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Chapter 1.

Introduction

1.1 Challenge: Preparing for Connected and Automated Driving System-Equipped Vehicle Deployment

The integration of Connected and Automated Driving Systems (C/ADS) into the vehicle fleet and the commercialization of these vehicles into everyday operating situations (especially alongside the standard vehicle fleet) poses current challenges for governmental agencies and policy makers. This integration also requires that the law and regulatory framework be in place to adapt quickly as technology advances and industry and customer demands for these types of vehicles accelerates. Lives depend on ensuring that innovation can progress but also that innovation proceeds in a responsible manner.

The transformation of the motor-vehicle fleet in the U.S. over the next one to three decades will likely entail a mix of conventional (driver-operated) vehicles with limited vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) capabilities and an increasing number of autonomous vehicles (AVs) that may or may not require driver supervision. These different CV/AV scenarios and the rate of CV/AV vehicle/infrastructure integration into everyday driving will have underlying implications for motor vehicle laws and regulations. Ultimately, the emerging paradigms will increase the number of CVs/AVs on our networks, while reducing the “traditional” use of private automobiles and changing the nature of freight movement. This transition will require laws and regulations that are flexible and able to adapt to technology changes, and will require state policy makers to determine how they want to embrace these changes in their states and interagency coordination and will necessitate the engagement of traditional and non-traditional stakeholders.

Moving forward, it is important that agency leadership in the transportation domain recognize the critical laws and regulations that may need to be changed or modified as C/ADS-equipped vehicles are deployed. Industry sectors engaged in C/ADS deployment, legal practitioners, state legislatures, and Governors’ offices recognize that current laws and regulations must be addressed in a comprehensive, yet flexible way to ensure safety and reap the anticipated societal benefits of C/ADSs, while simultaneously anticipating many unknowns. Unlike implementing traditional legal and regulatory changes or making simple citation modifications for adding a new title brand or type of license plate, or instituting an adjustment in fees, fines, or driver sanctions, the changes to C/ADS-related laws are complicated and challenging. Modifying these laws and regulations will changes to basic underpinning concepts and definitions, as well as an understanding of C/ADS technologies and their limitations.
This project forms the basis for states to develop the framework for an Autonomous Vehicle Action Plan (AVAP) that begins with being aware of the legislative landscape and the foundational laws and regulations that may need to be prioritized for modification (Figure 1-1).

**Purpose of the Autonomous Vehicle Action Plan**

The AVAP is intended to provide guidance and resources to state departments of motor vehicles (DMVs) and transportation (DOTs) to assist with the legal changes that will result from the rollout of C/ADS-equipped vehicles. This resource will provide states a means to validate their legal and regulatory modification decisions and opportunities to identify migration strategies to minimize any negative impacts before implementing changes to current motor vehicle codes. The following questions are addressed within the AVAP:
1. What applicable existing laws and regulations may need reconsideration as C/ADSs become more widely used?
2. How and when will these codes need to be revised?
3. How might changes to motor vehicle laws, regulations, and statutes related to C/ADSs affect current driving practices and impact the continuous responsibility of managing traffic safety hazards?
4. What are the barriers to implementing the resultant new rules of the road and what strategies can be used to overcome these barriers?

1.2 AVAP Organization

This guidance document is organized as follows:

**Chapter 2:** Presents a brief overview of the C/ADS legal and regulatory landscape as well as an overview of potential legal and regulatory modifications and/or clarifications that will be required as a result of the deployment of C/ADSs

**Chapter 3:** Presents a prioritized list of potential legal and regulatory modifications and/or clarifications according to time period (short-, mid-, and long-term) and notes whether or not harmonization is recommended

**Chapter 4:** Discusses potential barriers to legal and regulatory modifications

**Chapter 5:** Presents a guide for establishing a C/ADS task force

**Chapter 6:** Provides a guide for engaging the legislature

**Chapter 7:** Presents concluding thoughts and next steps

Additional supporting materials may be found in the following reports and memorandum:

1.3 Definitions, Assumptions, and Considerations

Levels of Automation

This project adopts the levels of automation as defined in SAE J3016 (SAE International, 2016b). For reference, a summary of these levels is provided in Figure 1-2.

![The 5 Levels of Driving Automation](image)

**Figure 1-2. SAE J3016 Levels of Automation**

Definitions of C/ADS Commercial Applications

**Connected vehicles** are defined as vehicles equipped for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications (collectively, V2X) as defined in NHTSA’s notice of proposed rulemaking on V2V Communications (Posten & Barrett, 2016) and SAE J2735/J2945 (SAE International, 2016a). Connected vehicles allow for low latency direct communications between road entities (e.g., cars, trucks, intersection controllers, pedestrians) to reduce crashes and accomplish other transportation objectives, while avoiding collection and transmission of personally identifiable information. Traffic
agencies can collect traffic flow data from connected vehicles to support their data needs, and traffic agencies can upload data that supports vehicle operations. For instance, Signal Phase and Timing data (available via V2I or “the cloud”) can enable vehicles to anticipate signal timing and adjust speed to reduce delay and conserve fuel. Available data can also be used to support level 4–5 ADS-equipped vehicle control in dynamic situations, such as intersection traversals and work zone configurations.

In this case, we are primarily interested in connected vehicle applications when used in conjunction with driving automation systems at levels 1–2 and level 3–5 ADS-equipped vehicles.

**ADS-equipped vehicles are defined in SAE J3016.** Conditional driving automation is characterized as a level 3 ADS where the sustained and operational design domain- (ODD)-specific performance of the dynamic driving task (DDT) is completed by the ADS with the assumption that fallback-ready user is receptive to ADS requests to intervene. In level 4–5 ADS-equipped vehicles, the ADS performs the DDT while the user is considered a passenger when the ADS is engaged. Automated mobility as a service (A-MaaS) applications are an example of levels 4–5 ADS-equipped vehicles. Current traffic laws were written with the assumption that a human driver is in control of the vehicle. Vehicles equipped with driving automation systems operating at SAE level 2 and below define the human driver as continuing to perform part of the DDT while the driving automation system (longitudinal and/or lateral vehicle motion control) is engaged. For more information and expanded definitions, see above Figure 1-2.

**ADS-equipped passenger vehicles.** Those ADS-equipped vehicles purchased or leased solely for personal use, parking, or sending off to park somewhere else when not in use. This use case will require a number of fundamental changes to the vehicle code to permit deployment, but these changes are critical to the eventual deployment of C/ADS because they overcome the many barriers currently posed by the assumption that a human driver will be in control of a vehicle; this underpins most current vehicle codes.

**ADS-equipped commercial motor vehicles (CMVs).** Those ADS-equipped vehicles used for commercial purposes not associated with platooning.

**Platooning.** Platooning is two or more vehicles in line following one another at distances much smaller than human drivers could perform safely. As a result, aerodynamic drag may be decreased, potentially resulting in increased fuel economy. The major interest in platooning is for long-haul trucking. Platooning is enabled by sensor technology and V2V communications. First-generation platooning systems are expected to be level 1, with the ADS controlling the brakes and throttle, and drivers in all vehicles being fully responsible for steering and monitoring the road environment. In the longer term, platooning at higher levels of automation is expected. Platooning is unique in that it requires consideration of following distance in state motor vehicle codes. Otherwise, platooning automation aspects would be focused only on level 3 ADS-equipped vehicles and higher, as described above.

**Automated Mobility as a Service, or A-MaaS,** can address both passenger and local freight delivery level 4–5 ADS-equipped vehicles. For passengers, A-MaaS is an on-demand, shared, for-hire mobility service offered to the public and utilizing a fleet of level 4 or higher ADS-dedicated vehicle with no expectation that a user will respond to a request to intervene (although the vehicle may be operated by a
remote dispatcher). The same applies generally to last mile delivery of freight (parcels); however, the vehicle may be optimized for parcels and not be designed to carry people.

**Definition of Harmonization**

For purposes of this document, harmonization is defined as the process of minimizing redundant or conflicting standards which may have evolved independently (Pelkmans, 1987). Harmonization can create consistency of laws, regulations, standards, and practices, so that the same rules will apply across jurisdictional boarders. Regulatory harmonization ensures that business rules are followed across borders (Black's Law Dictionary Free Online Legal Dictionary 2nd Ed). Harmonization is not uncommon across the states in the motor vehicle and driver licensing areas and states have worked over the years to improve state-to-state harmonization or at a minimum reciprocity. Harmonization is also extremely difficult to achieve in the driver license and motor vehicle areas based on the fact that laws and regulations governing these areas – unless federally mandated— are set based on state legislative preference and state agency/administration direction. In the motor vehicle and driver license areas, states have attempted to achieve best practices or work with model laws to best achieve harmonization.

**Assumptions**

The following assumptions were considered in developing the progressions of priorities needed for the legal and/or regulatory changes outlined in this report. While these assumptions are expected to hold true, regardless of whether they do or not, state policy makers will still need to consider their impact on legal modifications and should consider them in advancing any legislative or regulatory change.

**Assumption #1. NHTSA’s Role and Federal Preemption in Key Areas.** It is assumed that NHTSA’s delegation of duties and authorities between the federal government and the states will not change. NHTSA notes that under current law, manufacturers bear the responsibility to self-certify that the vehicles they manufacture for use on public roadways comply with the Federal Motor Vehicle Safety Standards (FMVSS). If a vehicle is compliant within this framework and maintains a conventional vehicle design, there is currently no specific federal legal barrier to a C/ADS being offered for sale or for commercial mobility operations. NHTSA’s Best Practices for State Legislatures (See A Vision for Safety 2.0, NHTSA, 2017) confirms that the states retain their traditional responsibilities for driver licensing (perhaps only until the vehicle is “the driver”), vehicle licensing and registration, traffic laws and enforcement, and motor vehicle insurance and liability regimes. It is assumed that for harmonization reasons, NHTSA will specifically retain FMVSS settings and manufacturer/technology company vehicle and equipment standards. As the Global Automakers have pointed out, the “primary advantage for federal standards related to the design and performance of motor vehicles is to allow manufacturers to design, build, and sell one vehicle across all 50 states” (Global Automakers, 2017). States and their associations need to keep this assumption in mind and remain aware of the changing federal landscape. It is recommended that associations like the American Association of Motor Vehicle Administrators (AAMVA) continue their close coordination with NHTSA and that NHTSA continues to engage AAMVA in assisting the states.
Assumption #2. Assumption on Commercial Driver License Standards and Interstate Motor Carrier Preemption. It is assumed that FMCSA will promulgate standards in both of these areas. With the importance of harmonization across state lines and the need for one industry standard and state-to-state uniformity, jurisdictional stakeholders clearly indicated that current standards as codified in the Commercial Motor Vehicle Safety Act of 1986 and accompanying regulations for states should be updated by FMCSA in consultation with the states (Commercial Motor Vehicle Safety Act, 1986). States should, however, review their current laws and regulations that codify these federal requirements and consider modifications that would allow for the easy incorporation of new provisions. This is an area of legal review that should not be overlooked. Many state federal codification statutes are specific to a particular law reference or a particular federal regulation. Some even codify the exact wording of the federal regulation. The key in this evolving environment is to review current federal preemptive statutes and consider how they may need to be changed in anticipation of changes at the federal level that govern these statutes.

Assumption #3. Focus on Deployment versus Testing. Further, with the issuance of the Federal Automated Vehicles Policy (NHTSA, 2016) and the subsequent publication, A Vision for Safety 2.0 (NHTSA, 2017), along with the extensive body of current and anticipated laws, regulations, and introduced legislation, the focus of this roadmap document is primarily on driving automation system-equipped and C/ADS-equipped vehicle deployment rather than on testing. While this document does highlight legal requirements associated with both the deployment and testing of C/ADS-equipped vehicles, the most likely application of this resource document is deployment efforts. The varied goals associated with testing in states tend to drive testing legislation, so this project would not be as useful to the end users if the focus was primarily on testing.

Assumption #4. Timeline for Deployment. The timeline for deployment can vary widely based on individuals’ perspectives, vehicle level of autonomy, and anticipated use case. Taking these factors into consideration, a timeline for deployment reflecting anticipated commercial availability was developed with panel and stakeholder input.

While it may not be possible to set a precise date when state motor vehicle codes and regulations will require certain modifications, it is clear that states need to start planning for deployment now. The recommended priorities for modification of laws and regulations have been developed to coincide with this timeline and have been grouped according to the short-term (2018–2020), mid-term (2021–2025), and long-term (2026 and beyond; Figure 1-3).

This timeline is provided to help state policymakers recognize that the time frame for passenger level 4–5 ADS-equipped vehicles operating in unconstrained environments is likely to be longer, but also that C/ADS-equipped vehicle deployment is unlikely to be linear. What the timeline indicates is that any laws that states need to modify for level 1 truck platooning need to take place immediately. Some states have begun this effort by modifying (as necessary) following distance laws, definitions for platoons, and other impacting constraints. However, states should also recognize that a limited number of level 3 ADS-equipped vehicles are already on the market, with significant market penetration expected by 2020. Additionally, level 4 ADS-equipped A-MaaS shuttles in constrained environments and level 5 ADS-equipped A-MaaS shuttles are expected to be on the market by 2020. Level 1 driving automation system-
equipped platooning commercial vehicles are anticipated to be market-ready by 2020 as well. Therefore, laws cannot be modified simply for one level of C/ADS or their expected progression but should be examined holistically with any timeline only as a point of possible reference.

While states should not overreact to this timeline or any of the other expressed timelines by technology companies, manufacturers, or other private interests, efforts to modify laws should be underway or planned for the immediate and near term. Having the appropriate legislative and legal framework in place, preferably one that permits easy adaptation, will facilitate state efforts to navigate the rapid pace of change and will allow OEMs and technology providers to develop, refine and apply the technology appropriately, safely, and effectively.
Chapter 2.

