

NETC 20-4

Coordinating State Policies, Laws, and Regulations for Automated Driving Systems across New England

June 30, 2022

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Coordinating State Policies, Laws, and Regulations for Automated Driving Systems across New England

TECHNICAL REPORT DOCUMENTATION PAGE

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1. Report No. NETCR120	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle NETC 20-4: Coordinating State Policies, Laws, and Regulations for Automated Driving Systems across New England		5. Report Date June 30, 2022	
		6. Performing Organization Code N/A	
7. Author(s) Greg Rodriguez, JD, Stantec; Ann McGrane, Stantec; Emily Raque, Stantec; Gretchen Stoeltje, JD, TTI; Todd Hansen, TTI; William Lyons, PE, AICP, JD, Fort Hill Companies, LLC		8. Performing Organization Report No. NETCR120	
9. Performing Organization Name and Address Stantec Consulting Services 1101 14th Street, #1200 Washington, D.C. 20005		10. Work Unit No. N/A	
		11. Contract or Grant No. State W.I.N. #023430.18	
12. Sponsoring Agency Name and Address Maine DOT 16 State House Station Augusta, Maine 04333-0016		13. Type of Report and Period Covered Final Report Dec. 2020-June 2022	
		14. Sponsoring Agency Code NETC 20-4 / A study conducted in cooperation with United States Department of Transportation	
15. Supplementary Notes Conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration. This report can be found at https://www.newenglandtransportationconsortium.org/projects/netc-20-4/ .			
16. Abstract This project sought to develop a coordinated and consistent multi-state approach to the setting of policies, laws, and regulations within the New England region to support the seamless operation of ADS-equipped vehicles across the New England states.			
17. Key Words Automated Driving System, Automated Vehicles, New England, Regional, Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, Legal, Regulatory, Policy, ADS-equipped, ADS, AVs, Coordination, FMVSS		18. Distribution Statement No restrictions. This document is available to the public.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 76	22. Price N/A

Form DOT F 1700.7 (8-72)



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SI* (MODERN METRIC) CONVERSION FACTORS				
APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)



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Executive Summary

Automated Driving System (ADS)-equipped vehicles may challenge existing regulatory and governance structures. For this reason, states have been encouraged to and are actively preparing for their testing and deployment through the review of existing policies, laws, and regulations around vehicle operations. The purpose of this report is to identify legal issues and provide recommendations on how the New England States (“NE States”) can coordinate on a uniform, or more consistent, policy, statutory and regulatory approach to support multi-state deployment of ADS-equipped vehicles across the region. The coordinated research and visioning that has been invested in and completed by the NE States provides a strong foundation for the continued collaboration to bring increased testing and deployment of ADS-equipped vehicles to the region.

A consistent, coherent, and regionally focused approach to ADS will benefit all stakeholders, bring investment to the region, and provide a model for other regions in the country seeking to collaborate around ADS deployment.

This project seeks to develop a consistent approach to the setting of policies, laws, and regulations of ADS-equipped vehicles within New England by merging the research and analysis herein with an established vision for seamless operation of ADS-equipped vehicles across the NE States. With coordination towards the safe operation of ADS across state lines in New England, the NE States can support operations in surrounding states and take advantage of strategic corridor and international opportunities for more efficient goods and passenger movement. The research builds from previous work funded by the New England Transportation Coalition (NETC) that identified a roadmap of initiatives to support the testing and deployment of connected and ADS-equipped vehicles in the NE States.

The objectives of this research include:

- 1) Conducting a literature review of ADS-focused research;
- 2) Analyzing existing policy, legal, and regulatory issues to overcome anticipated barriers to multi-state ADS operations;
- 3) Recommending coordinated steps for the NE States to take in consideration of the operations of vehicles on the roadway transitioning from human driven to ADS operated;
- 4) Developing recommendations towards facilitating testing and deployment of ADS-equipped vehicles operating in multiple states or traveling across state lines; and
- 5) Supporting the development of policy, legal, and regulatory approaches that inform national and other regional ADS efforts.



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This project is important because, while the testing and deployment of ADS-equipped vehicles continues to grow nationally, ADS operations to date tend to focus on particular geographies centered around the presence and interests of industry, permissive regulatory structures, venture capital, favorable weather, and research institutions, and have not scaled to every part of the country. This presents both an opportunity and challenge for the New England region. While the New England region has challenging operational domains, it also presents important use cases focused on the positive benefits that ADS offers, including, but not limited to: rural mobility connections; transportation across small, but densely populated urbanized areas and communities; cross-state on-demand passenger services; commercial trucking; and international operations. Further, if it is expected that ADS technology continues to mature so that it can gain public trust and adoption for being able to operate in all the different operating environments of the U.S., the New England region presents a strong testing and deployment partnership opportunity.

