04. The order includes updates to keep pace with emerging technology, including advancements toward fully autonomous vehicles, and requires all ADS to be in compliance with all federal and state safety standards.

- Ohio Governor John Kasich signed Executive Order 2018-01K on January 18, 2018. The order created DriveOhio to, in part, "bring together those who are responsible for building infrastructure in Ohio with those who are developing the advanced mobility technologies needed to allow our transportation system to reach its full potential by reducing serious and fatal crashes and improving traffic flow."

  In May 2018, Governor Kasich signed an Executive Order allowing autonomous vehicle testing and pilot programs in the state. In order to do so, companies must register with DriveOhio and submit information on their companies, intended areas and conditions to test in, and other requirements. Autonomous vehicles tested in the state must have a designated operator, but they are not required to be inside the vehicle.

- Washington's Governor Jay Inslee signed an Executive Order in 2017 to address AV testing and establish an AV workgroup. The order:

  - Requires that state agencies with pertinent regulator jurisdiction "support the safe testing and operation of autonomous vehicles on Washington's public roads."

  - Establishes an interagency workgroup and enables pilot programs throughout the state.

  - Specifies certain requirements for vehicles operated by humans present in the vehicle and for vehicles operated without humans in the vehicle.

Several states have enacted legislation (summarized below) on AVs that allows for specific applications and testing (states in bold have passed comprehensive regulations governing testing):

- Arkansas regulates testing of AV technology and truck platoons.

- **California** requires the California Highway Patrol to adopt safety and performance standards for AVs on public roads, permits AV testing following adoption of such standards, and authorizes two area transportation authorities to test AVs.

- Colorado requires approval for AV testing and legislative reports.

- Connecticut requires development of pilot programs for up to four municipalities, specifies testing requirements, and requires proof of insurance.

- **Florida** encourages AV and autonomous technology development and testing, allows drivers to operate an AV, allows testing with insurance requirements on public roads, and provides for a study on truck platooning.

- Georgia defines and allows truck platooning, exempts driver's license requirements for operating AVs, and specifies insurance and registration requirements.

- Indiana defines vehicle platooning and has an approval system for their operations upon filing a plan for operations with the state.

- Kentucky allows CV platooning on highways after providing notification to the Department of Vehicle Regulation and State Police and gaining their approvals.

- **Michigan** allows for AVs under certain conditions and allows operation without a person in the AV.

- Mississippi defines platooning and allows operations with approvals from the Department of Transportation and the Department of Public Safety.

- Nebraska defines ADS and allows operations on public roads meeting certain conditions with proof of insurance and approval by the Division of Motor Vehicles (DMV). This includes for-hire, public-transportation, and on-demand services.

- **Nevada** defines platooning technology, authorizes operation of AVs, requires a driver's license endorsement for operators of AVs, defines AVs, and directs the DMV to adopt rules for license endorsement and for operation (including insurance, safety standards, and testing).

- New York allows the DMV to approve AV testing and demonstrations with supervision by the state police, including a law enforcement interaction plan.

- Tennessee allows motor vehicles to be operated, or to be equipped with, an integrated electronic display visible to the operator while autonomous technology is engaged, and permits the operation of a platoon on streets and highways in the state after the person provides notification to the Departments of Transportation and Safety. The state also exempts ADS-operated vehicles from licensing requirements, and permits ADS-operated vehicles on streets and highways without a driver in the vehicle if the vehicle meets certain conditions.

- Utah authorizes the Department of Transportation to conduct a connected vehicle technology testing program and defines a connected platooning system.

The states with comprehensive AV regulations have some common themes and best practices, including:

- Adopting state safety and performance standards for AVs.
- Permitting AV testing following adoption of such standards.
- Identifying AV pilot testing opportunities.
- Requiring AV registration and approval of insurance and licensing for such testing and operation.
- Defining platooning technology and operations.

National Safety Policy

The U.S. DOT and the NHTSA released federal guidance for ADS titled "A Vision for Safety 2.0."

The document promotes safe deployment of advanced driver-assistance technologies by encouraging best practices and prioritizing safety. It provides a flexible framework for industry to use in choosing how to address safety-design elements.

The guide encourages entities engaged in testing and deployment to publicly disclose voluntary safety self-assessments of their systems to demonstrate their approaches to achieving safety. It also:

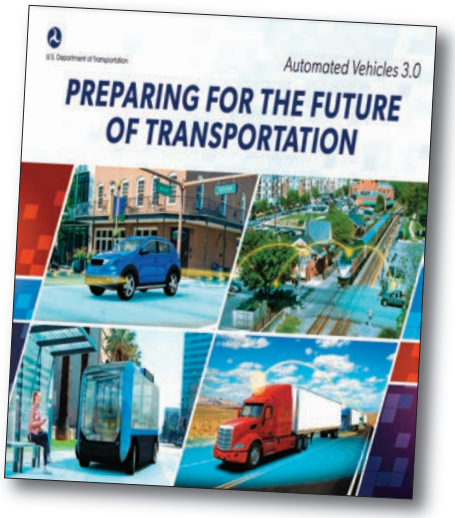
- Provides technical assistance to states
- Provides best practices for policymakers
- Focuses on SAE International automation levels three through five (conditional, high, and full automation)
- Clarifies the guidance process
- Specifies that entities do not need to wait to test or deploy ADS
- Revises unnecessary design elements from the safety self-assessment
- Aligns federal guidance with the latest developments and industry terminology
- Clarifies federal and state roles going forward

The voluntary guidance document is designed to support the automotive industry, states, and other key stakeholders as they consider and design best practices for testing and deployment, and addresses 12 areas:

1. System Safety
2. Operational Design Domain (ODD)
3. Object and Event Detection and Response
4. Fallback (Minimal Risk Condition)
5. Validation Methods
6. Human Machine Interface
7. Vehicle Cybersecurity
8. Crashworthiness
9. Post-Crash ADS Behavior
10. Data Recording
11. Consumer Education and Training
12. Federal, State and Local Laws

In October 2018, the U.S. DOT released its new policy framework addressing AVs, "Automated Vehicles 3.0: Preparing for the Future of Transportation" (AV 3.0). According to the U.S. DOT, this voluntary guidance builds upon, but does not replace, the guidance provided in the earlier "Automated Driving Systems 2.0: A Vision for Safety."