C/ADS Legal Landscape

2.1 Overview of the C/ADS Legal Landscape

This chapter provides a brief summary of the C/ADS legal landscape. For a more detailed review, readers are encouraged to seek out the information included within (Loftus-Otway & Gallun, Updated 2018). The detailed review covers five major areas related to the C/ADS legal landscape:

1. U.S. federal activities within the sphere of regulating C/ADSs.
2. State and local activities underway, including a review of all 50 states to determine the state of the practice in this area.
3. Activities being undertaken by transportation agencies within this field, with a focus on AAMVA’s activities.
4. A review of law journal articles that have begun to lay out specific subject matter focus areas for policymakers and legislators to consider as C/ADS market penetrations grow along with a review of privacy laws.
5. A high-level scope review of international activities being undertaken in this area (e.g., Canada, Mexico, European Union, Australia, and Japan).

To supplement the broad overview, key findings from an in-depth state legal and regulatory audit are also included.

A review of legislation throughout the U.S. and internationally showed that, from a legal and regulatory perspective, legislating for C/ADSs is just beginning. As of June 2018, 29 states have passed legislation related to driving automation system-equipped or ADS-equipped vehicles while governors in another 10 states have issued executive orders. Three states, Maine, Wisconsin, and Washington, have enacted legislation and executive orders (Figure 2-1).

At the federal level, no new laws have yet passed out of Congress regarding C/ADSs. However, Congress has introduced legislation regarding issues related to the introduction of C/ADSs, such as privacy. It is expected that further bills will be filed in the 115th Congress. In 2017, NHTSA released updated policies regarding C/ADSs and cybersecurity, and is expected to continue issuing regulations within this area. In addition, it is anticipated that the Federal Trade Commission and Federal Communications Commission will continue to regulate in the areas of consumer protection and communications.

A review of legal journals revealed that articles have yet to discuss:

- Amendments to motor vehicle codes, or
- Terminology that is, or will become, obsolete.
2.2 In-Depth State Legal and Regulatory Audit

C/ADSs present both opportunities and challenges for state agencies and lawmakers. Among the highest priority challenges is charting how C/ADSs, particularly SAE level 4–5 ADS-equipped vehicles, fit within the existing legal frameworks at the state level. Over the last 50 years, states have developed elaborate statutes, often consisting of hundreds of sections of state code, dedicated to regulating all facets of driving, vehicles, and underlying infrastructure. Most of these codes and regulations, however, were written without any anticipation of C/ADSs. When vehicles are driven by an ADS rather than a human (or a mix of both), existing state laws or regulations governing their safe operation may need to change in fundamental ways or at the very least may require numerous adjustments. While states are already responding to the challenges of automated technology, many find themselves operating reactively, responding to industry advances as they arise rather than proactively anticipating technological changes.

A state legal and regulatory audit was completed to provide assistance to state agencies as they work to adapt their legal programs to reflect the realities of C/ADSs (See Wagner et al., 2018). The research involved a front-to-back audit of 15 separate states codes and regulations (states were selected to represent a broad range of legal approaches), as well as the latest version of the Uniform Vehicle Code (UVC; 2000), since the UVC served as the legal starting point for a number of state codes. The goal of the audit was to identify the types of legal impediments embedded in existing codes that may require those codes to be modified. The audit method developed was also intended to offer states a useful template or checklist for conducting their own internal state audits.

1 Readers should refer to Figure 1-1 for information on SAE driving levels.
2 The vast majority of the raw audit data on the UVC and 15 states (i.e., key provisions with comments) is available on a dedicated web space. This information is available through a hyperlink and will be maintained for the foreseeable future (e.g., 5 years). See: https://utexas.box.com/s/341xa53e7yb8usyv0vjkjhtc45mtdqdr
The state legal and regulatory audit highlighted dozens of state code provisions that may need modification or clarification to reduce ambiguity and uncertainty as they apply to C/ADSs. The 10 most critical recommendations for potential modification or clarification are itemized below.

1. **Definitions.** Identification of fundamental terms that are in need of clarification or revision to provide predictability and consistency in the legal treatment of C/ADSs. These include “drive” and “driver,” “due care,” and “operator,” each of which occur hundreds and sometimes thousands of times in a single state legislative motor vehicle code and form the underpinnings of much of the code’s legal applicability and jurisdictional reach.

2. **Legal Audit.** A front-to-back audit of state codes that reveals not only where codes must be changed, but highlights where the absence of law is, in and of itself, an equally or even more significant problem. Table 2-1 presents a more detailed list of 23 state code provisions potentially needing modification or clarification. Chapter 3 further refines this list by organizing the potential areas for modification or clarification organized by timeframe for action (short-, mid-, and long-terms) and commercial application. This list may be adapted by states into a checklist as they move forward in developing their own action plans.

3. **Use of Data and Data Protection.** A rigorous examination of the types of consumer data that could be collected by C/ADSs as well as by connected infrastructure located outside vehicles. States may also want to assess how third parties might use this collected data to compromise consumer privacy. This includes an assessment of whether some consumer data could be used by law enforcement or made publicly accessible through Open Records Statutes in ways that conflict with legitimate consumer privacy interests.

4. **Truck Platooning.** Adjustments to various existing legal requirements that affect truck platooning. To allow platoons on state highways, states should modify following distance requirements. The possibility of local restrictions that could conflict with state platooning programs should also be researched and addressed. Engineering analyses may also be useful to understand the effects of long platoons as they relate to current weight, length, and other restrictions.

5. **Aftermarket.** A mechanism to regulate aftermarket modification of vehicles that enhance or alter automated features. Vehicle registration programs more generally may also need to include new requirements, such as tracking the nature and type of automated features on a vehicle, but these new programs generally will not require modifications to existing requirements.

6. **Operator Responsibility.** Modification of criminal or civil laws that currently place full responsibility on operators and owners for violations and damages, even if the vehicle is operating appropriately in automated mode.

7. **Human Judgment of Rules of the Road.** Modification or clarification of rules of the road that require human judgment or visual cues, both for safe operation and for crash reporting requirements set by policy makers.

8. **Vehicle Inspection Requirements.** Modification of vehicle safety and inspection requirements to remove any unreasonable impediments to the use of C/ADSs. An assessment of additional inspection and vehicle requirements, such as requirements for software updates, may also be necessary to ensure safe C/ADS deployment; however, these are wholly new programs and generally do not require modifications to existing requirements.
9. **Occupant Safety.** Modification of legislative and regulatory requirements governing occupant safety (child seat belts) and requirements governing unattended vehicles operating at Level 4 and above.

10. **Driver Restrictions and Limitations.** Re-examination of the licensing restrictions for specific types of driver limitations (e.g., seizure). States may want to revise their testing and education programs to ensure operator competence with automated features, although these changes will add to rather than modify existing legal requirements.

As states use these recommendations to address their own codes there are some important things to consider. For each desired modification, states (e.g., DMV staff or general counsel’s office) should identify which governmental institutions are legally authorized to make modifications. Because of the wide variation in how these responsibilities are structured in different states, these recommendations are generally directed to “states” rather than specific government entities. States also vary their legal delegations of authority to DMVs, DOTs and other relevant agencies. The nature of the statutory text itself will also affect whether legislative or agency modifications are necessary or possible. For example, prescriptive and detailed statutes will generally require legislative modifications because they allow state regulators little to no interpretive authority, which may prove problematic in the oversight of a quickly-changing technology.

States will also need to identify the form the modification will take—e.g. laws versus regulations versus interpretation. These choices will also differ from topic to topic and state to state. Finally, states should consider the type of public deliberations that are desirable for various modifications, particularly when the choices involve significant public policy considerations.

With these important caveats regarding important state-specific choices involved in implementing modifications, below is a full list of 23 recommendations for state code provisions that may need modification or clarification. States should find this checklist helpful as they begin to review their own state code provisions to identify the state codes that will require a more thorough front-to-back audit.

**Table 2-1. Critical Category Checklist for State Legal Audits**

<table>
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<tr>
<th>Checklist of State Code Provisions Potentially Needing Modification or Clarification</th>
<th>Recommendation</th>
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<tr>
<td>1</td>
<td>Conduct a critical review of fundamental vehicle code terms “drive,” “driver,” “operate,” and “operator,” and develop necessary clarification in terms, intent, and interpretation.</td>
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<td>2</td>
<td>Address the possibility that vehicle codes can be interpreted to regulate only “drivers” (who are licensed and human) and exempt level 4–5 ADS-equipped vehicles from legal oversight.</td>
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<td>3</td>
<td>Determine who can operate driving automation systems at different levels of driving automation and adjust the law for driver licensing requirements.</td>
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<td>4</td>
<td>Develop driving tests (or amend existing tests) keyed to varying levels of driving automation systems.</td>
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### Checklist of State Code Provisions Potentially Needing Modification or Clarification

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<th>Recommendation</th>
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<td>5</td>
<td>Modify prohibitions against inattentive drivers depending on level of driving automation system deployed.</td>
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<td>6</td>
<td>Clarify the meaning of laws that prohibit unattended vehicles, especially for level 4–5 ADS-equipped vehicles, including automated mobility as a service (A-MaaS) vehicles.</td>
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<td>7</td>
<td>Amend statutes governing criminal and civil liability to leave open the possibility that when properly engaged, the ADS in a level 3–5 ADS-equipped vehicle could also be responsible in whole or in part for a resulting violation.</td>
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<td>8</td>
<td>Consider when “reasonable suspicion” of alcohol or drug use is appropriate in specific ODD with a properly engaged level 3–5 ADS-equipped vehicle.</td>
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<td>9</td>
<td>Clarify alcohol and drug use and regulation (including in states where marijuana has been legalized) within the various levels of driving automation. Develop offenses, fines, and sentencing terms for lower level violations at varying levels of driving automation.</td>
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<td>10</td>
<td>Modify anti-distraction provisions to enhance the utility of ADS-equipped vehicles for their drivers (while the ADS is unengaged) or passengers (while the ADS is engaged).</td>
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<td>11</td>
<td>Memorialize, from the time of manufacture to junk or salvage on title and registration documents, that the vehicle is driving automation system-equipped. Consider memorialization of aftermarket technologies.</td>
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<td>12</td>
<td>Consider culling obscure requirements that reference specific items (e.g. use “steering assemblies” rather than “wheels” and “braking systems” rather than “pedals”).</td>
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<td>13</td>
<td>Modify agency inspection legislation/regulations to accommodate the new technological features of C/ADS.</td>
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<td>14</td>
<td>Revise or clarify existing laws with respect to whether and how they regulate aftermarket driving automation system-related technologies installed on a vehicle.</td>
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<td>15</td>
<td>Determine responsibility for crashes, incidents, and harms that may not be the result of human error but rather flaws in the ADS as engaged at the time of the event of interest.</td>
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<td>16</td>
<td>Modify lemon laws to account for new driving automation system-related technologies to ensure adequate consumer protection from product defects.</td>
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<td>17</td>
<td>Identify how and whether the rules of the road apply to different levels of driving automation systems. Ensure that level 4–5 ADS-equipped vehicles are not exempted from rules of the road requirements.</td>
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### Checklist of State Code Provisions Potentially Needing Modification or Clarification

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</tr>
<tr>
<td>23</td>
</tr>
</tbody>
</table>

Since each state will need to consider its own state codes, it is recommended that states begin with laws that might need to be modified because they impede automated transportation functionality or are no longer relevant. The checklist above should help in that identification process. Once those codes are identified, a thorough front-to-back review of each state code is recommended. As states conduct their audit, the following lists of questions (Table 2-2 and Table 2-3) will help identify provisions that need further review and may require modification or clarification.
### Table 2-2. Triggers Used to Identify Problematic State Provisions – Core Questions

<table>
<thead>
<tr>
<th></th>
<th>CORE QUESTIONS THAT MUST BE RESOLVED IN THE SOURCES OF LAW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is an operator and does that operator need to be a human? This will be covered partly in definitions (“operator” and “person” are typically located in the first section of code requirements for operating a car); also look for clues as to whether the operator must have a license, and then whether that license must include fingerprints, etc.</td>
</tr>
<tr>
<td>2</td>
<td>Does an operator need to be present in the vehicle or can the operator control the vehicle remotely?</td>
</tr>
<tr>
<td>3</td>
<td>Even if the operator must be physically present, does the operator need to be actively controlling the vehicle? Are there accommodations that allow automation for handicapped drivers?</td>
</tr>
<tr>
<td>4</td>
<td>Are there other requirements that may impede ADS operations (e.g., operator must be attentive; operator must “see” the road)?</td>
</tr>
<tr>
<td>5</td>
<td>Can there be two operators (e.g., the human driver and the ADS manufacturer)? If so, can the ADS manufacturer bear most of the responsibility?</td>
</tr>
<tr>
<td>6</td>
<td>Are there rules of the road that seem specific to the roadway and that would require a human operator (rather than an ADS)?</td>
</tr>
<tr>
<td>7</td>
<td>If there are vehicle inspection requirements, do the vehicles require pedals, steering wheels, etc. in order to be allowed on the road?</td>
</tr>
<tr>
<td>8</td>
<td>What other intersections do you see between driving automation system-equipped vehicles and the states’ laws and rules?</td>
</tr>
<tr>
<td>9</td>
<td>Are there requirements that preclude texting, drinking, etc. while operating a car? These could place limits on the use of ADS-equipped vehicles.</td>
</tr>
<tr>
<td>10</td>
<td>Is it the state’s expectation that all existing rules of the road will apply to some or all levels of automation?</td>
</tr>
</tbody>
</table>