Research Process

Section 1 of this report provides further background on the project, the current deployment and policy, legal, and regulatory landscape for ADS-equipped vehicles, and the methods of engagement and research used to develop the final recommendations. The research process included an in-depth literature review of ADS reports related to policy, legal, and regulatory issues. (Please see Appendix B titled “Literature Review” for more information.) The key themes identified through this review were then incorporated into stakeholder engagement conversations. In addition to receiving feedback from the standing Technical Committee (TC) representing the NE States, the research team conducted a workshop with representatives from states outside of New England that are active in ADS testing and deployment. It also interviewed a series of ADS stakeholders representing industry, transportation professional organizations, municipalities, insurance firms, and legal organizations. The focus of this phase of the project was to move beyond the surface of issues related to ADS operations and to engage on the more complicated policy, legal, and regulatory issues that need to be addressed in order to realize more widespread ADS deployment nationally.

Key Issues Identified Through the Research Process

The regional focus of this Project is an opportunity to overcome concerns of an inconsistent state-by-state regulatory approach to ADS regulations.

Section 2 of this report is a discussion of the challenges and opportunities identified through the research process. This includes issues like distinguishing between commercial goods and passenger movement, insurance considerations, safety verification, and managing information exchanges. A key theme that repeats throughout the report is the need for better coordination among states around such issues. But to accomplish this coordination, further clarification of ADS terminology may be needed, as even terms such as “driver,” “testing,” and “deployment” have different meanings in different contexts or states.



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While differences of opinion remain regarding the appropriate policy, legal, or regulatory approaches to overseeing an evolving and maturing technology at this stage in its development, one area of opportunity is coordination and standardization of testing and permitting processes. The regional focus of this project was received with positive feedback during the strategic outreach and engagement from stakeholders representing a variety of interests. Finally, a critical factor in advancing ADS remains education to the public, decision-makers, and elected officials about the technology so that the public better understands what ADS-equipped vehicles are, their technological capabilities, and decision-makers understand how to support adaptable regulatory structures for a developing technology.

Policy, Legal, and Regulatory Considerations for Vehicle Operations



Image Source: Stantec

Section 3 of this report analyzes the roles and responsibilities of federal, state, and local governments, including the existing statutory and regulatory environment for vehicles, and how it may need to change to accommodate ADS-equipped vehicles. ADS-equipped vehicles present the opportunity to improve safety, enhance mobility, decrease congestion, reduce emissions, and increase accessibility to reliable and convenient transportation options for all users. But, ensuring the positive benefits of ADS are realized will require federal, state, local, and industry coordination. Supporting the deployment of new mobility innovations while managing risks is made difficult right now as federal safety regulations are still working to catch up to ADS. New approaches to Federal regulations may continue to evolve as more ADS-equipped systems are deployed onto roadways and data can be analyzed to better understand how ADS-equipped vehicles will merge into the transportation system. Additionally, there are foundations to build from, including both industry standards and federal guidance, as discussed in this report, for developing a coordinated approach around policy, legal, and regulatory issues for ADS.

In addition to questions around how vehicle operations may be impacted by the continued integration of ADS onto roads, there are unknowns around how existing roles and responsibilities around vehicle regulation may change. This includes important issues like vehicle safety – a computer instead of a human will be operating a vehicle some or all of the time; licensing – if a person is no longer expected to handle any of the driving tasks, why would they need a license; and, traffic enforcement – if a vehicle does not require human intervention or monitoring and can be programmed to follow all laws, will traffic laws become nationalized to facilitate the programming of ADS-equipped vehicles. Answers to these



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questions are challenged by different levels of automation and confusion around what different levels of automation mean and expectations around human monitoring of systems. Section 3 discusses these issues from the perspective of the NE States, considers national trends and approaches, and analyzes policy, legal, and regulatory issues for supporting continued deployment of ADS.