The American Association of Motor Vehicle Administrators (AAMVA) provided the following synopsis of AV 3.0:



- The U.S. DOT will interpret and adapt the definitions of "driver" and "operator" to recognize that the terms do not refer exclusively to a human, but may include an automated system.
- The U.S. DOT no longer recognizes the designation of the ten Automated Vehicle Proving Grounds announced in 2017.
- States are urged to remove barriers to automated vehicle technologies and to support interoperability.

- The U.S. DOT has the authority to establish motor vehicle safety standards that allow for new vehicle designs, such as those without steering wheels, pedals, or mirrors.

- The U.S. DOT will pursue a self-certification approach rather than a vehicle type approval process.

- Developers of automated driving systems are encouraged to make their Voluntary Safety Self-Assessments public.

In addition, AV 3.0:

- Provides considerations and best practices for state and local governments to support the testing and operation of automation technologies.

- Supports the development of voluntary technical standards and approaches as a non-regulatory means to advance the integration of automation technologies into the transportation system.

- Describes a framework of safety risk management stages for integration of commercial automated vehicles.

- Affirms the U.S. DOT is continuing its work to preserve the ability for transportation safety applications to function in the 5.9 GHz spectrum.

The policy framework also establishes U.S. DOT administrative actions to explore:

- Setting exceptions to certain safety standards that are relevant only when human drivers are present for vehicles equipped with automated driving systems.

- A proposal to modify the procedures NHTSA will follow when making decisions on exemption petitions.

- How to better understand the areas of responsibility between state and federal governments in the context of ADS-equipped commercial motor vehicles and carriers.

- The Federal Motor Carrier Safety Administration (FMCSA) consideration of changes to federal motor carrier safety regulations to accommodate the integration of ADS-equipped commercial vehicles.

- Plans to update the 2009 Manual on Uniform Traffic Control Devices, taking new technologies into consideration.

- Identification of automation-related voluntary standards being developed through standards development organizations and associations.

- A study of the workforce impacts of AVs.

The framework provides the U.S. DOT's vision for states' roles regarding AVs, and indicates that states are directly "*responsible for licensing human drivers, registering motor vehicles, enacting and enforcing traffic laws, conducting safety inspections, and regulating motor vehicle insurance and liability. They are also responsible for planning, building, managing, and operating transit and the roadway infrastructure. Many of those roles may not change significantly with the deployment of automated vehicles.*"

Roles and Responsibilities

The U.S. DOT established the following federal and state responsibilities:

Federal Responsibilities

NHTSA is responsible for:

- Setting FMVSS for new motor vehicles and motor vehicle equipment. Manufacturers must certify compliance with these standards before selling vehicles
- Enforcing compliance with the FMVSS
- Investigating and managing the recall and remedy of non-compliance and safety-related vehicle defects and recalls on a nationwide basis
- Communicating with and educating the public about vehicle-safety issues
- Issuing guidance for vehicle and equipment manufacturers, such as the Vehicle Performance Guidance for HAVs

State Responsibilities

State agencies are responsible for:

- Licensing human drivers and registering motor vehicles in their jurisdictions
- Enacting and enforcing traffic laws and regulations
- Conducting safety inspections, where states choose to do so
- Regulating motor vehicle insurance and liability

Based on decades of experience with highway and vehicle safety related to driver licensing, and closely following recent developments in self-driving technology, NHTSA developed the following recommendations:

Licensing Drivers to Operate Self-Driving Vehicles for Testing
The federal guidance for ADS recommends that states:

- Ensure drivers understand how to operate a self-driving vehicle safely
- Ensure that on-road testing of self-driving vehicles minimizes risks to other road users
- Limit testing operations to roadway, traffic, and environmental conditions suitable for the capabilities of the tested self-driving vehicles
- Establish reporting requirements to monitor the performance of self-driving technology during testing
- Ensure the transition from self-driving mode to driver control is safe, simple, and timely
- Require that self-driving test vehicles be able to detect, record, and inform the driver when the automated technology has malfunctioned
- Ensure that the installation or operation of any self-driving vehicle technologies do not disable federally required safety features or systems
- Ensure that self-driving test vehicles record information about the status of the automated control technologies in the event of a crash or loss of vehicle control

NHTSA does not recommend that states authorize the operation of self-driving vehicles for purposes other than testing at this time. NHTSA believes that technological and human-performance issues be addressed before self-driving vehicles can be made widely available.

If states do decide to allow the non-testing operation of self-driving vehicles, the states should, at a minimum, require a driver who is properly licensed to operate a self-driving vehicle to be in the driver's seat and available at all times to operate the vehicle in situations during which the automated technology is not able to safely control the vehicle.

Model State Policy
NHTSA released a Federal Automated Vehicles Policy, "Accelerating the Next Revolution in Roadway Safety" to provide a model regulatory policy framework for states seeking to develop procedures and conditions for the testing, deployment, and operation of HAVs.

NHTSA believes there should eventually be a consistent set of laws and regulations governing the testing and operation of HAVs. Under this approach, NHTSA would regulate motor vehicles and the computer hardware and software that perform functions formerly performed by a human driver, and the states would continue to regulate human drivers, vehicle registration, traffic laws, regulations and enforcement, insurance, and liability.

The model state policy addresses seven major areas:

- Administrative
- Application for manufacturers or other entities to test HAVs on public roadways
- Jurisdictional permission to test
- Testing by the manufacturer or other entity
- Deployed vehicle drivers
- Law enforcement considerations
- Liability and insurance

Coordination with Stakeholders

NHTSA will continue to coordinate with state partners and other safety stakeholders to ensure the Vehicle Performance Guidance and the Model State Policy continue to complement each other and provide valuable tools for use by state agencies. These outreach efforts will include education, public workshops, and meeting with state stakeholders.