### Table 2-3. Triggers Used to Identify Problematic State Provisions – Supplemental Triggers

<table>
<thead>
<tr>
<th></th>
<th>POSSIBLE (NONEXCLUSIVE) QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>With regard to the driver, is there a provision for operating a level 4 or level 5 ADS-equipped vehicle (particularly an ADS-dedicated vehicle) without a human driver or manual driver controls?</td>
</tr>
<tr>
<td>2</td>
<td>Are there specific visibility requirements (e.g., operator must be able to see through windshield)?</td>
</tr>
<tr>
<td>3</td>
<td>Are there specific operator requirements that will restrict the usefulness of ADS-equipped vehicles (e.g., explicit requirement of a human “driver”; emergency requirements that the operator perform specific tasks)?</td>
</tr>
<tr>
<td>4</td>
<td>Are there requirements that constrain the operator (e.g., require an awake or alert human operator)?</td>
</tr>
<tr>
<td>5</td>
<td>Are there requirements that suggest the operator must be human (e.g., definition of person, fingerprints)?</td>
</tr>
<tr>
<td></td>
<td>POSSIBLE (NONEXCLUSIVE) QUESTIONS</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Are there required vehicle features that imply a traditional human operator or that may become outdated with the deployment of ADS-equipped vehicles (e.g., steering wheel and/or brake pedals must be present)?</td>
</tr>
<tr>
<td>7</td>
<td>How is the legal responsibility for violations determined (e.g., operator in vehicle at time)?</td>
</tr>
<tr>
<td>8</td>
<td>Are there any rules of the road that are situation-specific (sensitive to conditions on the road at a given time) and might be difficult to code for as they require human judgment or situation-specific judgments (e.g., school bus or emergency stops, work zones)?</td>
</tr>
<tr>
<td>9</td>
<td>Are there particular requirements that might impede truck platoons?</td>
</tr>
<tr>
<td>10</td>
<td>Do protections exist for driver privacy (e.g., others cannot obtain driver’s license number or photo; license plate is not linked to private data)? Note, due to connectivity-related concerns, there may be a privacy risk associated with C/ADS data.</td>
</tr>
<tr>
<td>11</td>
<td>What are the terms of criminal sanctions and liability (e.g., leaving children in the vehicle unattended, driving under the influence, etc.)?</td>
</tr>
<tr>
<td>12</td>
<td>Under what conditions is there probable cause to investigate a vehicle?</td>
</tr>
</tbody>
</table>
Chapter 3.

Prioritization and Harmonization of C/ADS Legislative and Regulatory Changes

3.1 Understanding Opportunities for Legal and Regulatory Modifications

State legislatures, Governor’s offices, legal practitioners, and industry sectors engaged in C/ADS deployment recognize that current laws and regulations must be addressed in a comprehensive, yet flexible way to ensure safety and reap the anticipated societal benefits of C/ADSs, while simultaneously anticipating many unknowns. Unlike implementing traditional legal and regulatory changes or making simple citation modifications for adding a new title brand or type of license plate, or instituting an adjustment in fees, fines, or driver sanctions, the changes to C/ADS-related laws are complicated and challenging. Modifying these laws and regulations will require more foundational changes to basic underpinning concepts and definitions, as well as an understanding of C/ADS technologies and their limitations.

Further, there exist a number of situations in which states, through their motor vehicle agency or DOT, may find their needs and those of industry best served by syncing their efforts in order to harmonize key regulatory or legislative provisions related to C/ADSs. There may also be areas in today’s vehicle codes and regulations where it may be important to harmonize for purposes of supporting the deployment of C/ADSs. In this respect, we assess the advantages, disadvantages, and practicality of harmonizing the approaches to these types of laws and regulations across the country.

Findings (as noted throughout this document) suggest the need for states to get as "centric" as possible to the intersecting realities of technological imperatives, public policy, and stakeholder interests. The point where these realities intersect represents opportunities for legal and regulatory modifications are illustrated in Figure 3-1.

![Figure 3-1. Visual depiction of the centric approach to prioritization efforts.](image-url)
Ideally, state legislative and regulatory schemes would fit neatly within the circles where public policy, technological imperatives, and stakeholder interests all intersect. However, it seems probable that the reality of legislation and regulation will be messier, straying in one direction or another on a given issue or at a particular moment in time.

When assessing law and regulation change, the closer a legislative and regulatory approach comes to the theoretical center where technology, stakeholders, and current laws, regulations, and policies meet, the more likely that change is to meet public policy objectives, avoid or withstand external challenges, and meet the needs of a complex, evolving technology.

3.2 Overarching Considerations Regarding Harmonization

Individual state laws and regulations for C/ADS are vital, but equally important is ensuring that vehicles can operate seamlessly across state lines. Ensuring state laws do not substantially conflict can occur through a process known as harmonization, which is the process of minimizing redundant or conflicting standards that may have evolved independently (Pelkmans, 1987). Harmonization can create consistency of laws, regulations, standards, and practices, so that the same rules will apply across jurisdictional boarders. Harmonization is agnostic to the specific policy approach, and can mean moving all jurisdictions’ standards to the strictest standard, most permissive standard, or to a midpoint between the two poles or to a more uniform standard.

Harmonized state regulations for C/ADSs offer a number of critical advantages over a diverse and discordant set of state regulations. However, while harmonization has some advantages, there are some drawbacks, possible alternative strategies, and several areas (identified in Serian et al. 2017) that do not need harmonization for the safe deployment and operation of C/ADSs. The following subsections explore harmonization of motor vehicle codes and other rules governing C/ADSs, considering benefits, drawbacks, examples, and alternatives to harmonization.

Potential Benefits Associated with Harmonization

As with most regulatory discussions revolving around C/ADSs, the primary rationale for harmonizing state motor vehicle codes is to make the vehicles and the roadways safer for all users, improve enforcement, and increase driver awareness. Furthermore, the potential for substantial reductions in motor vehicle crashes, fatalities, and injuries serves as the driving force behind the generally supportive posture the public sector has taken towards C/ADSs (Strickland, 2013). At the same time, states are motivated to remove any barriers to the operation of safe C/ADSs to encourage private sector investment and research into this technology. Consistent, clear, and predictable rules across disparate political entities can reduce complexity for manufacturing and product development, potentially reducing costs to industry and consumers alike. Harmonization therefore touches issues that affect state policy makers and agencies, industry, as well as the traveling public.

The business case for C/ADSs depends, in part, on state harmonization of motor vehicle codes. To the degree that similar regulations are in place across many or all states (for example, liability), some
introductions of C/ADS technologies may be accelerated, increasing the market size. A-MaaS use cases, for example, rely on a “network effect” to function effectively (Rogers, 2016). Services like A-MaaS must build out a robust network of users to function, and states with consistent rules make it easier for companies to build a user base across state lines. This has been clearly demonstrated with the deployment of Transportation Network Companies from state to state and from city to city.

The business case for C/ADSs in CMV operations can also depend on harmonized state motor vehicle codes and regulations. For example, many goods reach markets via CMVs, and ensuring their safe and efficient operation is important for other road users, the companies receiving and shipping the goods, and the users of the goods. Harmonized state motor vehicle codes can reduce the regulatory burden on CMV operators transporting goods across state lines, and may also be relevant as platooning CMVs enter the transportation network. From a broader economic perspective, harmonization offers a seamless regime that facilitates the free flow of goods and commerce across borders without regulatory barriers. This application has been demonstrated through such applications of the International Registration Plan.

When there are disparate approaches to regulating specific aspects of vehicle equipment, manufacturing costs may rise (Canis and Lattanzio, 2014). Harmonization at the state and local levels can reduce these costs, which in turn is likely to benefit consumers through lower cost products and a more efficient technology rollout. This efficiency stems from the regulatory consistency that is provided for manufacturers of vehicles, as well as system developers regarding uniform vehicle functionality, external markings, and several other areas that could help reduce development and implementation complexity and accelerate market introductions.

Another motivation for harmonization is facilitating data sharing between states, such as improving interstate consistency for vehicle records designations (e.g., titling and the National Motor Vehicle Title Information System and the Commercial Driver License System). Much of this type of harmonization is already underway. Note that when it comes to harmonization of areas such as liability and insurance requirements, this may need to be approached based on the type of consumer ADS application. Within this analysis, harmonization considerations are presented in in terms of consumer ADS applications (C/ADS-equipped passenger vehicles and A-MaaS; see Chapter 1 for definitions).

**Potential Drawbacks of Harmonization**

While harmonization offers many advantages for states, industry, and the traveling public, there are also downsides that bear consideration. Perhaps the most obvious concern a state might have regarding harmonization is a loss of control over policy decisions. Under the Tenth Amendment to the Constitution, states maintain powers not designated to the federal government (U.S. Const. amend. X).

Harmonization can reduce complexity by aligning a disparate set of rules or regulations. However, doing so can also cause problems if the harmonized rules are inappropriate, premature, or have other flaws. If an industry or product is not technically mature, for example, establishing rules prematurely could hamper innovation by restricting the product or industry in ways that may not improve safety or efficiency. If states harmonized to a premature or inappropriate set of rules, the problematic rule would shift from being a local or regional problem to being a national problem. For this reason, those involved in the
harmonization process should carefully consider the costs and benefits to all stakeholders and interests, including manufacturers and the traveling public, both with regards to safety and cost.

Beyond overt disadvantages, there are also basic questions of necessity when considering harmonization across all states. Harmonization is not a simple or speedy process, as demonstrated by the Drivers License Compact, and typically takes several years to complete. Due to the slowness and difficulty of harmonizing regulations, states may wish to avoid harmonization for areas that are neither necessary nor beneficial.

For issues that do not expressly need state harmonization, each state could ensure their laws and/or regulations are clear, in particular as they relate to core terms and definitions (e.g., drive, driver, operate). Additionally, states could require all vehicles follow the rules of the road, regardless of whether a human driver or the ADS performs the DDT. However, flexibility in interpretation and execution of the rules of the road is also important, in that it enables vehicles—both ADS and human-operated—to make reasonable decisions in a complex and dynamic operating environment.

Harmonization may be unnecessary when regulating certain aspects of C/ADS, as some manufacturers may develop the ability to automatically adjust to new parameters and requirements whenever crossing state lines or any jurisdictional boundaries. As an example, A-MaaS operations areas may gradually expand as regulatory regimes evolve. In much the same way that C/ADSs will need to adjust automatically to each roadway’s speed limit, developers could potentially include automatic adjustments for other non-hardware related regulatory provisions.

**Implications of Not Harmonizing**

Much of the above discussion has centered on the benefits that come from states harmonizing their vehicle codes and standards for C/ADS, but it is equally important to note the risks for industry and the broader public if such harmonization, where needed, does not occur. Without harmonization, industry faces what has been termed a “patchwork quilt” of state regulations.

The risk associated with the failure to harmonize standards when needed is that industry testing and eventual deployment of C/ADS will be unnecessarily delayed and/or potentially not broadly available, the safety benefits of C/ADSs will be lost, and the lives saved from roadway fatalities will be lessened. Regulatory inconsistencies will create roadblocks for C/ADS testing and operation if the differences include conflicting standards or excessive overlapping of state, county, regional, and local requirements.

This risk is associated only with a failure to harmonize those areas we have recommended for harmonization. For areas identified as not requiring harmonization, the impact on industry is deemed much less detrimental with regard to testing, development, and deployment of C/ADSs. This is a result of the current lack of harmonization in these areas across states. We believe industry can comply with any existing related provisions without impacting their timelines for C/ADS deployment or the manufacturing process.
For hardware, design, and other fixed vehicle attributes, harmonization through federal preemption is likely necessary. Standards that address or prohibit allowable hardware, hardware mounting, or other hardware aspects essential to level 4–5 ADS-equipped vehicles could prove prohibitive to their interstate operation, thus conceivably blocking market introduction.

**Alternatives to Harmonization**

**Reciprocity Agreements**

Harmonization is not the sole mechanism for achieving seamless authority to operate a motor vehicle across state borders with different laws, regulations, standards, and practices. Reciprocity agreements represent a highly effective, and frequently utilized, alternative in which states sign agreements to mutually recognize each other’s licenses, share driver infraction records, or any other provision of vehicle codes that are necessary for operating vehicles in other states.

Three examples of existing interstate compacts include 1) The Driver License Agreement, 2) the Driver License Compact, and 3) the Non-Resident Violator Compact (AAMVA, n.d.; National Center for Interstate Compacts, n.d.a; National Center for Interstate Compacts, n.d.b). Under these arrangements, states agree to mutually honor licenses issued by other states, share information regarding out-of-state infractions and driver safety, and allow for the processing of traffic citations across state borders. Most states take part in these arrangements: 44 out of 50 (88%) participate in the NRVC, and 45 of 50 (90%) participate in the Driver License Agreement, for example. These agreements ease interstate travel without the harmonization of state vehicle codes or licensing requirements. The process for a state to join a reciprocity agreement or interstate compact such as these can involve state legislatures ratifying the agreement and the passage of legislation to codify the content of the reciprocity agreement. This process can be lengthy, and historically, some states have taken years to sign these compacts. An example candidate for reciprocity could include permit requirements for platooning level 1 driving automation system-equipped vehicles. However, with the recognition of the obstacles to interstate compact agreements, this is not a preferred recommended direction.