Key Project Findings and Recommendations

Section 4 of this report identifies key project findings and recommendations in support of the NE States planning their near- and medium-term actions to coordinate policies, laws, and regulations to support the vision for seamless ADS operation across the New England region and surrounding regions of the US and Canada. The following is a summary of the key recommendations for the NE States to consider:



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<p>Develop a multi-state regulatory approach to ADS testing and deployment that is deliberate around different use cases and has a regional focus.</p>	<p>Execute a Memorandum of Understanding signed by each state and explore the creation of an ADS regional entity to coordinate and streamline process.</p>	<p>Coordinate around the passage of ADS legislation and consider when legislation is warranted and a productive use of resources to advance the safe testing and deployment of ADS in the region.</p>
<p>Implement a common set of definitions for “operator” and/or “driver” that considers a “person” shall include a non-human in the context of ADS-equipped vehicles.</p>	<p>Outline and implement a uniform approach to insurance, vehicle registration, licensing, and crash reporting. This should include prioritizing law enforcement coordination.</p>	<p>Draft and approve a regionally focused ADS operations permit prioritizing on-demand ridehailing services, commercial freight, and purpose-built vehicles for local goods movement and delivery.</p>
<p>Support the standardization of ADS focused data exchange between the public sector and industry, including a more consistent approach to protecting data that may be considered proprietary, confidential, or trade secrets.</p>	<p>Proactively explore ways to educate the public and decision-makers about ADS technology. Outreach should focus on the capabilities for different types of ADS-equipped vehicles, including use cases and expected responsibilities for human monitoring.</p>	<p>Ensure the perspectives of the New England region are heard nationally to inform development of ADS policies, laws, regulations, and standards.</p>

- Establishing ADS Policies, Laws, and Regulations – Licensing Registration Insurance
- Data
- Outreach and Education
- Pilots/Deployments
- Coordination – MOU/Regional Entity

Draft Memorandum of Understanding

To support the implementation of the findings and recommendations, Section 4 of this report also includes a draft Memorandum of Understanding (“MOU”). The title for this MOU is “**Advancing Testing**”



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and Deployment of ADS-Equipped Vehicles in New England through Coordination, Partnerships, Outreach, and Education.” For each NE State to sign the MOU provides an even greater opportunity to memorialize the vision and coordinated efforts by the region around the deployment of ADS, and it provides a tangible resource that the NE States can point to and share in efforts to engage in partnerships for the deployment of ADS-equipped vehicles in New England.

It is necessary to note that while this report does discuss and evaluate legal issues, it is not intended to be, nor should it be interpreted as legal advice. However, the project does provide considerations for breaking down silos and merging conversations between ADS planning, legal, and policy matters. Further, since ADS is a fast-moving issue, it is important to note that this research is current up through June of 2022.

Image Source: Courtesy of Connecticut Department of Transportation



How Can This Project Inform ADS Deployment?

In completing this report, the intention is for it to inform and guide various stakeholders in the advancement of ADS deployment. This includes:

NE States. As noted in the introduction to this report, this Project is intended to provide a foundation for the NE States to continue coordination efforts, prioritize resources, and implement the recommendations to support the multi-state seamless operation of ADS-equipped vehicles in the New England region.

Other regional efforts. This Project, through its research and analysis, and accompanying discussion, can inform other regional efforts around ADS operations. This report is more than just a listing of potential issues; instead, it seeks to align the discussion around policy, legal, and regulatory issues with the development of use cases for ADS.

National dialogue. This Project can also inform national efforts to support the safe deployment of ADS. This includes important and complicated considerations around roles and responsibilities between local, state, and federal entities, and how those roles and responsibilities may be challenged as higher levels of ADS (i.e. full driving automation) are integrated into the transportation system.

Academic and research. A strong body of research has already been developed around ADS. The focus of this Project around policy, legal, and regulatory issues highlight the need for multi-discipline collaboration on reengineering laws as legal barriers around the human driving status quo are identified.

Policy, legal, and planning staff at State DOTs. The Project can help DOTs and other public agencies that have not been proactive around ADS by providing a guide around where efforts can start. This is especially true for those agencies with more limited resources, and which may be looking for opportunities around regional coordination.

Industry. The discussion in this report also provides the opportunity to break down silos between the public and private sector around ADS. For industry, this report provides insights into what issues State DOTs are concerned about and why.



Definitions Of Key Terms

During the completion of this project, one of the recurring themes was the lack of consistency in use of terminology when discussing the testing and deployment of ADS-equipped vehicles. This lack of consistency was identified in all aspects of the project, including project discussions with the TC, review of the literature, stakeholder outreach, and monitoring of ongoing events around ADS and ADS-equipped vehicles. Without consensus around accepted terminology, confusion can result before even getting to the important discussions around findings and recommendations for analysis completed as part of this project. This is an important takeaway from this project, and it will be important for the New England States (“NE States”) to continue to develop consensus as a region and support outreach and education around terminology for ADS-equipped vehicles being discussed and adopted by both industry and the public sector, particularly when coordinating around legislation.