CHAPTER 4

Infrastructure

Autonomous and connected vehicles will ultimately require modifications to Idaho's existing physical and digital infrastructure. The physical infrastructure includes, but is not limited to, roadways, signs, lane striping, and traffic signals. The digital infrastructure includes the vast amount of data associated with CV operations and the systems necessary to manage and utilize that data.

While the requirements for both the physical and digital infrastructure are still evolving, the current technology developments and research allow a basic understanding of potential options for those systems.

Physical Infrastructure

Based on testing and research, to function properly, AV/CVs will require an improved and modernized physical transportation infrastructure. This will likely include better lane striping; modern fade-resistant signs; and signals with redundancies to aid the optical sensors in these advanced vehicles.

Current testing indicates that even with ideal signage and roadway markings, optical sensors can have difficulty dealing with glare, rain, snow, or misidentification. Because the typical roadway infrastructure is less than ideal and optical sensors can malfunction, manufacturers have added layers of redundancy to improve vehicle safety.

Idaho transportation agencies will need to consider future improvements to specific elements of the physical infrastructure and address the likely increase in traffic volumes associated with AV/CV development. Studies indicate AVs will likely provide transportation options for those who currently have limited access, such as the elderly and disabled.

As states integrate AVs into the network, they will need to address the fact that traditional human-driven vehicles will also be using the roadways far into the future, further highlighting the need for extensive testing followed by the deployment of known and proven technologies. As a result, Idaho's current infrastructure will likely not adequately support future traffic levels until more than 75 percent of the vehicles in use are HAVs. As AVs reach these levels, modeling predicts HAVs may operate in eight-foot-wide lanes with eight feet between vehicles traveling at 80 miles per hour, which would dramatically improve system capacity.

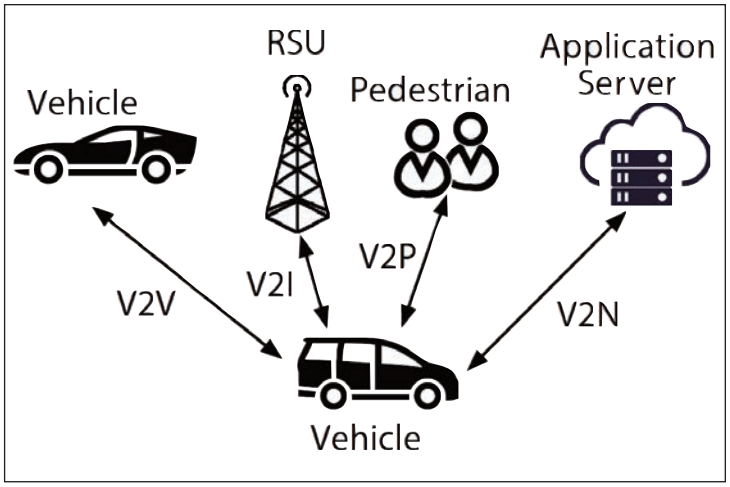
More specifically, a typical Idaho freeway is currently saturated when traffic flows reach 2,000 vehicles per lane-hour. Because artificial intelligence makes decisions faster and better than humans, Princeton University predicts HAVs will double the number of vehicles required to reach saturation, increasing the capacity from 2,000 to 4,000 vehicles per lane-hour. HAVs are also expected to improve capacity at intersections by maximizing the number of vehicles operating in travel lanes.

Digital Infrastructure

As with the physical roadway, Idaho's digital infrastructure will require several types of expansion. AV/CV technology will enable communications:

- Between vehicles (V2V)
- With the infrastructure (V2I)
- With "other" participants in or near the system (V2X)

This network will require systems capable of establishing the communications and will generate vast amounts of data. This will require agencies to have the ability to manage the data.



Connected Vehicle Communication Types

There are currently two primary methods for this communication:

- Short-range radio through Dedicated Short-Range Communication (DSRC)
- Wi-Fi (wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections)

Many developers utilize DSRC because of its well-established capabilities. Current 4G Wi-Fi systems have significantly delayed transfer times, limiting its usefulness in transportation communications. However, 5G Wi-Fi systems are developing rapidly and virtually eliminate the latency issues. A hybrid capability known as Cellular V2I (C-V2I) also exists, using cellular systems to connect to cloud-based services.

Current estimates predict that AV/CVs could generate 25 gigabytes of data per hour. Neither industry nor the federal government have established communications standards, so it is difficult to determine which system or combination of systems will prevail.

Communications will provide access to data such as vehicle location, ports of entry, work zones, traffic flows, congestion, traffic signal timing, and safety alerts.

Autonomous Vehicle Technology

To understand the infrastructure requirements, it is important to understand the vehicle systems. General Motors intends to have fully autonomous vehicles available in 2019. These initial vehicles will be for ride-share and taxi services, being cost prohibitive for general retail sales. They will have approximately

23 on-board sensors using both LIDAR and radar for navigation, and be equipped with a GPS that incorporates highly accurate mapping and on-board computers. The computers are making decisions in excess of 20 times per second through advanced artificial intelligence. This technology will continue to improve.

Audi is testing V2I CV systems in Las Vegas, Houston, Dallas, and Portland. In Idaho, the Idaho Transportation Department (ITD) is currently partnering with the Idaho National Laboratory on a V2I initiative using DSRC via radio signals, and Wi-Fi via 4G and 5G cell phone signals.

Despite the progress, there are still significant hurdles in development. Some of the difficulties identified with sharing V2I information include liability, cybersecurity, lack of deployment uniformity, and the radio frequencies (spectrum) allotted for DSRC communication.

Rapid Pace of Automation

The development of AV/CV technologies will likely lead to a major change in transportation systems. The last major transportation revolution involved constructing the nation's Interstate System, which was driven by public policy. Unlike the Interstate System, AV/CV technology is being driven first by competing business agendas, and second by policy. Most car manufacturers are currently working to develop these technologies.