**Model Law / Best Practice Language**

Another approach that can make the harmonization process much easier is drafting model legislation or best practice language. A model law is a complete piece of legislation, pre-made and ready for introduction into the legislative process. Best practice language is less formal, and features pre-crafted tenets or aspects of legislation that lawmakers can adopt into law. This approach is effective because it enables unfamiliar legislators to start from a prepared text rather than requiring each individual state, and each legislative committee within each state, to craft original language. In discussions with state administrators, we found that stakeholders view model legislation as a solid foundation for state laws and cross-jurisdictional reciprocity. Similarly, state DOTs echoed the importance of uniform regulatory efforts related to infrastructure improvements, such as interconnected traffic signals and other V2I systems for connected vehicles.
Model laws or best practice language can be useful to lawmakers who are unfamiliar with C/ADS technology or who do not have the time to become experts in the intricacies of the technology or its full array of policy implications. However, while model laws can be helpful, they are far from perfect, as there are rarely issues as complex as those surrounding C/ADSs that can be addressed within the text of a singular, universal bill. Additionally, variation among existing state codes can make it difficult to apply model laws, as doing so would require closely scrutinizing existing code and replacing it with model language. As such, it is helpful for those crafting model laws to focus on providing model language primarily for the most important policy aspects of this topic. States, working with the legislatures, can then utilize the model language within the content of a bill, drafted according to their state’s statutes, codes, and regulatory agency structures. Associations such as AAMVA and AASHTO and the Uniform Law Commission are important resources and ideally should (with their members) drive model law considerations. History teaches a lesson here as well. Model laws are difficult to get legislatively enacted in some states.

The legislative process is complicated. Bills often change substantially from introduction to acceptance, which can reduce the effectiveness of model legislation. For these reasons, based on our interviews, many industry representatives favor the less prescriptive best practice language approach over that of model law when seeking harmonization; this is a lesson they learned through experience during past attempts to enact model bills across the states.

Guidelines

Lastly, states should consider the use of less prescriptive and more flexible guidelines at the state level. NHTSA used this mechanism with the issuance of non-binding Federal Automated Vehicle Guidelines in 2013, again in 2016, and further updated under the current DOT leadership (NHTSA 2013, 2016, 2017).

Based on our stakeholder feedback, recent experiences in the C/ADS regulatory area have led many to believe that it is likely too hard to “go straight to regulations” and that an approach centered on the issuance of clear guidelines may prove to be a better approach. When responding to questionnaires, several stakeholders, including manufacturers and technology companies, cited the State of California’s in-depth regulations for the testing and deployment of C/ADSs as a reason for moving their testing operations to other, less prescriptive states.

Guidelines addressing key areas of needed legal changes, such as definitions, developed at the federal level with input from state- and local-level government entities and other stakeholders (e.g., national and state associations, citizen groups) can provide state policy makers with a starting point for their individual efforts. Further, guidelines may serve as a catalyst for harmonization across states.

Federal Preemption

The impetus behind federal preemption has historically been to avoid a patchwork of state standards and regulations. The federal government has strongly indicated it will address standards for C/ADS hardware and software such that state level regulations (or harmonization) will not be necessary, and that federal laws and standards could preempt state policy (NHTSA, 2016, 2017). Under this scenario, the
harmonization of certain aspects of C/ADS regulations and standards would become moot as NHTSA (or FMCSA for motor carriers) would set standards preventing states from enacting standards that differ from federal rules. Enforcement of federal standards would largely depend on the specifics of the policy in question; currently, many automotive safety and environmental regulations are enforced via self-certification, and this seems a likely avenue for future enforcement mechanisms (Canis and Lattanzio, 2014). As noted in the previous chapter, with the unanimous passage of the SELF DRIVE Act of 2017 by the House of Representatives, Congress has already begun to consider preemption of state and local regulations and laws pertaining to hardware and design features for C/ADSs.

3.3 Prioritization and Harmonization Recommendations

As noted in Chapter 2, states should examine the fundamental legal concepts and terms that undergird their motor vehicle and transportation programs, and consider how these concepts and terms will be affected by the use of C/ADSs. This is a time to assess and then act, rather than reacting or acting for the sake of action. These latter approaches result in the crafting of piecemeal revisions and solutions to legal impediments and gaps as they arise, but fail to recognize the more strategic implications of specific law changes that go deeper than one piece of a state motor vehicle code. During the assessment process, states are advised to refer to NHTSA’s guidance (2017) which encourages states "to allow DOT alone to regulate the safety design and performance aspects of ADS technology. If a State does pursue ADS performance-related regulations, the State should consult with NHTSA" (2017, p. 20). NHTSA notes that "allowing NHTSA alone to regulate the safety design and performance aspects of ADS technology will help avoid conflicting federal and state laws and regulations that could impede deployment” (2017, p.18).

Recommendations included within this chapter are based on past experience with C/ADS-related research, input from stakeholders, and the anticipated timeline of level 4-5 ADS-equipped vehicle deployment (Figure 1-3). All changes to laws and regulations should be girded by the state’s goals and objectives surrounding level 4-5 ADS-equipped vehicle deployment and an individual state motor vehicle code assessment. For additional reasoning behind these recommendations Chapters 4 and 5 of Serian et al. (2018).

Short-Term (2018–2020) Modification Priorities

Short-Term Recommendation 1. User Requirements Definitions and Driver Only Vehicle Codes

States, if they have not yet done so, should review the fundamental terms “drive,” “driver,” “operate,” and “operator,” as well as any wording that arguably omits any restrictions on C/ADS-equipped vehicles. Any ambiguous terms should be clarified to provide consistency and reduce ambiguity. Additionally, policy makers should directly address the possibility that their vehicle codes can be interpreted to regulate only “drivers” (who are licensed and hence human), thus potentially exempting from legal oversight level 4-5 C/ADS-equipped dedicated vehicles (C/ADS-DVs) where the ADS is, in effect, the “driver.”

Moving forward, states should be mindful of a current NHTSA project—Assessment, Evaluation, and Approaches to Technical Translations of FMVSS and Test Procedures That May Impact Compliance of
Innovative New Vehicle Designs Associated with Automated Driving Systems—which is considering these definitional issues as well as issues associated with vehicle requirements.

**Prioritization Recommendation:** In developing laws, regulations, and policies, ensure that the included definitions, especially those for level 3–5 C/ADS-equipped vehicles, are consistent with the SAE framework (as reflected in NHTSA, 2017).

**Harmonization Recommended:** Yes. Best practices language.

**Consumer C/ADS application(s) affected first:** C/ADS-equipped passenger vehicles and A-MaaS.

**Prioritization Recommendation:** States should consider working with NHTSA and AAMVA to develop uniform definitions for the terms “driver,” “operate,” and “operator” as best practices or uniform definitions. This effort should recognize the possibility that state vehicle codes can be interpreted to regulate only “drivers” (who are licensed and hence human) and thus effectively exempting from legal oversight level 4–5 C/ADS-equipped vehicles (where the ADS, when engaged, could be considered the “driver”).

**Harmonization Recommended:** Yes. Guidelines (policy decision).

**Consumer C/ADS application(s) affected first:** C/ADS-equipped passenger vehicles and A-MaaS.

**Short-Term Recommendation 2: Platooning-Related Code Provisions**

Policy makers should audit their highway/transportation state laws and regulations to identify those areas that deter the use of platoons. Areas possibly requiring modification include lane restrictions, service requirements, size, weight, and following distance—following distance being a frequently addressed area (Serian et al., 2017). Policy makers should also determine if local governments will have the ability to regulate platoons in ways that differ from the rest of the state. A number of stakeholders noted the need to address state regulations related to move over laws, following distance and tailgating, passing of other vehicles, convoys, and vehicle size and weight laws. However, some stakeholders saw no need for any legal or regulatory changes. As highlighted in Wagner et al. (2018), perspectives vary based on how jurisdictions interpret their current law and regulation wording. As with operator and driver definitions, some states have begun to define what a platoon is, where it can operate, and how approvals will be considered.
Prioritization Recommendation: If platoons are to be encouraged on a state’s highways, modification of following distance requirements will likely be necessary, particularly in states that impose prescriptive following distances.

Prioritization Recommendation: The legal classification of platoon is generally not specified in state codes. Policy makers should consider providing guidance or amend laws to provide a clearer definition of the classification of truck platoons.

Harmonization Recommended: Yes. Definitions surrounding platooning could benefit from best practices definitions and consistency from state to state. States should consider working with AAMVA, AASHTO, the Commercial Vehicle Safety Alliance, and FMCSA, to develop consistent platooning recommendations.

Consumer C/ADS application(s) affected first: Truck platooning driving automation system-equipped CMVs.

Prioritization Recommendation: Since trucks in platoons operate independently but in relative close proximity, state regulators may—if supported by engineering analyses—to consider the aggregate length, weight, and possible noise restrictions as they apply to a set of trucks operating as a platoon, depending on the outcome of relevant engineering analyses.

Prioritization Recommendation: In addition to a vehicle code review, policy makers should audit their highway/transportation state laws and regulations to identify those that impede the benefits of platoons. Some areas possibly requiring modification include lane restrictions, service requirements, size and weight, and following distance, which has been addressed frequently with regard to driving automation systems. In addition, policy makers need to determine if local governments will have the ability to regulate platoons in ways that differ from the rest of the state. Another important consideration for policy makers is harmonization across local boundaries, state boundaries, and international boundaries so as to not impede commerce.

Harmonization Recommended: Useful, but not essential. Definitions surrounding platooning could benefit from best practices definitions and consistency from state to state. States should consider working with AAMVA, AASHTO, the Commercial Vehicle Safety Alliance, and FMCSA, to develop consistent platooning recommendations.

Consumer C/ADS application(s) affected first: Truck platooning driving automation system-equipped CMVs.
Short-Term Recommendation 3: Vehicle Identification and Title Brands

This recommendation addresses two areas highlighted by stakeholders and revealed in Wagner et al. (2018): 1) how a vehicle will be identified as a level 4–5 ADS-equipped vehicle (an OEM and NHTSA role), and 2) how vehicles may need to be branded or identified for titling and/or registration. Each state currently has varying title brands and inconsistent definitions for brands. This is an area that should be considered in the short-term to allow states moving forward at the onset of C/ADS development to adopt consistent title and registration branding.

States should consider modifying statutes that define vehicle brands based on SAE J3016 automation level, and include new title brands for level 3 and higher ADS-equipped vehicles. State accommodations for title brands should follow the SAE levels, but also make provisions for aftermarket applications and brand revisions.

**Prioritization Recommendation:** States should consider modifying statutes that define vehicle brands based on SAE J3016 automation level, and include new title brands for level 3 and higher ADS-equipped vehicles. State accommodations for title brands should follow the SAE levels, but also make provisions for aftermarket applications and brand revisions.

**Harmonization Recommended:** Yes. Guidelines (policy decision)

**Consumer C/ADS application(s) affected first:** C/ADS-equipped passenger vehicles and A-MaaS.

Short-Term Recommendation 4. Data Privacy and Data Security

While NHTSA and other federal regulators are engaged in the various privacy issues presented by connected vehicles, which may also be automated, states should also consider statute changes to ensure public confidence and clarity on data collection and use. Two key legal issues should be addressed in this short-term timeframe. State policy makers should ensure that if privacy-sensitive data is collected on vehicles through connected infrastructure or otherwise, that data is not publicly accessible—for example through open records statutes—in ways that can compromise the privacy of individual drivers, riders or passengers (e.g., by being linked to specific cars or rides). Second, states should consider whether this same data could be used by state law enforcement officials in ways that compromise Fourth Amendment protections against unconstitutional search and seizures.

**Prioritization Recommendation:** States and their associations should review open records statutes and user and vehicle data use and availability statutes to address any needed modifications. They should also closely monitor activities at the federal level regarding data privacy. Since the collection, storage, and use of the data from connected vehicles carry such significant privacy risks, regulators such as NHTSA, the Intelligent...
Transport Systems Joint Program Office, Federal Trade Commission, and Federal Communications System, as well as the auto industry itself, must prepare regulations or standards to minimize those risks. Whether at the federal level or the state level, the benefits from improved technology in C/ADSs will need to be balanced against the growing need for data security and privacy to instill public confidence in these vehicles.

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

**Short-Term Recommendation 5: User Attentiveness Provisions**

Only a few states require the driver to be fully attentive during the DDT, but when these conditions apply, they limit the use of level 3–5 C/ADS-equipped vehicles. There are also several different requirements that regulate user behavior and demand a heightened level of attentiveness. Although the requirements are dispersed throughout the reviewed vehicle codes, some will require modification.

**Prioritization Recommendation:** States should review all statutes that related to driver attentiveness and inattentive driving and consider modifications to these anti-distraction provisions depending on the level of driving automation system deployed.

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

**Short-Term Recommendation 6: Rules of the Road**

States should identify and determine whether the rules of the road apply to C/ADSs and make appropriate modifications to motor vehicle laws. Some states have indicated in newly developed statutes that all provisions of rules of the road and accompanying penalties apply to level 4–5 C/ADS-equipped vehicles. Additionally, when these rules apply to “drivers,” clarification is needed as to who or, in the case of level 4–5 C/ADS-equipped vehicles, what that “driver” is to ensure that C/ADSs are not exempted from rules of the road requirements. States should also review all rules of the road with an eye to the “human” element and implement provisions that apply to all drivers and vehicles as appropriate. In addition, visual cues should be reviewed.

**Prioritization Recommendation:** States should review all rules of the road with an eye to the “human” element and implement provisions that apply to all drivers and vehicles as appropriate. Visual cues should also be reviewed. Benchmarks may need to be modified or adjusted by policy makers to accommodate the sensory abilities of C/ADS-equipped vehicles operating at level 3 or above.
Harmonization Recommended: No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

Short-Term Recommendation 7: Local Restrictions

The issue of local restrictions is one of the overarching priority considerations discussed earlier in this report. The UVC and some states provide explicit powers to local authorities to override the state laws in their motor vehicle codes. The sharing of powers and responsibilities between the states and localities with respect to C/ADSs may be a major impediment unto itself. Most of these challenges, however, lie beyond the motor vehicle codes. Given the importance and scope of this issue, we spotlight this type of provision, both for rules of the road and platoons. State-local cooperation, authorized by the law, may need refining or modification in the future in some states. Moving forward, states should begin reviewing existing statutes that allow for local control/local restrictions in light of level 3 and above C/ADS-equipped vehicle deployment.