Part of the challenge with terminology has to do with the lack of understanding around the different categories or components of driving automation systems. While not perfect, the Society of Automotive Engineers (SAE) J3016 standard titled “Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles” provides the most cited source for referencing the various categories or components of driving automation systems. Due to the complexity of issues around ADS-equipped vehicles and the importance of clear terminology for the evaluation of policy, legal, and regulatory issues around ADS, it is important to clarify the following definitions for purposes of this report.

For clarity, this project is not seeking to recommend new terms for ADS considerations; instead, the following terms and definitions should be seen as a baseline to support the discussion and analysis herein. Note several of the definitions below are SAE J3016 standardized definitions and some are not; the ones that are not are clearly indicated as such.

“Automated Driving System” (ADS) means the hardware and software that are collectively capable of performing the entire dynamic driving task (DDT) on a sustained basis, regardless of whether it is limited to a specific operational design domain (ODD); this term is used specifically to describe Level 3 – Conditional Driving Automation, Level 4 – High Driving Automation, and Level 5 – Full Driving Automation.

“Automated Driving System Equipped Vehicle” or **“ADS-equipped Vehicle”** means a vehicle that is equipped with an automated driving system.

“Automated Driving System-Issued Requests to Intervene” means a notification by the automated driving system to a human driver to begin or resume performance of the dynamic driving task.

“Deployment” is not a term that is defined in SAE J3016. Here, it is used to refer to the operation of an ADS-equipped vehicle on public roads by members of the public; or for use by the public who are not employees or contractors of an ADS-tester; or for purposes of sale, lease, providing transportation services for a fee, or otherwise making commercially available outside of a testing program. For purposes of this report, it is important to provide further considerations around broad use of a term like “deployment” as follows:



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- **Limited Deployment** – This typically refers to the stage beyond testing, but before full scale commercial deployment (defined below) operations for a particular use case. This is the stage when a limited set of ADS-equipped vehicles may be deployed on public roadways or in limited operational design domains for specific use cases. Information sharing and coordination between the public and private sector is anticipated to be extremely valuable during limited deployments to further the development, adoption, and success of the ADS technologies.
- **Full Scale Commercial Deployment** – This typically refers to the stage beyond limited deployments for a particular use case. This is when a full or large fleet of ADS-equipped vehicles may be deployed on public roadways or in limited operational design domains for specific use cases. During full scale commercial deployment, ADS technology is considered established and mature, consideration (i.e. payment) has been exchanged between user and the ADS operator or provider, the ADS-equipped vehicles are for sale and resale, and may be prevalent or growing in volume on public roadways or in limited operational design domains.

“Dynamic Driving Task” means the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints.

“Dynamic Driving Task Fallback” or **“DDT Fallback”** means the response by the user to either perform the DDT or achieve a minimal risk condition after occurrence of a DDT performance-relevant system failure or upon operational design domain exit, or the response by an ADS to achieve a minimal risk condition given the same circumstances.

“Dynamic Driving Task Fallback-Ready User” or **“DDT Fallback Ready User”** means the user of a vehicle equipped with an engaged ADS feature who is able to operate the vehicle and is receptive to ADS-issued requests to intervene and to evident dynamic driving task (DDT) performance-relevant system failures in the vehicle compelling them to perform the DDT fallback.

“Dynamic Driving Task Performance-Relevant System Failures” or **“DDT Performance-Relevant System Failures”** means a malfunction in a driving automation system and/or other vehicle system that prevents the driving automation system from reliably performing the portion of the DDT on a sustained basis, including the complete DDT that it would otherwise perform.

“Legal” is not a term that is defined in SAE J3016. For the purposes of this report, the use of the term refers to regulations or requirements that have been enacted by Congress or a state legislative body via statute and have the force of law from an enforcement perspective.