Three different and independent studies predict 80 percent of vehicles in the United States will be fully automated by 2060. Forbes predicts 25 percent of vehicles will be fully automated by 2030. The Victoria Transport Policy Institute predicts 40 percent by 2050, and the RAND Corporation predicts 80 percent by 2060.

Idaho needs to be ready for the AV transition to occur sooner than predicted because of the major revolution in technology, with consumers adopting new technologies faster than ever before. For example, the first iPhone was released in 2007, and in 11 short years has had a dramatic effect on the world and human culture. The AV/CV revolution could happen just as quickly.

The AV/CV revolution may be accelerated by insurance companies seeking to accurately price the risks they insure in light of safety improvements. They may provide financial incentives for AV use and increase premiums for those who use non-automated vehicles.

Public Transit

The predictable routes, limited number of vehicles, fixed infrastructure in the public right-of-way, and public oversight place public transit in a unique position to pilot AV/CV technology. By piloting AV/CV for transit, the public could become more familiar and comfortable with the technology. Enabling and deploying AV/CV technology for public transit would also provide operational benefits to transit agencies by providing more consistent operations at potentially lower costs. Several agencies across the country are already deploying automated transit vehicles in controlled settings.

Infrastructure Funding
Automated vehicles will also present additional challenges to transportation funding. Many experts believe most if not all AVs will be electric vehicles. This will further stress the already inadequate revenues generated by fuel taxes. As a result, Idaho will need to find new and innovative ways to fund its transportation system. These funding mechanisms could include road-user charges and public-private partnerships.

Idaho is a member of a northwest consortium researching ways to implement road-user charges. ITD has effectively used public-private partnerships, but will likely need to develop more enhanced strategies. The department has assets to aid these partnerships, including leasing space for communication equipment in ITD rights-of-way and providing the data it collects about travel patterns.

Many of the future AV/CV infrastructure requirements will apply to the rural locations in Idaho. With the likely increase in both physical and digital infrastructure, rural communities may have difficulty acquiring the necessary funding, which could lead to a disconnected network for AV/CV operations.

Idaho's current sources of infrastructure funding are inadequate, but the state is developing funding options. Idaho currently has a $417 million annual shortfall for transportation funding ($156.4 million annually for highway maintenance and a $260.7 million annually for safety and capacity improvements).

Conclusion
In the future, most vehicles using Idaho's transportation infrastructure may not be individually owned, as they are today. The Mobility as a Service (MaaS) model predicts that most vehicles would be owned by corporations or collectives, and dispatched to users on demand. This model already exists with services like UBER and Lyft that currently use human drivers. These services have pilot projects testing the use of AVs.

AV technology is accelerating faster in urban areas than rural areas. If state policies fail to address the needs of rural and local jurisdictions, the state could develop a disconnected network for AV/CV operations.

Idaho's roads and highways will have a mix of traditional and automated vehicles sharing the roads well into the future. In the long term, AV/CV technology will reduce demand on the infrastructure, but this will not happen immediately. It may take 30 years or more, and will require a significant investment in physical and digital transportation infrastructure to keep Idaho on a level playing field and competitive with surrounding states.

Idaho agencies will need to identify the types of data they will need to provide to AV/CV; how that data will be collected and stored; and then fund, design, and build the infrastructure to make the data available.

Public-private partnerships may be useful to fund the installation of fiber-optic cable along roadways. The Idaho Transportation Board is currently studying these partnerships and their legal implications.

CHAPTER 5

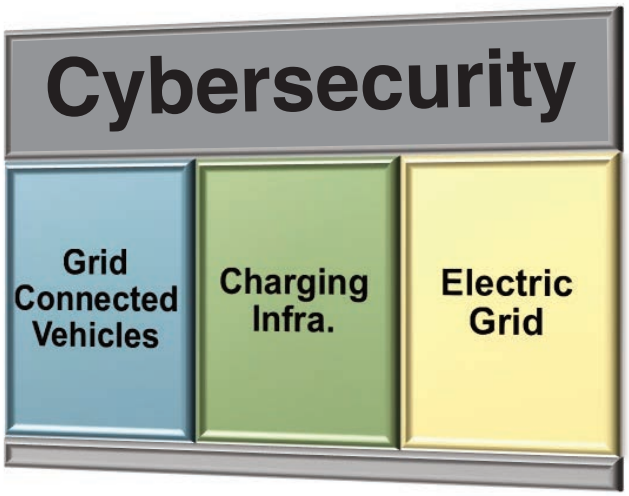
Security and Privacy

Cybersecurity is an important part of protecting the safety and privacy of all drivers on the road. Security professionals use engineering and design to mitigate the potential impacts of cyber crime and to protect:

- Digital systems from unauthorized or unintended use
- Digital data
- Physical systems connected to digital controls
- Critical infrastructure

Vulnerabilities
Security experts believe that most AVs in the future will be electric, providing cyber criminals with three primary targets:

- The electrical grid
- Vehicles that connect to the electrical grid
- The vehicle-charging infrastructure



Security research shows the electrical grid can be manipulated to create widespread disturbances that can negatively affect system performance, efficiency, and safety. This threat increases with the number of charging facilities and vehicles connected to the grid.

To address cybersecurity vulnerabilities, the Alliance of Automobile Manufacturers and the Association of Global Automakers have a program that allows manufacturers and suppliers to share information on potential cybersecurity threats and vulnerabilities. In addition, the Infrastructure Technology Information Sharing and Analysis Center works with the Booz Allen Hamilton Threat Detection Center to monitor the "dark web" for potential threats.

Privacy

Modern vehicles need a large amount of computer code to operate. For example, a Boeing 787 uses seven million lines of computer code, but a 2016 Ford F150 uses 150 million lines of code. Autonomous vehicles will use even larger amounts of code, and will send and receive large amounts of data, making the vehicles a prime target for hackers.