Prioritization Recommendation: Some states’ codes provide local governments with authority to regulate traffic and impose local restrictions in addition to state restrictions. To the extent that local provisions would be stricter than state code restrictions, states should work with local governments to determine if the local controls should remain in place with deployment of level 3 and higher C/ADS-equipped vehicles.

Harmonization Recommended: No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

Short-Term Recommendation 8: Aftermarket Technologies

The application of existing state laws to aftermarket conversions of conventional vehicles into C/ADS-equipped vehicles remains unclear. Existing laws should be revised or clarified. In addition, aftermarket modifications should be classified and DMVs notified via a state-determined process if C/ADSs are installed on a vehicle. States should be aware that NHTSA governs vehicle safety equipment, and state revisions to this area of law are subject to federal preemption.

Prioritization Recommendation: States should begin to consider how they will address, legislate, or regulate aftermarket C/ADSs. Current laws and regulations may need to be revised or clarified with respect to whether and how they regulate aftermarket driving automation system-related technologies installed on a vehicle.

Harmonization Recommended: Yes. Guidelines (policy decision).
**Short-Term Recommendation 9: Unattended Vehicles**

States should consider clarifying the meaning of laws that prohibit unattended vehicles, especially for level 4–5 C/ADS-equipped vehicles. While mass deployments of passenger vehicles operating at these levels are beyond the mid-term timeframe, this legal area will still need to be considered for A-MaaS vehicles in the short-term.

**Prioritization Recommendation:** Clarify the meaning of laws that prohibit unattended vehicles, especially for level 4–5 ADS-equipped vehicles, including A-MaaS fleet vehicles.

**Harmonization Recommended:** Yes. Best practice language.

**Consumer C/ADS application(s) affected first:** A-MaaS.

---

**Table 3-1. Short-Term (2018-2020) Prioritization and Harmonization Modification Summary**

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>HARMONIZATION RECOMMENDED?</th>
<th>CONSUMER C/ADS APPLICATION AFFECTED FIRST</th>
<th>MEANS OF ADDRESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct a critical review of fundamental vehicle code terms “drive,” “driver,”</td>
<td>Harmonization recommended</td>
<td>C/ADS-equipped passenger vehicles and A-</td>
<td>Best practice language</td>
</tr>
<tr>
<td>“operate,” and “operator,” and develop necessary clarification in terms, intent,</td>
<td></td>
<td>MaaS</td>
<td></td>
</tr>
<tr>
<td>and interpretation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address the possibility that vehicle codes can be interpreted to regulate only</td>
<td>Harmonization recommended</td>
<td>C/ADS-equipped passenger vehicles and A-</td>
<td>Guidelines (policy decision)</td>
</tr>
<tr>
<td>“drivers” (who are licensed and human) and exempt level 4–5 ADS-equipped vehicles from legal oversight.</td>
<td></td>
<td>MaaS</td>
<td></td>
</tr>
</tbody>
</table>

---

**Consumer C/ADS application(s) affected first:** C/ADS-equipped passenger vehicles and A-MaaS.
<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>HARMONIZATION RECOMMENDED?</th>
<th>CONSUMER C/ADS APPLICATION AFFECTED FIRST</th>
<th>MEANS OF ADDRESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider the need to modify following distance requirements for platoons on a state’s highways. This is particularly important in states that impose prescriptive following distances. Additionally, provide guidance and clarify the legal classification of truck platoons</td>
<td>Harmonization recommended</td>
<td>Platooning ADS-equipped CMVs</td>
<td>Best practice language; receive guidance (e.g., from the Commercial Vehicle Safety Alliance)</td>
</tr>
<tr>
<td>Develop restrictions as needed if technical scan/engineering analyses identify any negative length, weight, and/or noise effects due to trucks operating as a platoon. Further, audit state laws and regulations that may impose lane restrictions or service requirements on platoons to develop harmonization across the state.</td>
<td>Useful but not essential</td>
<td>Platooning ADS-equipped CMVs</td>
<td>Best practice language; receive guidance (e.g., from the Commercial Vehicle Safety Alliance)</td>
</tr>
</tbody>
</table>

**VEHICLE TITLING AND REGISTRATION**

Memorialize, from the time of manufacture to junk or salvage on title and registration documents, that the vehicle is driving automation system-equipped. Consider memorialization of aftermarket technologies.

| Harmonization recommended | C/ADS-equipped passenger vehicles and A-MaaS | Guidelines (policy decision) |

**PRIVACY PROTECTIONS**

Assess state policy protections for privacy-sensitive data collected on vehicles through connected infrastructure and vehicle transmission and also the implications of open records laws and the applicability of current state privacy protection statutes.

| No harmonization recommended | | Not currently harmonized at the state level; no specific reason to harmonize for C/ADS |

**USER ATTENTIVENESS**

Modify prohibitions against inattentive drivers depending on level of driving automation system deployed.

| No harmonization recommended | | Not currently harmonized at the state level; no specific reason to harmonize for C/ADS |

**RULES OF THE ROAD – APPLICABILITY TO C/ADS**
### RECOMMENDATION

<table>
<thead>
<tr>
<th>Identify how and whether the rules of the road apply to different levels of driving automation systems. Ensure that level 4–5 ADS-equipped vehicles are not exempted from rules of the road requirements.</th>
<th>No harmonization recommended</th>
<th>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</th>
</tr>
</thead>
</table>

### RULES OF THE ROAD – LOCAL RESTRICTIONS

<table>
<thead>
<tr>
<th>Modify local controls over roadways for who can operate on them, the rules of the road, and consider issues of state level preemption.</th>
<th>No harmonization recommended</th>
<th>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</th>
</tr>
</thead>
</table>

### AFTERMARKET MODIFICATION

<table>
<thead>
<tr>
<th>Revise or clarify existing laws with respect to whether and how they regulate aftermarket driving automation system-related technologies installed on a vehicle.</th>
<th>Harmonization recommended</th>
<th>C/ADS-equipped passenger vehicles and A-MaaS</th>
<th>Guidelines (policy decision)</th>
</tr>
</thead>
</table>

### UNATTENDED VEHICLES

<table>
<thead>
<tr>
<th>Clarify the meaning of laws that prohibit unattended vehicles, especially for level 4–5 ADS-equipped vehicles, including A-MaaS vehicles.</th>
<th>Harmonization recommended</th>
<th>A-MaaS</th>
<th>Best practice language</th>
</tr>
</thead>
</table>

**Mid-Term (2021–2025) Priorities**

The mid-term timeframe of 2021–2025 will see significant change in terms of vehicles at different SAE J3016 levels of automation. We anticipate an increasing number of level 3 ADS-equipped passenger vehicles, the introduction of level 4 ADS-equipped A-MaaS vehicles, and the early introduction of level 4 ADS-equipped passenger vehicles. The most significant and rapid change is expected to happen during this period. The following law and/or regulation code changes are recommended in advance of this timeframe.

**Mid-Term Recommendation 1: User Qualifications, Testing, and Driver Education**

States should expect to modify licensing qualifications and requirements and determine if additional user testing and education is necessary. This effort goes well beyond the issuance of a digital or physical...
credential with an “ADS-equipped” designation. States will also need to look at any underlying reasons citizens have NOT been able to obtain a license to drive and if those issues can be resolved in level 4–5 C/ADS-equipped vehicles. These reasons might include medical competency provisions, sight restrictions, or other physical restrictions. Regulations governing medical competency boards should also be reviewed to determine possible changes in representation and skill sets. By this point, states should have addressed the underlying fundamental definitions of “drive,” “driver,” “operate,” and “operator,” making a review of these types of provisions less daunting.

Testing components should also be reviewed during this time, and states might consider adding level 4–5 C/ADS component language to existing driving tests to help ensure that the user understands the functional limits of the C/ADS system. Some of these terms may include C/ADS, DDT, minimal risk condition, operator and driver, and ODD limits.

Education requirements will similarly need to be examined for possible inclusion of new provisions and units to help users understand the appropriate times to engage and disengage a C/ADS, as well as how to operate during a handoff situation. Similar consideration should be given to how to interact with level 4–5 C/ADS-equipped vehicles.

Any change to issuance requirements, testing, or training will be on a state-by-state basis and is likely to intersect with federal mandates or requirements for non-commercial drivers in this area. The emphasis needs to be on reciprocity and best practices or model minimum standards developed by the states in concert with AAMVA.

Prioritization Recommendation: Determine who can operate C/ADSs at different SAE J3016 levels of automation and adjust the law for driver licensing requirements.

Prioritization Recommendation: Develop driving tests (or amend existing tests) keyed to the different SAE J3016 levels of automation.

Harmonization Recommended: Useful, but not essential. Reciprocity agreements, best practice language.

Consumer C/ADS application(s) affected first: C/ADS-equipped passenger vehicles and A-MaaS.

Mid-Term Recommendation 2: Reasonable Articulable Suspicion (Implied Consent)

States should consider when a “reasonable articulable suspicion” of alcohol or drug use is appropriate in settings where the system is controlling a level 4–5 C/ADS-equipped vehicle. For example, if it is possible for law enforcement to confirm at the scene that the C/ADS was properly engaged at the time of a violation or crash, there can be no presumption of a “reasonable articulable suspicion” of impaired driving.
Amendments to implied consent would seem logically to lead to parallel allowances for drinking for C/ADS operators under conditions that allow for safe operation for high levels of automation. Yet the latter decision would involve more comprehensive standards and public decisions about when drinking is and is not allowed in operating vehicles. Adjustments to implied consent for higher levels of automated driving will not lead to the automatic legalization of alcohol consumption while driving.

Prioritization Recommendation: Consider when a “reasonable articulable suspicion” of alcohol or drug use is appropriate in settings where the C/ADS is engaged in a level 3–5 C/ADS-equipped vehicle.

Harmonization Recommended: No. Assumes definitions are modified to clarify users are considered passengers when traveling in a level 4–5 C/ADS-equipped passenger vehicle or A-MaaS.

Consumer C/ADS application(s) affected first: C/ADS-equipped passenger vehicles and A-MaaS.

Mid-Term Recommendation 3: Prohibitions Against Use of Alcohol and Legal Drugs

States will need to clarify alcohol and drug use and regulation within the various SAE J3016 levels of automation (including in states where marijuana has been legalized). For example, for higher levels of automation, states may decide to allow operators to consume alcohol in advance of or during driving. If alcohol consumption is allowed for some levels of automation, this legal modification will also impact the implied consent requirements discussed above. Implied consent for higher levels of automation may need to be adjusted or even eliminated entirely.

Prioritization Recommendation: Clarify alcohol and drug use and regulation within the various SAE J3016 levels of automation (including in states where marijuana has been legalized). Develop offenses, fines, and sentencing terms at varying levels of automation. Adjust implied consent requirements accordingly.

Harmonization Recommended: No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

Mid-Term Recommendation 4: Motor Vehicle Liability

Some crashes, incidents, and harms will be the result not of human driver error, but rather flaws in the engaged ADS when it is in control of the vehicle. Some state laws currently place full legal responsibility for any damages and harms on the human driver and preclude any manufacturer liability. Policy makers should consider whether it is more equitable to place primary responsibility on vehicle manufacturers and technology companies when the ADS is engaged and in control of the vehicle, or at least include partial
responsibility for manufacturers. There is also a parallel need to define the process for determining who was in charge of driving at the time of the crash (likely by modifying event data recorder regulations, typically a federal responsibility).

**Prioritization Recommendation:** Determine responsibility for crashes, incidents, and harms that may not be the results of human operator errors, but rather flaws in the ADS as operating at the time of the incident.

**Harmonization Recommended:** Useful, but not essential. Best practice language.

**Consumer C/ADS application(s) affected first:** C/ADS-equipped passenger vehicles (later) and A-MaaS (now).

**Mid-Term Recommendation 5: Due Care Standard**

Policy makers should clarify how the “due care” standard applies when a vehicle is operating at SAE J3016 levels 3–4. Presumably, there are “due care” considerations applied to the human driver with respect both to whether to engage the C/ADS and whether to override or disable the C/ADS in specific settings. Since these types of “due care” actions currently have no reliable benchmark in human experience, states should define what these terms might mean in different technological and operational scenarios.

**Prioritization Recommendation:** Modify or adjust benchmarks to accommodate the decision-making abilities of level 3–5 C/ADS-equipped vehicles, especially for the “due care” standard.

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

**Mid-Term Recommendation 6: User Distraction Provisions**

Most states prohibit driver distractions, which can take the form of video screens, texting, earphones, and even grooming. None of these provisions impede the use of C/ADSs and none create safety hazards. Given the features of ADSs, some of these provisions may need to be modified as the fleet evolves into SAE J3016 levels 4–5. In particular, level 5 C/ADS-equipped vehicles operating as part of an A-MaaS fleet will assume no passenger responsibility for attentiveness nor have any expectation that the passenger will retake control of the vehicle.

**Prioritization Recommendation:** Modify anti-distraction provisions to enhance the utility of level 4–5 ADS-equipped vehicles for those who would benefit from their use.
Mid-Term Recommendation 7: Unfair Criminal and Civil Sanctions on Users

Drivers can be charged with criminal acts for violating certain traffic laws, but in the case of level 4–5 C/ADS-equipped vehicles, some of these criminal charges are less straightforward. Certain provisions may assign criminal liability to a human operator in situations where the vehicle could be completely to blame, or at least largely responsible, for resulting harms or violations. For example, in vehicles operating at SAE J3016 levels 4–5, C/ADS malfunctions may cause the vehicle not to register a visual or audible signal from law enforcement, creating criminal liability for the human operator. Criminal acts that could be a result of C/ADS malfunction need to be reviewed in vehicle codes as do assumptions of liability against OEMs, suppliers, technology companies, and A-MaaS network companies.