“Levels of Driving Automation” refers to the SAE taxonomy adopted in the latest version of SAE J3016¹, which defines Levels from Level 0 (no driving automation) to Level 5 (full driving automation) in

¹ J3016_202104: *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles* - SAE International. (n.d.). https://www.sae.org/standards/content/j3016_202104/



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the context of motor vehicles and their operation on roadways. Regarding the specific levels referenced in this report, the following definitions apply:

- **“Level 3,”** or **“Conditional Driving Automation,”** means the sustained and operational design domain-specific performance by an automated driving system of the entire dynamic driving task under routine/normal operation with the expectation that the dynamic driving task fallback-ready user is receptive to automated driving system-issued requests to intervene, as well as to dynamic driving task performance-relevant system failures in other vehicle systems, and will respond appropriately.
- **“Level 4,”** or **“High Driving Automation,”** means the sustained and operational design domain specific performance by an automated driving system of the entire dynamic driving task and dynamic driving task fallback.
- **“Level 5,”** or **“Full Driving Automation,”** means the sustained and unconditional (i.e., not ODD-specific) performance by an automated driving system of the entire dynamic driving task and dynamic driving task fallback.

“Motor carrier” is not a term that is defined in SAE J3016. It means a person providing motor vehicle transportation for compensation. For purposes of this report, a motor carrier transports passengers or property for compensation.

“Operate” means collectively the activities performed by a (human) driver or by an automated driving system to perform the entire dynamic driving task for a given vehicle. The use of the word “operate” or “operation” refers broadly to ADS-equipped vehicles being used on public roads. It is not meant to distinguish between testing, deployment, and full scale commercial deployment.

“Operational Design Domain” or **“ODD”** means the operating conditions under which a given automated driving system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions and the requisite presence or absence of certain traffic or roadway characteristics.

“Platooning” is not a term that is defined in SAE J3016. For the purposes of this report, truck platooning refers to when multiple trucks travel together connected by a computer system normally controlled by the lead vehicle. The system communicates with the trucks in the platoon to align speed, acceleration, and braking, which allows vehicles to safely operate at close proximity to each other.

“Policy” is not a term that is defined in SAE J3016. This term takes many forms, including such documents as published policy papers and policy statements. These less formal means of communicating policy are similar in kind and type to other policies, like human resources policies, travel policies, and other statements of the intent of a governing body as to how certain functions are to be performed. From a legislative point of view, the ultimate expression of policy is the adopting of statutes, which codify policy into law. Administrative rules and regulations promulgated pursuant to legislative authorization are also laws based on policy. For instance, a state transportation agency’s highway access policy may be a policy document describing the intent of the rule making agency and providing justification for the policy. The rules that codify that policy are administrative laws, enforceable in a legal context. The nature of public policy, whether for transportation purposes or for other valid exercises of state power, is that it is a



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statement of what the governing body intends for an outcome. Many policies are simply that—an expression of intent or will. Some policies are carried forward and become laws. Others remain statements of intent.

“**Preemption**” is not a term that is defined in SAE J3016. This is meant to refer to when state or local authority is removed through statute or existing jurisdiction resulting in a state or local government not having the authority to implement laws or regulations in a specific area.

“**Regulation**” or “**regulatory**” are not terms defined in SAE J3016. They refer to the implementation of policy or laws in the form of legally enforceable requirements.

“**Testing**” is not a term that is defined by SAE J3016. It means operating an ADS-equipped vehicle on public roads by employees or contractors of an ADS-tester or other entities for the purpose of assessing, demonstrating, or validating the ADS capabilities. The use of this term typically refers to the piloting of ADS technologies within a specific or limited operational design domain and usually for a set amount of time.

SAE INTERNATIONAL

SAE J3016™ LEVELS OF DRIVING AUTOMATION™

Learn more here: [sae.org/standards/content/j3016_202104](https://www.sae.org/standards/content/j3016_202104)

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	SAE LEVEL 0™	SAE LEVEL 1™	SAE LEVEL 2™	SAE LEVEL 3™	SAE LEVEL 4™	SAE LEVEL 5™
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in “the driver's seat”		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
Copyright © 2021 SAE International.						
What do these features do?	These are driver support features			These are automated driving features		
	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
Example Features	<ul style="list-style-type: none"> • automatic emergency braking • blind spot warning • lane departure warning 	<ul style="list-style-type: none"> • lane centering OR • adaptive cruise control 	<ul style="list-style-type: none"> • lane centering AND • adaptive cruise control at the same time 	<ul style="list-style-type: none"> • traffic jam chauffeur 	<ul style="list-style-type: none"> • local driverless taxi • pedals/steering wheel may or may not be installed 	<ul style="list-style-type: none"> • same as level 4, but feature can drive everywhere in all conditions

Image Source: SAE International



1.0 Introduction

The conversation around mobility and innovation has come a long way since Karl Benz patented the three-wheeled motor car, known as the "Motorwagen," in 1886. As the automobile made its way onto roads, drivers had to navigate an interesting operational domain—horses, horse and buggy, people in streets, and street cars. Amazingly, this was all done without traffic systems to manage streets. Today, America's roads have unfortunately become less safe with rising pedestrian and cycling deaths, and vehicle crashes.² This rise in accidents and fatalities are occurring despite development of policies focused and continued investments in infrastructure focused on road safety.