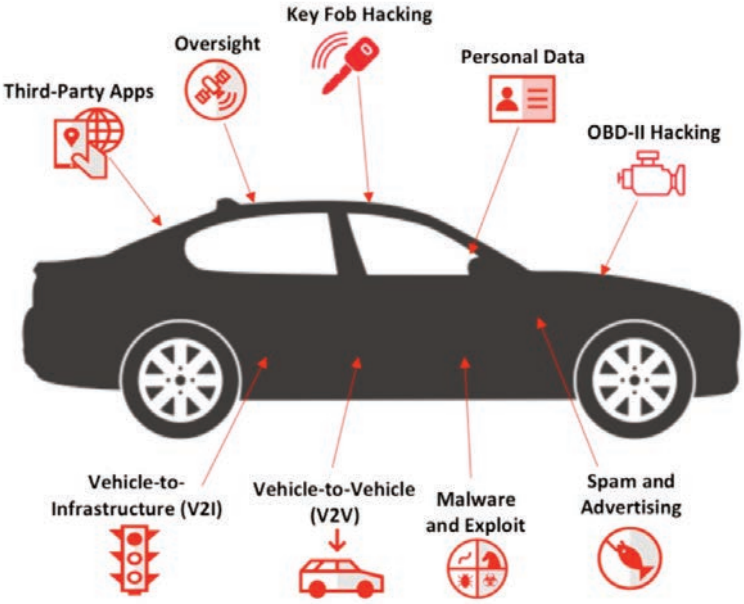
Modern vehicles allow drivers to connect their smartphones to the onboard computer. This allows hackers potential access to sensitive personal information contained on smartphones, including:

- Credit card and banking data
- Passwords and logon credentials
- Personally identifiable information

The transportation infrastructure AVs will rely on will also be susceptible to cyber attack. A successful security breach would allow hackers to track the movements of aircraft, trucks (transporting military equipment, radioactive materials, U.S. currency, etc), and buses across the country. Electronic message signs are already a common target.

Some of the vulnerabilities of transportation infrastructure include:

- Low levels of physical security
- Devices that handle payment information
- Management networks that lack security mechanisms
- Poorly deployed encryption



For infrastructure systems to be secure, the wireless communication systems they use will need to be secure, and sensitive data will need to be protected from end-to-end and carefully shared.

Recommendations:

- Educate everyone involved with transportation infrastructure about potential cybercrime vulnerabilities and consequences

- Develop a “consequence driven” engineering and design mindset

- Create a cyber team for Idaho’s transportation infrastructure

- Have backup systems available in case of attack

CHAPTER 6

Testing and Deployment

The challenge of testing and deploying AV/CV is to do so while ensuring safety for vehicles and drivers. Federal, state, and local agencies in Idaho will need to work together to develop a safe and effective testing and deployment system.

Automated and connected vehicles will bring a revolution of change and opportunities for drivers and industry. These technologies are poised to improve the movement of goods and people, allowing it to be done safer and more efficiently.

AAMVA recommends that states add a field to motor vehicle databases to record the level of each vehicle's automation. Automation levels can change if owners add after-market technology, so states should record the current level of automation annually when vehicles are registered.

This information will assist law enforcement personnel and first responders. They need to know what to expect when an AV is involved in a crash to ensure their safety and the safety of others. They must be trained in how to disengage the automated-vehicle function to prevent further damage or injuries after a crash. Law enforcement personnel must also be able to access the data recorded starting from 30 seconds prior to the crash to aid in crash reconstruction.

Driver and Automated System Issues

Drivers and AV/CV may not react the same to issues they encounter on the road. For example, ADSs are currently programmed to obey traffic laws, except when necessary to protect human safety.

Human drivers recognize and react to many unofficial and non-standardized cues, such as obeying directions from police and bystanders, exchanging signals from other drivers at a four-way stop, determining when something in the road is an obstacle to be avoided and when it is not, and identifying temporary signage.

Because driving practices differ across the country, AV technology must be able to interpret local laws and practices and react accordingly. For example, the "Pittsburgh left" is a driving custom allowing the first left-turning vehicle stopped at a traffic light which turns green to turn left before oncoming vehicles enter the intersection. In Idaho, bicycle riders can treat stop signs as "yield" indications and treat stop lights as "stop and proceed when clear" indications. Social customs and communications that govern giving right-of-way to pedestrians vary between states, as do state and local laws on who has the right of way in crosswalks in different settings, and in the definition of a crosswalk.

Emergency situations sometimes require a choice between bad outcomes. If a dog runs into the road, will an automated vehicle be programmed to hit the dog, or steer off the road into a tree? What if a child runs into the road?

These issues involve ethical considerations. For example, some experts have proposed that an AV should always protect its occupants rather than anyone or anything outside the vehicle in situations requiring an ethical choice.

Automated driving systems continually check to be sure their software is operating properly, and that it remains within its operating-design parameters. If a problem is detected, they will go into a minimal-risk condition, probably by stopping in a safe location. This can be a risky situation in heavy traffic or on a high-speed road.

There are many driver and vehicle issues Idaho will need to address before testing and deploying automated vehicles, including:

- Will drivers of Level-Three vehicles require an endorsement on their driver's license to make sure they know how to operate the vehicles safely?
- Will mandatory training be required for those who buy AVs?
- Should the automation level be recorded on vehicle registrations, making the information available to law enforcement, insurance companies, and owners?
- If an ADS is in control, who carries liability insurance—the owner, the driver or occupant, the original equipment manufacturer, or the technology provider?

Passenger Issues

Fully automated vehicles are being promoted as offices, dining rooms, gyms, and bedrooms, with the implication that occupants will not be wearing seatbelts. This raises safety issues for Level Four and Level Five vehicles, including:

- Will passengers be required to use seatbelts?
- What is the definition of a seating position in vehicles without steering wheels?
- Will all seating positions be equipped with seatbelts?
- Will seatbelt requirements be changed?
- Will states wish to apply their seatbelt laws to Level-Four and Level-Five vehicles? If so, will they need to be modified to account for belt availability and seating position?
- Will passengers feel so safe that they ignore seatbelt laws?
- Will the use of Level-Four and Level-Five vehicles for ridesharing increase the current low belt use in rear seats, especially for passengers in taxis and on-demand ride services?