Prioritization Recommendation: Amend statutes governing criminal and civil liability to leave open the possibility that a level 3–5 C/ADS-equipped vehicle with a properly engaged C/ADS could also be responsible in whole or in part for a resulting violation.

Harmonization Recommended: Yes. Best practices language.

Consumer C/ADS application(s) affected first: C/ADS-equipped passenger vehicles and A-MaaS.

Mid-Term Recommendation 8: Crash Reporting and Rendering Aid

States should consider reviewing and modifying rendering aid statutes. These “report and render aid” provisions can create two separate challenges for level 4–5 C/ADS-equipped vehicles. The first challenge is that compliance requires a human. Thus, in cars without an active operator or even able occupants, compliance with the requirements may be difficult, if not impossible. The second challenge returns to the problem of definitions. The render aid requirements focus their mandates on the terms “drivers” and “operators.” It is possible that if a level 4–5 C/ADS-equipped vehicle operating without a human aboard causes an accident, it could be exempt from these provisions since there is no “driver” (human present in the car). Again, while most of the related deployment modifications apply to level 4–5 C/ADS-equipped passenger vehicles, this provision also applies to A-MaaS vehicles, which are expected to be deployed in the mid-term.

1 See also Glancy et al., A Look at the Legal Environment for Driverless Vehicles, TRB Legal Digest 69, at 43 (2015) (raising similar concerns about these provisions).
2 State codes generally reference the “driver” of the vehicle involved in the accident as triggering the duty. Miss. Code Ann. §§ 63-3-401, 403, 405, 407, 409 (same duty applied to fixtures), 411, 423; SDCL §§ 32-34-2, 3.1, 4, 6, 7; see also Texas Transportation Code §§ 550.021—025 (references “operator” rather than “driver” but definition of operator is person in actual physical control for this particular requirement); Utah § 41-6a-401 (same).
Mid-Term Recommendation 9: Vehicle Requirements

Most states impose specific types of requirements on the physical features of vehicles. While most of these vehicle requirements are open-ended and do not appear to impede C/ADSs, some do appear to pose potential impediments in the future (e.g., horns and other audible warning devices, steering wheels, mirrors, brake pedals). Level 4 and Level 5 C/ADS-equipped vehicles, especially those that are C/ADS-DVs, may not conform to these requirements. As a result, certain vehicular requirements in state codes may become outmoded or unduly prescriptive in limiting the types of C/ADSs allowed in the state. As part of a detailed motor vehicle code audit, policy makers may want to consider identifying and modifying soon to be obsolete requirements so that more applicable terms are used (e.g., referring to “steering assemblies” rather than “steering wheels”/“wheels” or “braking systems” rather than “pedals”).

The aforementioned NHTSA project, Assessment, Evaluation, and Approaches to Technical Translations of FMVSS and Test Procedures That May Impact Compliance of Innovative New Vehicle Designs Associated with Automated Driving Systems, is considering issues associated with vehicle requirements. States should be aware of this research effort and monitor NHTSA for findings related to the project.

Prioritization Recommendation: Begin to identify obscure requirements that reference specific items (use “steering assemblies” rather than “wheels” and “braking systems” rather than “pedals”) to address over the longer-term.

Harmonization Recommended: Yes. Reciprocity agreements and/or federal preemption (likely a policy decision).

Consumer C/ADS application(s) affected first: C/ADS-equipped passenger vehicles and A-MaaS.

Mid-Term Prioritization and Harmonization Recommendation Summary

In summary, the following state motor vehicle code provisions are suggested for modifications in the short term (Table 3-2). Note, items below are not ordered chronologically.
### Table 3-2. Mid-Term (2021–2025) Prioritization and Harmonization Modification Summary

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>HARMONIZATION RECOMMENDED?</th>
<th>CONSUMER C/ADS APPLICATION AFFECTED FIRST</th>
<th>MEANS OF ADDRESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRIVER LICENSING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine who can operate driving automation systems at different levels of</td>
<td>Useful but not essential</td>
<td>C/ADS-equipped passenger vehicles and A-</td>
<td>Reciprocity agreements, best practice</td>
</tr>
<tr>
<td>driving automation and adjust the law for driver licensing requirements.</td>
<td></td>
<td>MaaS</td>
<td>language</td>
</tr>
<tr>
<td>DRIVER TESTING AND EDUCATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop driving tests (or amend existing tests) keyed to varying levels of</td>
<td>Useful but not essential</td>
<td>C/ADS-equipped passenger vehicles and A-</td>
<td>Reciprocity agreements, best practice</td>
</tr>
<tr>
<td>driving automation systems.</td>
<td></td>
<td>MaaS</td>
<td>language</td>
</tr>
<tr>
<td>IMPLIED CONSENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider when “reasonable articulable suspicion” of alcohol or drug use is</td>
<td>No harmonization recommended</td>
<td>C/ADS-equipped passenger vehicles and A-</td>
<td>Assumes definitions are modified to clarify</td>
</tr>
<tr>
<td>appropriate in specific ODD with a properly engaged level 3–5 ADS-equipped</td>
<td></td>
<td>MaaS</td>
<td>users are considered passengers when</td>
</tr>
<tr>
<td>vehicle.</td>
<td></td>
<td></td>
<td>traveling in a level 4–5 ADS-equipped</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>passenger vehicle or A-MaaS</td>
</tr>
<tr>
<td>RECOMMENDATION</td>
<td>HARMONIZATION RECOMMENDED?</td>
<td>CONSUMER C/ADS APPLICATION AFFECTED FIRST</td>
<td>MEANS OF ADDRESSING</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>----------------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>PROHIBITIONS AGAINST USE OF ALCOHOL AND LEGAL DRUGS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarify alcohol and drug use and regulation (including in states where marijuana has been legalized) within the various levels of driving automation. Develop offenses, fines, and sentencing terms for lower level violations at varying levels of driving automation.</td>
<td>No harmonization recommended</td>
<td>No harmonization recommended</td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
</tr>
<tr>
<td><strong>MOTOR VEHICLE LIABILITY – USER AND OWNER LIABILITY FOR DAMAGES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine responsibility for crashes, incidents, and harms that may not be the result of human error but rather flaws in the ADS as engaged at the time of the event of interest.</td>
<td>Use useful but not essential</td>
<td>C/ADS-equipped passenger vehicles (later) and A-MaaS (now)</td>
<td>Best practice language</td>
</tr>
<tr>
<td><strong>RULES OF THE ROAD – DUE CARE STANDARD AND HUMAN JUDGMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify or adjust benchmarks to accommodate the decision-making abilities of level 3–5 ADS-equipped vehicles operating at level 3 or above, especially for the “due care” standard, which is tethered to human judgment.</td>
<td>No harmonization recommended</td>
<td>No harmonization recommended</td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
</tr>
<tr>
<td><strong>USER DISTRACTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify anti-distraction provisions to enhance the utility of ADS-equipped vehicles for their drivers (while the ADS is unengaged) or passengers (while the ADS is engaged).</td>
<td>No harmonization recommended</td>
<td>No harmonization recommended</td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
</tr>
<tr>
<td><strong>UNFAIR CRIMINAL AND CIVIL SANCTIONS ON USERS (REASONABLE ARTICULABLE SUSPICION)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amend statutes governing criminal and civil liability to leave open the possibility that when properly engaged, the ADS in a level 3–5 ADS-equipped vehicle could also be responsible in whole or in part for a resulting violation.</td>
<td>Use useful but not essential</td>
<td>C/ADS-equipped passenger vehicles (later) and A-MaaS (now)</td>
<td>Best practice language</td>
</tr>
<tr>
<td><strong>CRASH REPORTING AND RENDERING AID</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Long-Term (2026 and beyond) Priorities

Beyond the short- and mid-term changes needed, states should undertake several longer-term efforts after 2026, once the C/ADS market begins to reach greater penetration of the broader fleet. These include efforts to fully normalize and structure the operation of C/ADSs, both for personal use and under an A-MaaS service, such as through the adaptation of vehicle inspection requirements.

#### Long-Term Recommendation 1: Vehicle Inspection

Some agency inspection laws and accompanying regulations will likely need to be modified to accommodate the new technological features of C/ADS vehicles, such as the absence of steering wheels and brake pedals. Inspection laws and regulations may also need to be amended to include new requirements, such as mechanisms for disengaging a level 3–5 C/ADS-equipped vehicle, to ensure the safety of these vehicles on state roadways, and for any aftermarket C/ADS technologies applied to a vehicle. Note that, based on our 15-state review, no issues were found with auto emission regulations or laws.

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>HARMONIZATION RECOMMENDED</th>
<th>CONSUMER C/ADS APPLICATION AFFECTED FIRST</th>
<th>MEANS OF ADDRESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider the need for modifications to “rendering aid” statutes for level 4–5 ADS-equipped vehicles.</td>
<td>No harmonization recommended</td>
<td></td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
</tr>
</tbody>
</table>

**Prioritization Recommendation:** Modify agency inspection legislation/regulations to accommodate the new technological features of C/ADSs.

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.
**Long-Term Recommendation 2: Consumer Protection (i.e., Lemon Laws)**

States should consider needed modifications to lemon laws. These laws, originally designed to protect consumers, may not be sufficient to ensure adequate protection from C/ADS product defects. For states that have adopted these laws, some modifications may be necessary to account for the fact that problems with the programming or automation may not be evident over the relatively short period during which manufacturers are legally held responsible for making repairs.

---

** Prioritization Recommendation:** Modify lemon laws to account for new C/ADS technologies to ensure adequate consumer protection from product defects.

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

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**Long-Term Recommendation 3: Occupant Safety and Protection**

Occupant safety requirements may need to be revised to take full advantage of C/ADS sensor capabilities (e.g., sensing the weight of each passenger to determine appropriate safety restraint use; disengaging when belts are not in place so that the vehicle will not operate in conflict with safety requirements laws). Currently, at least child restraint requirements (i.e., the age of a child determines the required restraint) may not be programmable in an ADS. However, the same or improved protections for occupants may be accomplished by alternative sensory-based requirements (e.g., passenger weight determines restraint type). Legal responsibility of drivers for meeting occupant safety provisions for level 4–5 ADS-equipped vehicles may also need to be assessed to determine contributory negligence provisions within revised tort laws.

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** Prioritization Recommendation:** Revise occupant safety requirements to take full advantage of C/ADSs sensory capabilities (e.g., seatbelts and child restraints).

**Harmonization Recommended:** No. Not currently harmonized at the state level; no specific reason to harmonize for C/ADS.

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**Long-Term Prioritization and Harmonization Modification Recommendation Summary**

In summary, the following state motor vehicle code provisions are suggested for modifications in the long-term Table 3-3). Note, items below are not ordered chronologically.
Table 3-3. Long-Term (2026 and beyond) Prioritization and Harmonization Modification Summary

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>HARMONIZATION RECOMMENDED?</th>
<th>CONSUMER C/ADS APPLICATION AFFECTED FIRST</th>
<th>MEANS OF ADDRESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEHICLE INSPECTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify agency inspection legislation/regulations to accommodate the new technological features of C/ADS.</td>
<td>No harmonization recommended</td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
<td></td>
</tr>
<tr>
<td>CONSUMER PROTECTION LAWS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify lemon laws to account for new driving automation system-related technologies to ensure adequate consumer protection from product defects.</td>
<td>Useful but not essential</td>
<td>Best practice language</td>
<td></td>
</tr>
<tr>
<td>OCCUPANT SAFETY AND PROTECTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise occupant safety requirements to take full advantage of driving automation system-equipped vehicles' sensory capabilities (e.g., seatbelts and child boosters).</td>
<td>No harmonization recommended</td>
<td>Not currently harmonized at the state level; no specific reason to harmonize for C/ADS</td>
<td></td>
</tr>
</tbody>
</table>

3.4 Complex Interplay of Deployment Transition and Interoperability

Over time, the composition of the vehicle fleet will shift from almost entirely human operated vehicles to almost entirely C/ADSs. The pace of this evolution is difficult to predict, but the timeline envisioned in this study sees this transition occurring over the next 30 years, with level 1 vehicles predominating now and level 5 C/ADS-equipped vehicles perhaps beginning to dominate by the end of the 30-year period or just beyond.

In this assessment, the implications of the interoperability issues that this mix of vehicles will create for state motor vehicle codes were considered. It could be argued that state motor vehicle codes should evolve apace with the evolving vehicle fleet. However, this approach would inevitably cause lags between the emergence of C/ADS-related issues and appropriate state motor vehicle code changes. A better approach is the application of research such as this, further study of the impact of C/ADSs on various
jurisdictions, and the timely enactment of comprehensive legislative schemes to systematically address complex issues as they emerge.

Oliver Wendell Holmes famously observed that "the life of the law has not been logic: it has been experience" (Holmes, 2009, p.1). But the body of experience and case law related to C/ADSs will develop more smoothly if logical, comprehensive legislative schemes are in place from the outset. Absent such schemes, case law will develop haphazardly, driven by narrow factual situations and political concerns. As a practical matter, this will impede the implementation of C/ADSs and delay the realization of their ultimate benefits.

The demands imposed upon a state motor vehicle code by a 10% C/ADS-equipped vehicle market penetration rate versus an 80% market penetration rate are not appreciably different. A comprehensive state policy and legislative approach is needed in either scenario. Therefore, the priorities outlined in this Assessment should be considered regardless of the anticipated penetration rate.