With the introduction of ADS-equipped vehicles onto public roads, there is a new inflection point for the transportation system that may require reengineering policies, laws, and regulations for governing vehicle operations, especially if humans are no longer required. The notion of ADS-equipped vehicles has led to a reimagining of the transportation system, including opportunities to decrease the need for vehicle ownership; create safer streets, roads, and highways; and increase mobility access for populations with limited access to transportation options and those with disabilities. Many take for granted that access to safe, reliable, convenient, and accessible mobility options means something valuable; freedom to move within and outside of cities, states, and even across international borders.

For ADS, a looming question is whether such positive benefits will indeed materialize or whether ADS will exacerbate existing inequities in the transportation system or lead to increased vehicles miles traveled and congestion. How to implement and enforce new policies, laws, and regulations focused on the next generation of mobility will be an important determinant for what ADS operations look like on roads and is an important consideration for the New England region. An overall challenge fueling this report is how the NE States can continue to coordinate around supporting innovation while balancing the specific transportation needs and goals of each state.

1.1 Issue Background

Merging automation and transportation is not a new concept. The idea of ADS-equipped vehicles has been around since at least 1939 when General Motors created an electric vehicle that was guided by radio-controlled electromagnetic fields and operated from magnetized metal spikes embedded in the roadway³. From a public transportation perspective, the metro system operated by the Washington Metropolitan Area Transit Authority is designed for Automatic Train Operation; however, it has not

² *Newly Released Estimates Show Traffic Fatalities Reached a 16-Year High in 2021 | US Department of Transportation.* (n.d.). <https://www.transportation.gov/briefing-room/newly-released-estimates-show-traffic-fatalities-reached-16-year-high-2021#:~:text=Preliminary%20data%20reported%20by%20the,from%201.34%20fatalities%20in%202020>.

³ *History of Autonomous Cars.* (2021). TOMORROW'S WORLD TODAY®. <https://www.tomorrowstoday.com/2021/08/09/history-of-autonomous-cars/>



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operated in an automated manner since 2009. Airports around the world use automated trains to move people from terminal to terminal daily.

One of the best-known automated systems is that of “autopilot” on airplanes. Although it is a system that allows a pilot to fly a plane without continuous hands-on control, it is not meant to replace human monitoring at this point in time. However, what the computer system does do is monitor inputs, or data, to self-regulate based on the operational environment and assist pilots in the complicated operation of planes and monitoring of the skies. For many, the example of autopilot on a plane can help with the complicated discussion around what an “ADS-Equipped Vehicle” may be expected to be capable of based on the different levels of automation or features thereof currently being integrated into vehicles.



Image Source: Stantec

Many drivers take for granted how complicated and unsafe the task of driving can be, especially with all the different operating environments that drivers encounter. Over the last several years vehicle manufacturers have introduced and continue to deploy and improve a variety of advanced driver assistance systems (ADAS) technologies into new vehicles like collision warnings, collision interventions, driving control assistance, parking assistance, and other driver assistance systems to aid the driver with safely performing some of the driving tasks. It is critical to note these driver assistance technologies are not considered ADS⁴, as they are designed to assist, not replace an engaged driver, and thus are not the focus of this report. However, as these ADAS technologies mature and take over more and more of the driving tasks, it is anticipated that drivers may become more accustomed to manually driving less and may be more open minded (or maybe not) to vehicles that fully drive themselves all of the time, which leads to the focus of this report – ADS-Equipped Vehicles.

If ADS technology were capable of a complete one-for-one replacement of human driven vehicles by handling the sustained and unconditional performance of the entire dynamic driving tasks and the dynamic driving task fallback (what is defined as Level 5 – Full Driving Automation), then there may not be a need for a report such as this one. This report considers the fact that existing policies, laws, and regulations around vehicle operation all assume a human driver behind the wheel. In line with the fact that the development of ADS technology is ongoing and will take time, so will reengineering policies, laws,

⁴ *Clearing the Confusion: Recommended Common Naming for Advanced Driver Assistance Technologies*. (2020). Consumer Reports. <https://advocacy.consumerreports.org/wp-content/uploads/2018/10/Clearing-the-Confusion-ADAS-Nomenclature-one-pager-8-3-20-FINAL.pdf>



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and regulations to accommodate all the driving tasks and fallback being completed by an onboard ADS instead of a human driver. The goal of this report is not to provide definitive answers, especially since the ADS technology and viable use cases are still maturing, but to instead identify policy, legal, and regulatory issues that the New England States (“NE States”) can continue to collaborate and coordinate on in preparing for the continued integration of ADS-equipped vehicles across the region.