- Will child restraints be necessary? If so, will the vehicles accommodate them with secure latches and proper orientation?
- Will the laws applying to child restraints still apply?
- How will safety communications from passengers be prioritized?
- Should all passengers be permitted to communicate with the vehicle? If so, how does the vehicle decide among conflicting instructions?

Traffic Laws

Some issues may require laws to be created or modified to accommodate AV testing, both with and without test drivers, including:

- Authorizing driverless Level-Four and Level-Five operation
- What levels of AVs require a licensed driver
- Establishing legal responsibility for a driverless Level-Four and Level-Five vehicle
- Remote control of AVs
- Distracted driving, including the use of cell phones and other electronic devices
- Impaired driving
- Tailgating
- Road-user behavior near AVs

Testing Automated Vehicles

States should welcome the opportunity to encourage responsible AV testing that protects public safety. Requirements for and oversight of testing in states currently range from substantial to minimal.

NHTSA recommends a formal process that addresses testing, driver qualifications, liability, insurance, and reporting. AAMVA recommends that states address:

- Testing authorization
- Requirements for testing organizations
- Requirements for vehicles and drivers

- Liability and insurance
- Testing locations and conditions
- Reporting
- Traffic law changes or exemptions
- Coordination with law enforcement and local governments
- Informing the public and media about all aspects of testing and testing locations
- Maintaining high-level oversight of all testing

Deploying Automated Vehicles

AAMVA provides detailed guidance on the deployment of AVs, including:

- Establishing vehicle licensing and registration requirements
- Vehicle automation levels and features
- Software updates that change a vehicle's level or features, and that establish methods for law enforcement and first responders to determine this information quickly and easily
- Establishing or coordinating programs to educate owners and drivers, other road users, and the public about AVs
- Informing owners and drivers about their responsibilities, and their vehicle's capabilities and operational requirements
- Informing the public about how and where automated vehicles will be deployed, how they operate, and how other road users should act near them
- Training and informing driver-license examiners and driver-education instructors
- Developing partnerships with manufacturers and dealers, commercial operators, law enforcement agencies, and organizations involved in highway safety
- Incorporating automated-vehicle information into vehicle registration, traffic violation, crash reporting, and driver licensing systems
- Identifying vehicles by level and operating-design parameters

- Identifying whether vehicles involved in crashes were under the control of a driver or automated driving system

- Requiring crash investigators to record whether the vehicle has any automated features, the vehicle-automation level, and what level was engaged at the time of the crash

- Determining who (law enforcement, insurers, or others) should have access to data generated by AVs, and how that access should be granted

- Establishing law-enforcement policies and procedures regarding how to identify and communicate with an AV on the road and at a crash scene

- Determining if insurance requirements should be adjusted

Recommendations

- Draft legislation with provisions regarding AVs/CVs.

- Determine if Idaho will allow AV/CV testing through a permit process or allow deployment of automated vehicles.

- Create a new chapter of statute containing provisions regarding the operation of AVs, and require compliance with existing state and local traffic laws.

- Develop laws, licensing, and titling requirements for owners, manufacturers, OEMs, and operators of connected and automated vehicles.

- Define terms associated with AV/CV (include terms such as HAV, ADS, cybersecurity, etc.).

- Utilize SAE definitions for levels of automation.

- Require reporting of crashes and disengagements to the appropriate agencies.

- Determine permitting process to include vehicle identification and registration, and the SAE level of automation for which the vehicle is designed.

- Require only valid, licensed, and trained drivers to act as operators of AVs on public roads at all automated levels in which vehicles can be controlled by manual operation.

- Require owners/technology manufacturers to provide liability insurance at a limit defined by Idaho Code.

- Identify under what conditions automated vehicles may be tested.

- Identify what incidents or violations must be reported to the appropriate agencies.

- Require communication with and an operational plan for law enforcement agencies and first responders who may interact with AV/CV. Plan to include operational capabilities and protocols regarding how to identify the vehicles and how to disengage the automated mode when necessary.

- Preempt local governments from regulating AVs in addition to regulations provided in Idaho Code.

- Align closely with federal recommendations for AV/CV technology.

- Remain technology neutral.

CHAPTER 7

Current Impediments to Testing and Deploying Autonomous and Connected Vehicles in Idaho

Idaho Code provides a wide variety of regulatory requirements for the operation of vehicles within the state. Many of these statutes have the potential to limit or delay the testing and deployment of AVs. Therefore, the Autonomous and Connected Vehicle Testing and Deployment Committee recommends the Idaho State Legislature develop a new chapter of code specifically addressing the testing and deployment of AVs. This should be done under a CAT framework to allow for changes and new technologies to be tested and deployed.

Utah and several other states have successfully used this approach, and their work could provide a model for the Idaho legislature to consider. The automated vehicle testing and deployment requirements they addressed include, but are not limited to:

- Automated and connected vehicle definitions
- Operation of fully AVs without a human driver
- Licensing test drivers
- Education
- Owner and operator requirements following a crash involving an AV
- Requirements for on-demand AV networks, such as ride-sharing services like Uber and Lyft.
- Registration, titling, and insurance of fully autonomous vehicles
- Establishing a controlling authority for reporting and oversight
- Coordination and training of law enforcement and first responder personnel

Regulatory discussions about AVs sometimes fail to address CV operations, specifically truck platooning, which is a specialized form of CV operations where two or more trucks “connect” through DSRC using a system similar to adaptive cruise control.

This system operates with following distances between vehicles ranging from 30 to 120 feet, with typical distances being 50 to 70 feet. Having a shorter distance between vehicles reduces wind drag, which increases fuel efficiency. The distances are closer than the currently accepted following distances in Idaho.

Idaho allows "reasonable and prudent" distances between vehicles, and law enforcement agencies use well established "rules of thumb" to identify violations. Those rules of thumb have been accepted by Idaho courts, but pose an impediment to truck-platooning operations.

Rather than modifying accepted practices, this committee has two recommendations for truck platooning:

1. Require vehicles operating in platooning mode to have some form of indication, lighting, or marking to provide a way for law enforcement and the traveling public to identify and recognize such operations.