In terms of priorities, the progression of varying levels of C/ADS fleets are not expected to be linear. As noted in the timeline, level 5 ADS-equipped A-MaaS vehicles will be sharing the road with level 2 passenger vehicles and level 1 C/ADS-equipped truck platoons. Given this scenario, in the event of a crash involving a level 1 platoon vehicle, a level 2 passenger vehicle, a level 4 C/ADS-equipped vehicle, and a conventional vehicle, ALL laws relating to ALL vehicles would need to be on the books.

States recognize that there will likely be decades of transition from conventional vehicles to level 4–5 ADS-equipped vehicles. Accordingly, planning and designing for mixed environments is essential. From a DOT perspective, this effort will require rethinking planning processes. The same will hold true for DMVs and law enforcement.

3.5 Prioritization and Harmonization Conclusions

States need to begin modifying their laws and regulations now, at least in basic areas such as definitions, and in rapidly advancing areas. While moving forward is important, any action needs to be tempered by a state recognition that some issues are not yet clear. That lack of clarity is primarily rooted in three key issues:

1. As of this writing, the federal direction for C/ADSs oversight has yet to be set, and it is unknown what federal preemption will include or what actions Congress will take.
2. The timeline for deployment of different levels of ADS-equipped vehicles is also unknown, but is not expected to be linear.
3. Many states are waiting for model laws before taking action, but that effort (with the exception of AAMVA’s continued work on best practices) is not imminent and has been met with concerns from the motor vehicle community.

Despite these issues, enough states are now moving ahead to provide good law and regulation examples to consider. Drawing on these states’ laws and regulations as examples, and using the checklist and timetable of the top expected legal and regulatory modifications (See Chapter 2 of this report), state
agencies, lawmakers, and other state stakeholders can begin to prioritize what modifications will be most needed in their states and plan accordingly.

The eventual deployment of C/ADSs will require a regulatory structure that can cross state lines as easily as these vehicles will. These recommended changes and harmonization efforts are based on their urgency, as well as their necessity for the deployment of each consumer C/ADS application. As outlined, many of the most urgent recommendations for harmonization relate to elements of state motor vehicle codes that define key terms and their implications. For example, who is a “driver” or an “operator” of a motor vehicle and what exactly does it mean to “drive” or “operate” the vehicle on public roads?

Similarly, states are encouraged to harmonize changes that address previously basic scenarios. Situations where a vehicle is left unattended will soon take on a very different meaning when A-MaaS services become available, as these vehicles must be able to operate without any human passengers or operators present between trips. Additionally, for truck platoons to properly operate, issues related to minimum following distances and other core aspects will need to be addressed and harmonized so that the full benefits of this technology can be realized.

Meanwhile, states should not underestimate the challenges associated with any harmonization effort, and as such, should not expend energy or time harmonizing their motor vehicle codes for matters that don’t require uniformity. We advise against harmonization for recommended changes related to such issues as distracted driving, driving under the influence, privacy protections, lemon laws, and occupant protection devices, among others. These recommended changes, while no less important, simply fail to rise to the level of requiring states harmonization, as many are not currently harmonized for level 0 vehicles, to little or no ill effect.
Chapter 4.

Barriers to Legislative and Regulatory Modifications

4.1 Potential Barriers to Modifications

There may be some barriers to modifying legislation and regulations. Recognizing barriers and the role of different entities in addressing them will be helpful in the modification process. Among those playing a role are federal and state governments, technology companies, suppliers and OEMs (and many other stakeholders), consumers, state legislatures, and researchers. Based on input from the legal and regulatory needs assessment (Serian et al., 2017) and further discussions conducted with stakeholders, the following barriers were identified and suggestions for addressing them provided.

Lagging Legislative Action

A lagging legislative timeframe and a traditional approach to law changes in a non-traditional environment are among the greatest barriers to advancing C/ADS deployment laws. Forming advisory committees, especially committees that include legislative representation, begins to address this barrier foundationally.

A Quick-Fix Approach

An effort to “fit” C/ADS related laws into current statutes without a comprehensive review and understanding of state motor vehicle codes may result in provisions that become barriers as the technology advances. An additional issue in this area is a lack of legislative understanding of C/ADS technology. Continual legislative education, especially with legislative leaders, is important.

Lack of a Model State Policy or Minimum Guidance

This is the first time in many years that a uniform federal and state approach has been necessary outside of federally governed programs. As noted, some states are already beginning to modify or add laws. If federal and state entities do not work together, diverse and varying underlying basic definitions will create problems that will worsen over time. Associations such as AAMVA and AASHTO will be the most likely entities to work with their members in addressing this barrier.
A Focus Only on Testing

A barrier for state legislative changes, especially states that have not been actively involved with C/ADS legislation, is a sole focus on testing laws and regulations. With a body of references now available and with NHTSA’s guidelines, states should focus on both testing and deployment.

Lack of Federal Clarifications

While NHTSA has provided guidance to states, a general lack of clarification from the federal government and Congress is a significant barrier for states as they determine what deployment laws and regulations should look like. Manufacturers continue to determine what direction C/ADS deployment takes. And there is even a question as to whether the federal government or NHTSA has the required technological expertise to regulate C/ADSs. There is no way for states to overcome this barrier on their own, but they can work closely with their congressional delegations, the NGA, AAMVA and AASHTO to help accelerate clarity.

Lack of or Delayed State-led C/ADS Working Group

The lack of any state working group is a barrier to even beginning to assess what laws or regulations need to be modified. Implementing a working group is one of the overarching recommendations of this Assessment, and one way to address this barrier.

Overstated Automation Capabilities

There is some concern that manufacturers are overstating C/ADS capabilities. This, coupled with a lack of state technical support or expertise, is a barrier to willingness to move forward with modifications to laws and regulations. Approaching research institutions as well as external resources with expertise in C/ADSs can help states address this barrier in the short term. Building up state resources for this generation of transportation is a desirable longer-term approach.

Lack of Best Practices

Perhaps the greatest barrier to legislative and regulatory modifications is the lack of model guidelines, minimum guidelines, best practices, or model language for states. States considering modifications can use existing legislative modifications as an overall baseline for advancing their own legislative language. Additionally, continued consultation with AAMVA is recommended.
Chapter 5.

Overcoming Barriers – Establishing a C/ADS Vehicle State Policy Task Force

5.1 Task Force Overview

Establishing a Task Force

C/ADS vehicles are being tested around the country, and nearing readiness for deployment and operation in commercial settings. Despite the technological advances, areas of existing state laws and regulations assume the presence of a human operator, which may disallow or impede C/ADS operation. States can establish governmental task forces as a formal mechanism to review, analyze, and revise existing laws and regulations to ensure that C/ADSs can legally, safely, and efficiently operate.

Each state’s laws and governing context are unique, and as such it is not possible to recommend a universal approach to specific legal and regulatory changes. Instead, state task forces can use this guide as a roadmap for recommended legal changes. States should convene a task force of relevant government entities to analyze state laws using the legal recommendations identified in Chapter 2, create a list of needed legal and regulatory changes, elicit feedback from relevant stakeholders and the public, then revise, and ultimately enact the needed changes. Each state has different internal structures and stakeholders, so the process will vary across states. As such, this document provides a high-level guiding framework for organizing and convening a task force to analyze and revise laws and regulations to enable the deployment and operation of C/ADSs.

Legislative action may be needed in some states to develop advisory groups or steering committees; this type of mandate is often a state’s initial C/ADS-related legislation. Stakeholder committee charters should clearly note the timeframe for the committee’s activities, the committee's charge (e.g., complete an audit, provide opportunities for information sharing), and anticipated deliverables (e.g., a prioritized list of modifications), if any. Some examples of recent legislative action include the following:

Wisconsin

Executive Order 245 (2017) created the Governor’s Steering Committee on Autonomous and Connected Vehicle Testing and Deployment. The Committee is charged with identifying all agencies in the state with jurisdiction over testing and deployment of the vehicles, coordinating with the agencies to address concerns related to issues such as “vehicle registration, licensing, insurance, traffic regulations, equipment standards, and vehicle owner or operator responsibilities and liabilities under current law,” and reviewing current state laws and regulations that may impede testing and deployment, along with other tasks.
Connecticut

CT Public Act No. 17-69 (June 27, 2017) establishes a task force to study “fully autonomous vehicles,” to evaluate the standards established by NHTSA regarding state responsibilities for regulating fully autonomous vehicles, the laws, legislation and regulations proposed or enacted by other states, and recommendations on how the state should regulate.

Vermont

Act No. 38 (HB 494) (May 17, 2017) requires the DOT to convene a meeting of stakeholders with expertise on a range of topics related to “automated vehicles” and to report any recommendations, including proposed legislation, to the legislature.

Identifying Task Force Members

The task force should include representatives from key government agencies and departments (e.g., Governor's office, DOT, DMV, law enforcement) with an interest in and responsibility for the various areas of consideration for deployment (e.g., licensing/registration, enforcement of traffic laws/regulations). The composition will likely vary by state. The task force may want to designate one agency to take the lead in stakeholder outreach efforts, and state DMVs may be best equipped for this role. The required legal audit will likely focus on areas of law and governance that DMVs typically oversee, such as vehicle and driver laws.

5.2 Task Force Activities

Task forces can accomplish many different goals using a number of different methods, but for the purpose of reviewing laws and regulations to enable C/ADS deployment and operation, we recommend the task force take several steps. These are outlined below.

Convene a Working Group

First, the task force should convene a core working group of representatives from key governmental agencies and departments. The proper agencies will likely vary by state, but membership could include representatives from the Governor's office, DMVs, DOTs, state insurance agencies, state attorneys general, transit agencies and transportation providers, law enforcement, legislators and legislative aides, and local and regional governments, among others. This core working group should analyze the states’ existing laws and regulations to identify areas requiring changes to enable C/ADS deployment. This group may find it useful to start with the short- and mid-term recommendations presented in Chapter 3 and Appendix 2 as guidance to identify needed changes. States may wish to focus first on the report’s most time-sensitive recommendations and tackle longer-term changes in subsequent meetings. The core working group should develop a list of specific needed legal changes for use in subsequent task force activities.
Obtain Feedback

Second, members of the task force should take these proposed changes and engage with relevant stakeholders to obtain feedback. As an example, if the task force identifies necessary legal changes regarding commercial vehicle platooning, feedback may be desired from commercial vehicle operators and associations, companies developing platooning systems, state and local governmental entities, and other organizations and individuals with a stake in commercial vehicle operations specific to the proposed change. The task force members should consider the feedback provided, and potentially revise the needed changes as appropriate. This process should be repeated for each needed change with relevant stakeholder groups, and the needed changes revised as appropriate.

Upon completing the stakeholder engagement and revision process, the task force should then engage with the general public to gain feedback on the proposed changes. Public engagement can take many forms, but could include public meetings, workshops, and virtual open houses, among others. Again, the task force should consider the feedback provided, and revise the needed changes as appropriate.

Petition for Change

Finally, the task force should present the needed changes to the entities responsible for implementing the changes. Implementation of changes can take various forms, depending on the specifics of the needed changes and the state in question. State agencies may be able to make changes unilaterally if the needed change is the result of an administrative rule or regulation. State legislative bodies are often responsible for making legal changes, and the task force would likely present the needed changes before these bodies for consideration. Having legislators and legislative aides as part of the task force’s core working group will help ensure that the changes brought before legislative bodies are well informed and more efficiently implemented.

5.3 State Task Force Examples

States may find it helpful to consider how others are using a task force to facilitate the deployment of C/ADS-equipped vehicles. Accordingly, we have provided a number of examples below. It is worth noting that several of these examples describe the use of a task force to address C/ADS-equipped vehicle testing. States should keep in mind that moving forward, the role of task forces is likely to be primarily focused on revising state codes for C/ADS-equipped vehicle deployment and operation. States can establish governmental task forces as a formal mechanism to review, analyze, and revise existing laws and regulations to ensure C/ADS can legally, safely, and efficiently operate. The examples given here are still informative in showing the diversity of approaches by state, along with the common goal of collaboration amongst stakeholders to ensure that legislative and regulatory changes are well informed.

Connecticut

Connecticut plans to use a task force as a way to study ADS-equipped vehicles, evaluate NHTSA’s standards, and evaluate a pilot program. SB 260, which was enacted on June 27, 2017, requires the
development of a pilot program for up to four municipalities for the testing of level 5 ADS-equipped vehicles on public roads in those municipalities.\(^1\) It specifies the requirements for testing, which include having an operator seated in the driver’s seat and providing proof of insurance of at least $5 million. A task force is to be established to study ADS-equipped vehicles. The study must include an evaluation of NHTSA’s standards regarding state responsibility for regulating automated vehicles; an evaluation of laws, legislation, and regulations in other states and provide recommendations on how Connecticut should legislate and regulate automated vehicles; and an evaluation of the pilot program.

North Carolina

The North Carolina DOT and DMV partnered on the “NCDOT CAV Roadmap Development Project” with the goal determining how North Carolina should be preparing for connected and autonomous vehicle (CAV) technology.\(^2\) The project involved stakeholder coordination and education with a wide variety of stakeholders from State Agencies (e.g., NC Office of the Governor, NC State Highway Patrol), local agencies (Charlotte Area Transit, City of Durham), businesses (e.g., Regional Transportation Alliance, NC Association for Defense Attorneys) and other groups (e.g., Advocate for the Blind and Visually Impaired, Tesla Automotive, and UNC Highway Safety Research Center). The products of the joint DOT/DMV project include: (1) Assessment Summary of the NC Motor Vehicle and Licensing Codes (2) Stakeholder Workshop to identify key areas of focus for the State in response to CAV technology (3) Activities Roadmap of suggested near- and medium-term initiatives to be considered by the State in preparation for CAV technology.