1.2 How did the regional focus of the project come about?

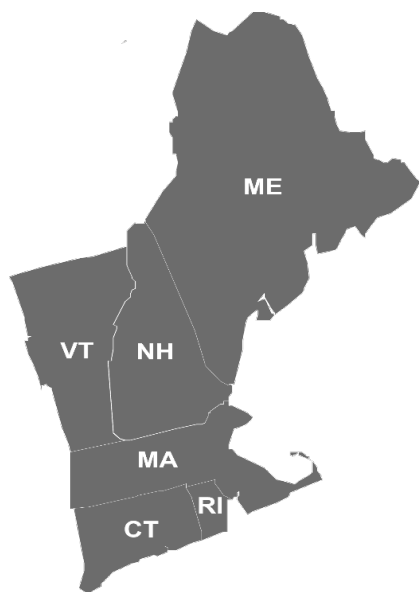


Figure 11: Map of NE CAV States

The regional focus of the project builds from previous work funded by the New England Transportation Consortium (NETC) and completed by the New England Connected and Automated Vehicle Coordination Group (NECAV) as further described below.

In 2017, the NETC funded an NETC quick response project titled, “New England Connected and Autonomous Vehicles” (Project 17-1). The objectives of this project were to:

- Identify multi-state issues related to the testing and deployment of connected and autonomous vehicles (C/AVs) in New England;
- Document opportunities and challenges related to multi-state C/AV issues; and
- Prepare an action plan that minimizes challenges and pursues opportunities for regional C/AV collaboration in New England.

Two important outcomes resulted from this project work, which was completed in 2018:

1. A roadmap of initiatives which support the testing and deployment of C/AVs in the six New England states; and



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2. An active working group, the Northeast Connected and Automated Vehicle Coordination Group (NECAV), with representatives from the transportation agencies in each of the six New England states (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont), that is also supported by the input of The Eastern Transportation Coalition (TETC) and continues to meet quarterly to share, learn and support each other in areas and initiatives related to C/AVs. The NECAV Coordination group members made up the Technical Committee advising the completion of this research project.

The vision of the NECAV group is for seamless operation of ADS-equipped vehicles across New England and surrounding regions of the United States and Canada. The mission of the NECAV group is to share resources and information, and work collaboratively with neighboring transportation agencies and other key stakeholders to facilitate the deployment of ADS-equipped vehicles in New England and its surrounding region for freight and passenger movement.

New England is a region composed of six small states with unique government structures and diverse numbers and types of urban, suburban, and rural communities that have aging infrastructure and four seasons of variable weather conditions. The geographically small states (with frequent cross-border travel across jurisdictions) also means that a consistent approach to ADS regulation, policy and deployment is critical for the region.

This Project focuses on the following question:
How to develop, implement, and provide continuing updates towards a uniform statutory and regulatory approach to facilitate the safe multi-state deployment of ADS-equipped vehicles across the NE States?

1.3 What are the research goals and objectives of the project?

The goals and objectives of this research project (hereinafter referred to as “Project”) are the following:

- Conduct a review of similar or related ADS focused research efforts to document known issues and to ensure relevant multi-state policy, legal, and regulatory issues are considered
- Analyze existing policy, legal, and regulatory issues to overcome anticipated barriers to multi-state CAV mobility in the New England region
- Focus on foundational policy, legal, and regulatory issues that require action in consideration of transitioning from human driving to ADS-equipped vehicles with a focus on cross-state consistency and consideration of future roles and responsibilities for states
- Develop and identify specific recommendations towards facilitating testing and deployment of ADS-equipped vehicles in multiple states and across state lines within the New England region with the goal of collaborating on the development of policy, legal, and regulatory approaches
- Avoid duplication of previous research projects and inform national and other regional efforts around ADS through the findings of the Project



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For this Project, the focus of the research and analysis is on ADS, which is the “hardware and software that are collectively capable of performing the entire DDT on a sustained basis, regardless of whether it is limited to a specific operational design domain (ODD); this term is used specifically to describe a Level 3, 4, or 5 driving automation system.