2. For vehicles operating in platooning mode, authorize law enforcement to not enforce the "rules of thumb" for following distances.

CHAPTER 8

Conclusions and Recommendations

CONCLUSIONS

Autonomous and connected vehicle technology, also known as CAT, will likely improve safety and mobility as the technology develops, and will also provide new and innovative ways to address transportation needs and requirements for Idaho. However, much of the technology is still in the research and development phase. This is why Idaho agencies have monitored CAT development in other states with more robust testing and deployment processes to avoid committing limited resources to unknown and unproven technologies.

AV technology is accelerating faster in urban areas than rural areas. To ensure Idaho does not develop a disconnected network for AV/CV operations, future state policies should address the needs of rural and local jurisdictions so they can maintain pace with statewide transportation technology developments.

Idaho's roads and highways will have a mix of traditional and automated vehicles sharing the roads well into the future. In the long term, AV/CV technology will reduce demand on the infrastructure, but this will not happen immediately. It may take 30 years or more, and will require a significant investment in physical and digital transportation infrastructure to keep Idaho on a level playing field and competitive with surrounding states.

The Idaho Legislature has considered legislation on AVs, but no bills have been passed to date. Recognizing that CAT technologies are developing rapidly, the Governor signed an Executive Order establishing the committee that developed this report, and the associated conclusions and recommendations.

As Idaho moves forward to integrate AV/CV on its roadways, public and private agencies should capitalize on the opportunities these technologies provide to develop creative ways to improve safety and mobility, and provide economic benefits the state.

CAT standards will continue to develop at the national level for issues such as data transfer and collection, digital and physical infrastructure, cybersecurity, and data privacy—providing models for possible use in Idaho.

The recommendations in this report provide a CAT framework for testing and deploying AV/CV on Idaho's roads to address increasing transportation needs and requirements. Because safety is a top priority, Idaho must ensure that the roads are safe for all users during the testing and deployment of AV/CV. This includes, but is not limited to automobile operators and drivers, pedestrians, bicyclists, and other roadway users.

CAT technology is ever-evolving and dynamic. To stay abreast of new and emerging developments, Idaho will need to continuously monitor the technology, its readiness for testing/deployment, and potential impacts on the state.

RECOMMENDATIONS

Legislation and Policy:

- Encourage legislation to allow autonomous vehicle testing and deployment.

- Rather than amending all chapters of motor vehicle or traffic law to include the use of CAT, consider establishing regulatory or policy actions as a separate chapter of Idaho Code.

- When establishing regulatory and policy actions, do not assume a driver is human.

- Coordinate CAT-related regulatory and policy decisions across state lines to avoid a legal patchwork that may limit technology development.

- Consider vehicle parking implications for highly automated vehicles deployed in urban areas.

- Develop liability requirements, limits, and responsibilities for AV operations.

Testing and Deployment:

- Consider establishing state guidelines for AV/CV testing and deployment that include licensing, registration, and certification requirements.

- Monitor national CAT testing and deployment guidelines based on evolving direction from the following sources:
  - U.S. DOT
  - NHTSA
  - FHWA
  - AAMVA
  - U.S. congressional actions

- Remain technology neutral through testing and deployment to:
  - Avoid limiting development options
  - Allow industry and markets to determine effective transportation technology solutions

- Monitor national trends for training requirements in areas such as driver's education, law-enforcement training, and first-responder training; and participate in applicable training.

- Encourage transit agencies to incorporate AVs in their future transit plans.

- Require testing agencies to provide operational design domains that address issues such as local ordinances, bike lanes, pedestrian crossings, and school zones.

Infrastructure:

- As CAT technologies become more mature, study the infrastructure needs and requirements for CAT to include both physical and digital systems.

- Consider developing a preliminary plan to:
  - Collect CAT data
  - Design the digital infrastructure required for the deployment of CVs
  - Address cybersecurity concerns

Economic Impact:

- Study state funding options for CAT technologies mature enough to receive financial investments for operational implementation.

- Limit investments in technologies still under early development.

- As CAT technologies become more mature, study the financial impacts to transportation funding with the understanding that most automated vehicles will likely be powered by electricity rather than gas or diesel. Most truck fleets will likely continue to powered by diesel, gasoline, or other non-electric means.

- Study the economic impacts of CAT on issues such as the displacement of workers, disruptive technology leading to new industry, business opportunities, and new training opportunities.

- Facilitate a business-friendly environment that encourages industry partners involved in CAT to choose Idaho for developing and testing their technology, and incorporate relevant public and private agencies.

Research:

- Monitor CAT research and development and the associated impacts to Idaho, with a focus on issues such as:
  - Safety
  - Economic benefits
  - Traffic congestion
  - Improved mobility for elderly, disabled, and non-motorized users
  - Underserved areas of the state that currently lack public transportation alternatives

Public Engagement:

- Increase public education, and awareness of CAT risks, limits, and benefits, and collect public input.

Appendix A

Executive Department
State of Idaho

State Capitol
Boise

EXECUTIVE DEPARTMENT
STATE OF IDAHO
BOISE

EXECUTIVE ORDER NO. 2018-01

CREATING THE AUTONOMOUS AND CONNECTED VEHICLE AND DEPLOYMENT COMMITTEE

WHEREAS, the State of Idaho has been a leader in technology and transportation throughout its history; and

WHEREAS, the State of Idaho has contributed to significant advancements in technology and transportation; and

WHEREAS, the Idaho Transportation Department is considered one of the most innovative transportation departments in the country; and

WHEREAS, the State of Idaho has universities, corporations, businesses, start-ups, and other private-sector partners engaged in the development and implementation of new technology; and

WHEREAS, the State of Idaho is uniquely positioned to assist in the development and deployment of autonomous and connected vehicle technology; and

WHEREAS, the State of Idaho believes that studying the controlled testing and operation of autonomous and connected vehicles in a variety of real-world driving conditions on roads within the state will advance the safe and successful deployment of autonomous and connected vehicles; and