North Dakota

North Dakota is encouraging collaboration between the DOT and industry. In 2017 HB 1202, which was enacted on April 13, 2017, authorizes a DOT study under which the North Dakota DOT will collaborate with the ADS technology industry to study the use of, and data collected by, ADSs on state highways.\(^3\) The North Dakota DOT must review current laws of licensing, registration, insurance, and data ownership to be applied to driving automation system-equipped vehicles. North Dakota’s DOT would report this study to the 66\(^{th}\) Legislative Assembly of North Dakota.

Pennsylvania

Pennsylvania created an Autonomous Vehicles Testing Policy Task Force, chaired by PennDOT, to develop recommended guidance for developing policies to oversee testing of level 4–5 ADS-equipped vehicles.\(^4\) The guidance was presented to the PennDOT Secretary and the final testing policy was reviewed during an on-line public forum. The effort involved months of collaboration between state, federal, and private-industry officials (e.g., the Federal Highway Administration, AAA, Carnegie Mellon

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University, University of Pennsylvania, Uber, SAE, the Pennsylvania Motor Truck Association, and General Motors). The goal of the task force was “to create a framework for testing [highly automated vehicles] in Pennsylvania that balances public safety with innovation and provides for the flexibility required to keep the state in the forefront of the development of this emerging and potentially transformative technology.”

**Utah**

Utah passed HB 280 in May 2016, authorizing a level 4-5 ADS-equipped vehicle study. The bill specifies that each agency of the state “with regulatory authority impacting autonomous vehicle technology testing shall facilitate and encourage the responsible testing and operation of autonomous vehicle technology within the state.” The bill authorizes the departments of Public Safety, Motor Vehicles, Transportation and Technology Services to contract and partner with groups for testing C/ADSs in the state. The bill directs that the Department of Public Safety, in consultation with other state agencies, including the DMV and the DOT, shall study, prepare a report, and make recommendations regarding the best practices for regulation of driving automation system-equipped vehicle technologies on Utah highways.

**Virginia**

On June 2, 2015, Virginia Governor Terry McAuliffe announced the designation of more than 70 miles of interstates and arterial roads in the Northern Virginia region as the “Virginia Automated Corridors,” allowing developers of C/ADS-equipped vehicles the opportunity to test their technologies. The project is a joint effort of the Virginia DOT and DMV in partnership with the Virginia Tech Transportation Institute, Transurban, and the navigation and mapping company HERE.

**Washington**

Washington, via Executive Order 17-02, has set up a driving automation system-equipped vehicle work group to begin to address driving automation system testing and enable pilot programs within the state. The working group will have at least one representative from the Governor’s office, and representatives from other state agencies. Pilot programs are authorized and can be conducted in partnership with entities developing ADS-equipped vehicle technology equipment.

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5 HB 280, Se 41-26-102 (3)(a). (2016)
Chapter 6.

Overcoming Barriers – Engaging Legislators to Advance ADS-Equipped Vehicle Legislation

6.1 Introduction to Legislative Outreach

Politics is the art of the possible. It is extremely unlikely that even the best, most clearly articulated public policy will be fully realized by legislative action. Rather, some portion of that policy will become law. It is important for state senior leaders to take a careful, considered approach to the legislative process and its political realities to maximize positive results and minimize any barriers.

The Importance of Legislative Outreach

How many times have legislators asked state officials, “what are other states doing?” It is a perennial question and especially pertinent when issues or key legislative changes are nationwide in scope. State administrators need to be ready to answer this question. It is also likely that legislative staff will be engaged in answering this question for their legislative members. Many use the National Council of State Legislators (NCSL) as a resource and source of reference. NCSL conducts policy research in a variety of areas including transportation. They also help draft bills and provide extensive background on bills that have been enacted or are under consideration.

It is important to take the first step in preparing for discussions about legislation needed to accommodate C/ADSs by doing your homework and studying an overview of legislation being considered in other states, especially neighboring states. The presentation that accompanies this action plan is a good starting point (Appendix 1). The standalone document titled State Legal and Regulatory Audit: Identification of Laws and Regulations Potentially Requiring Modification (Wagner et al., 2018) provides a more thorough overview of the types of laws that are being changed across the nation and the focus of those laws. While this is a good starting point, keep in mind that legislation is dynamic and changes constantly each legislative session, and it is also important to regularly check for current legislation.

6.2 The Outreach Process

Know the Ask and Prepare in Advance

Prior to meeting with your legislature, there are many other considerations that need to be thought through. Assuming that the path has been cleared internally, (Governor’s Office and/or senior agency leadership), you should determine exactly what legislative assistance is necessary. These needs vary by
state and by each state’s current C/ADS involvement. For example, a basic first step “ask” may be to officially legislate a C/ADS steering committee or advisory committee. Some states are well beyond that point and ready to recommend legislative changes that will facilitate testing or deployment. Know what you want before you meet. Ideally, these first meetings or initial “asks” should be with legislative leadership.

Several overarching considerations should be prioritized outside of the specific legal changes. These overarching considerations (presented below) should be addressed internally before any legislative engagement.

**Overarching Considerations**

1. **Determine your state’s goals and objectives for C/ADS deployment.**

Does your agency leadership want your state’s role in C/ADS testing and/or deployment to be research based, driven by economic development, supportive of industry goals? Does your state want to advance law changes quickly? Is legislation necessary or can a regulatory or policy direction be considered? What is the scope and timeline of needed legislative changes? Does your state want to focus on platooning or full deployment regardless of vehicle type? What is needed not just from the DMV side of the business, but also from law enforcement and transportation? All of these questions should be considered in determining your agency’s goals so that they can be communicated to legislative leaders.

We can look to Utah, Virginia, and Pennsylvania for good examples of embracing the overarching priority of determining state goals and objectives. For example, Virginia recently developed its vision for advancing C/ADSs in the state: “To create a strategic policy framework for transitioning autonomous vehicles into the Virginia transportation network, and associated Autonomous Vehicle program, by which the Office of the Secretary can position Virginia to be a national leader in the rapidly advancing field of self-driving, connected mobility” (Day, 2017). Pennsylvania also recently outlined its C/ADS statewide strategic plan, which calls for expanding existing research, using actionable information, and developing near-term and long-term actions in nine areas ranging from driver licensing and motor vehicles to workforce requirements (Myers, 2017).

2. **Be prepared to outline what an organized Stakeholder or Advisory Committee would look like.**

As discussed in Chapter 5, states should convene a task force of relevant governmental entities that analyzes its state’s laws against the legal recommendations identified in Chapter 2, create a list of needed legal and regulatory changes, elicit feedback from relevant stakeholders and the public, revise, and then ultimately enact the needed changes. Each state has different internal structures and stakeholders, so the process will vary across states.

3. **Determine your agency’s direction regarding federal and state preemption.**

Guide the legislative discussion on what the agency expects regarding the federal role and those areas where federal preemption is expected, like FMVSS, and determine your agency’s recommendation regarding state preemption over local authority. The most recent NHTSA federal guidance, A Vision for
Safety (NHTSA, 2017), is a good tool to highlight areas where NHTSA expects to be involved and areas retained by states.

Similarly, strategic consideration should be given to the amount of local variation states will allow regarding level 4–5 ADS-equipped vehicle deployment at the local level. This is especially relevant for A-MaaS deployment and the most recent introduction of ride share services. State preemption provisions and local control are an important factor as states consider this overarching priority. When local ordinances and regulations are layered into level 4–5 ADS-equipped vehicle deployment law and regulation modifications, the situation becomes complex, especially for OEMs and technology companies. These types of strategic considerations need to be made early in the audit process, as do incorporated statute modification provisions for any statutes governing federal preemption or local restrictions.

4. Highlight the importance of a legal audit and outline your agency’s plans.

In early discussions with the legislature, you should have a plan to complete a legal or vehicle code audit. This proactive approach will help guide needed legislative change.

Identify the Right Agency Team

Ideally, your policy will be advanced by a team consisting of a legislative process expert, the legislative liaison, a subject matter expert, and a senior level policy maker or administrator. It may be tempting for politically experienced subject matter experts to proceed without the legislative liaison but this is not advisable. There are usually a set of complex political issues and relationships having little, if nothing, to do with new C/ADSs legislation needs, which can dramatically affect legislative outcomes. The legislative liaison can identify and help manage these issues, allowing the subject matter expert to focus on the policy. Given the breadth and complexity of issues included C/ADSs, it may be necessary to include more than one, or even a team, of subject matter experts. If so, it is still advisable to designate a senior-level individual as the primary point of contact, as legislators may think it is more appropriate to deal with a senior-level representative.

Where to Start

Ideally, the process of developing a C/ADS policy will have included identifying key legislative leaders. If so, these legislators should be your initial points of contact. These individuals may or may not be the chair or chairs of the appropriate legislative committees, but will still be your initial contacts.

Commitees are, of course, the engine rooms of legislatures, so the chair of the appropriate committee has significant power in the legislative process. Without their assent and active participation, it will be difficult to obtain the necessary policy support. Once again, given the breadth and complexity of C/ADS issues, it may be necessary to approach more than one committee, as bills may be referred to multiple committees. However, most bills fall under the jurisdiction of one committee, and identifying the appropriate committee in this iteration is critical. Again, the advice of a seasoned, competent legislative liaison is vital to a successful strategy in this regard.
The broader legislative leadership will eventually decide if and when a legislative committee’s work will be taken up by the entire body. Accordingly, it is also necessary to begin to build a broader foundation of legislative support for any proposed legislative changes. The legislative liaison and committee chairs are invaluable in this process. Legislative staff is, of course, critical to the process. Senior committee and leadership staff are arguably second in importance only to their principals.

**What to Present**

A well-developed, clearly articulated public policy addressing C/ADS is vital in the legislative approach. This public policy should be developed in a coordinated, collaborative, and comprehensive process. It is often advisable to involve external stakeholders as well, but it is imperative that all internal parties reach consensus around a clear policy direction. Legislative outreach is not the time to attempt to resolve internal disputes or generate top level buy-in or enthusiasm for legislative change. Proceeding without these firm underpinnings can cause a significant setback.

Assuming the strong foundation of a well-developed, clearly articulated public policy, there are several topics that will be of interest to legislators as noted earlier. “Why must this be done now,” is often the first question asked. Legislators will also have other questions, such as what other states are doing; what the appropriate federal, state, and local rules are; what the cost will be; who will pay; and what the biggest challenges are. It is important to have anticipated as many of these and any other relevant questions as possible and to have answers at hand. If something unexpected is asked, it is important to have a process in place to quickly identify and provide an answer.

Conversely, it is equally important that the DMV or DOT clearly express and support their priorities as noted earlier. What are their mission and goals? Do they want to lead or follow, from a national perspective? What are their safety concerns? Is this an important economic development or competitiveness issue? What kind of legislative and regulatory framework do they prefer — prescriptive or flexible? And finally, what is the specific action requested. This forms a good basis for a legislative action paper.

The best approach to ensuring that all of these issues and other vital topics are covered is to have a comprehensive set of talking points developed at the outset, and to amend and supplement these points as necessary throughout the legislative process. Specific short-, mid- and long-term legislative priorities are identified (in Chapter 3), but these specific priorities must be advanced within the context of the broader discussion above.

**Knowing When to Present**

Some legislative outreach may have occurred during the policy formation process. The main body of legislative effort should occur in the year or so prior to the date of desired legislative action. As a practical matter, it may be necessary and even desirable to do most of the outreach when the legislature is in recess or out of session. Session time may be too busy and too late to get much done.
Final Thoughts

There remain many uncertainties regarding C/ADS market entry and penetration, but one thing is clear: states, and especially state DMVs, will be tasked with addressing the uncertainties in law and regulation. The legislative process and legislative involvement is expected to be key in advancing C/ADS deployment successfully.
Chapter 7.

The Road Forward

7.1 Next Steps

This AVAP draws attention to potential legal and regulatory areas that will require modification and/or clarification as C/ADSs are deployed in all domains by providing:

- A framework for completing an in-depth state legal audit.
- Prioritized areas of law determined to merit the most attention in the short-, mid-, and long-terms as C/ADSs in all domains are deployed.
- An overview of potential barriers to legislative and regulatory modification.
- Recommendations for overcoming these barriers via tasks forces and legislative outreach.

The eventual deployment of C/ADSs will require a regulatory structure that will work across state lines. In some cases, this will require that states work together to harmonize their motor vehicle codes in advance to enable the operation of this new technology as it develops.

Addressing these recommended modifications and harmonization needs will take coordination with state legislatures, sister state agencies, and a close alliance with industry. States are encouraged to use the priorities outlined in this AVAP to put a strategic framework in place to assess, engage, and act as they consider modifications to state motor vehicle codes. Further, the role of AAMVA and AASHTO in this effort cannot be overemphasized. AAMVA’s expert staff and its Vehicle Standing Committee, Automated Vehicles Best Practices Working Group, and Law Enforcement Standing Committee—consisting of DMV and law enforcement practitioners on the front lines—are valuable resources, and AAMVA continues to be a leader in the area of C/ADS deployment. Similarly, AASHTO staff is a valuable resource for DOT administrators.

The prioritization and harmonization summary tables presented in Chapter 3 illustrate that 2018–2020 is an important timeframe for states to begin legislation and regulation changes (Table 3-1, Table 3-2, Table 3-3). States can choose to make these modifications earlier, but should also closely monitor the marketplace and any federal oversight direction. Just as importantly, any modifications suggested should be in a form that allows for flexible updating and ease of change.
References

http://www.aamva.org/Drivers-License-Compacts/.


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National Center for Interstate Compacts. Nonresident Violator Compact, n.d.b.
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