WHEREAS, the removal of barriers to the testing and deployment of autonomous and connected vehicle technology in Idaho may produce significant social, economic, environmental and innovative benefits, including enhancing mobility, creating jobs and improving transportation safety and efficiency;

NOW THEREFORE, I, C.L. "BUTCH" OTTER Governor of the State of Idaho, by the authority vested in me under the Constitution and law of the State of Idaho do hereby order creation of the "Autonomous and Connected Vehicle Testing and Deployment Committee" and do hereby further order as follows:

1. *By not later than March 1, 2018, the Transportation Department shall create the committee hereafter known as the Autonomous and Connected Vehicle Testing and Deployment Committee.*

2. *The Committee membership shall be comprised of the following standing members:*

    a. *The Director of the Transportation Department or designee;*
    b. *The Director of the Department of Commerce or designee;*
    c. *The Director of the Department of Insurance or designee;*
    d. *The Director of the Idaho State Police or designee;*
    e. *Legal counsel from the Office of the Governor;*
    f. *Two (2) members of the Idaho Legislature, one (1) appointed by the Speaker of the House and one (1) appointed by the President Pro Tempore of the Senate;*
    g. *The Director of Information Security.*

3. *The Committee shall include, but not limited to, the following members appointed by the Governor:*

    a. *At least four representatives from the autonomous and connected vehicle technology sector, two of which must be representatives of automobile manufacturers.*
    b. *A representative from the Idaho Association of Highway Districts.*
    c. *A representative from the Local Highway Technical Assistance Council.*
    d. *A representative from the Idaho Sheriffs' Association.*
    e. *A representative from the Idaho Chiefs of Police Association.*
    f. *A representative from the American Automobile Association.*
    g. *A representative from the Idaho Automobile Dealers Association.*
    h. *A representative from the trucking industry.*
    i. *Others not yet identified.*

4. *The Committee shall be chaired by the Director of the Transportation Department.*

    a. *Meetings shall be held no less than twice each calendar year, and additional meetings may be held at the discretion of the Chair.*
    b. *Meetings shall comply with chapter 2, title 74, Idaho Code. Meetings will be held and announcements associated with such meetings shall be posted at the designated location of the meeting.*
    c. *The Committee may form advisory subcommittees as necessary, and such subcommittees shall report back to the Committee.*
    d. *The Committee may seek technical or professional assistance as deemed necessary and appropriate.*

5. *Each Committee member shall have full and equal voting rights. A simple majority of members voting shall be sufficient to decide any matter pending before the Committee.*

6. *The Committee shall have the following mission:*

    a. *Identify all agencies of the State of Idaho with pertinent jurisdiction to support the testing and deployment of autonomous and connected vehicles.*
    b. *Coordinate with the identified agencies and discuss how best to administer the testing of autonomous and connected vehicles on roads in relation to issues such as vehicle registration, licensing, insurance, traffic regulations, and vehicle owner or operator responsibilities and liabilities under current law.*
    c. *Review existing State statutes and administrative rules and identify existing laws or rules that impede the testing and deployment of autonomous and connected vehicles on roads.*
    d. *Identify strategic partnerships to leverage the social, economic, and environmental benefits of autonomous and connected vehicles.*

7. *The Transportation Department shall provide staff support for the Committee.*

8. *The Transportation Department shall produce reports containing the Committee's findings and recommendations and shall submit its first report to the Governor no later than November 1, 2018.*

October 5, 2018

American Association of Motor Vehicle Administrators aamva.org movemag.org

U.S. Department of Transportation Releases AV 3.0

The United States Department of Transportation has released its new policy framework with respect to autonomous vehicles, entitled "Automated Vehicles 3.0: Preparing for the Future of Transportation" (AV 3.0). According to U.S. DOT, this voluntary guidance builds upon, but does not replace, the guidance provided in the earlier "Automated Driving Systems 2.0: A Vision for Safety."

The highlights of AV 3.0 include:

- U.S. DOT will interpret and adapt the definitions of "driver" and "operator" to recognize that the terms do not refer exclusively to a human but may include an automated system.
- U.S. DOT no longer recognizes the designation of the ten Automated Vehicle Proving Grounds announced in 2017.
- Urging states to remove barriers to automated vehicle technologies and to support interoperability.
- Affirming U.S. DOT's authority to establish motor vehicle safety standards that allow for new vehicle designs, such as those without steering wheels, pedals, or mirrors.
- Reaffirming that U.S. DOT will pursue a self-certification approach rather than a vehicle type approval process.
- Encouraging automated driving system developers to make their Voluntary Safety Self-Assessments public.
- Providing considerations and best practices for state and local governments to support the testing and operation of automation technologies.
- Supporting the development of voluntary technical standards and approaches as a non-regulatory means to advance the integration of automation technologies into the transportation system.
- Describing a framework of safety risk management stages for integration of commercial automated vehicles.
- Affirming U.S. DOT is continuing its work to preserve the ability for transportation safety applications to function in the 5.9 GHz spectrum.

The policy framework also establishes U.S. DOT administrative actions to explore:

- Setting exceptions to certain safety standards that are relevant only when human drivers are present for automated driving system-equipped vehicles.
- A proposal to modify the procedures NHTSA will follow when making decisions on exemption petitions.
- How to better understand the areas of responsibility between state and federal governments in the context of ADS-equipped commercial motor vehicles and commercial carriers.
- FMCSA consideration of changes to federal motor carrier safety regulations to accommodate integration of ADS-equipped commercial vehicles.
- Plans to update the 2009 Manual on Uniform Traffic Control Devices, taking new technologies into consideration.
- Identification of automation-related voluntary standards being developed through standards development organizations and associations.
- A study of the workforce impacts of automated vehicles.

Page 18 of the framework provides U.S. DOT's vision for the state role with respect to AVs, and indicates that states are directly "responsible for licensing human drivers, registering motor vehicles, enacting and enforcing traffic laws, conducting safety inspections, and regulating motor vehicle insurance and liability. They are also responsible for planning, building, managing, and operating transit and the roadway infrastructure. Many of those roles may not change significantly with the deployment of automated vehicles."