Image Source: Courtesy of Connecticut Department of Transportation



What is not covered in the scope for this Project?

The breadth and scope of issues that come with the deployment of ADS is cumbersome, evolving, and challenging. Like any research project taking on a complicated and ever changing issue like ADS deployment, parameters had to be placed around what this Project could cover. For clarification purposes, the following issues were not comprehensively evaluated as part of the Project, although they may be mentioned in parts of the report as these are issues that are important to and warrant further research and consideration around the deployment of ADS.

Connected vehicles: ADS-equipped vehicles and connected vehicles are sister technologies that are being developed in parallel paths and oftentimes tend to be merged together in discussions among transportation professionals. One of the reasons connected vehicles are largely not included as part of this Project is because connected vehicle technologies involves different policy, legal, and regulatory issues or considerations that are being debated at the national level with some state or local implications for installation and deployment. This includes considerations around both vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) connected vehicle communications. While both ADS and connected vehicle technologies may compliment one another, the extent or implications of that outcome are still unknown. An important consideration for future connected vehicle related policy, legal, and regulatory tracking and coordination is the prioritization of wireless spectrum for transportation specific communications and the development and consistent application of interoperable equipment standards for industry to follow, which



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will make it easier and provide a focus on future readiness for state and local infrastructure owner operators (IOOs) to install related equipment onto roadways.

Infrastructure needs and considerations: There are still a number of questions around what infrastructure is needed to support the safe operation of ADS. While lane markings and signage are often discussed, issues like broadband connectivity may need to be addressed as well should remote operations or monitoring take shape for fleet operations. Infrastructure considerations will be an important subject area to continue to track and issues related to use and control of right-of-way may be challenged with the increased deployment of ADS onto public roads. Additionally, any requirements around lane markings and signage should be tracked through the ongoing update to the Manual on Uniform Traffic Control Devices⁵.

Personal Delivery Devices: Personal delivery devices (PDDs) are not specifically covered in this report due their operations mainly being focused on the use of sidewalks as opposed to public roads. The Project does consider larger vehicles being used for local goods delivery and operating on public roads without any driver. These are referred to herein as “ADS purpose-built vehicles.”

1.4 ADS Technologies Can Support a Safe, Sustainable, And Accessible Transportation System

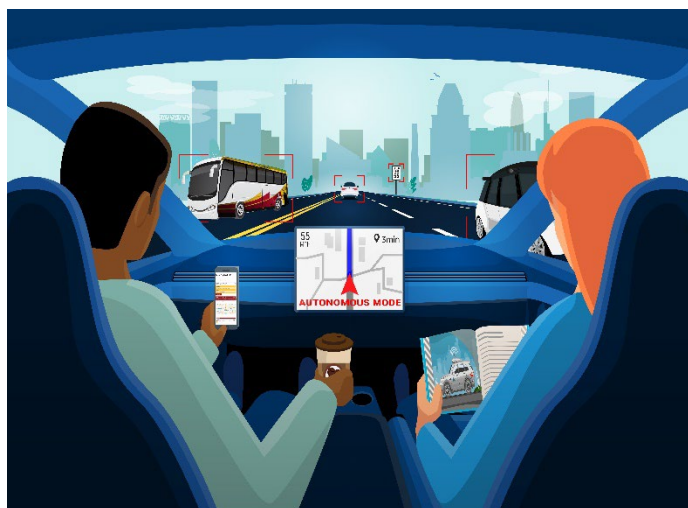


Image Source: Stantec

Why is it important to be investing resources into planning for ADS-equipped vehicles? ADS technologies have the potential to provide significant safety, mobility, environmental, economic, and other quality of life improvements that could benefit nearly every user of the transportation system. However, in order to maximize such benefits, a modernization of policies, laws, and regulations will be needed to support the

⁵ *Status of Rulemaking for the Eleventh Edition of the MUTCD - Knowledge - FHWA MUTCD.* (n.d.). <https://mutcd.fhwa.dot.gov/mutcd11status.htm>



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minimization or elimination of human responsibilities for the operation of vehicles. Further, coordination will be needed to foster the equitable deployment of ADS-equipped vehicles, including overcoming focus on urban and highly populated areas of the country from a market share perspective which may lead to focus areas like rural access and first-last mile paratransit to not be prioritized.

The renewed enthusiasm for ADS in vehicles arguably came in 2016 when the United States Department of Transportation (USDOT) under the Obama Administration released policy and guidance aimed at getting more ADS-equipped vehicles on public roads. In March of 2016, the Senate Committee on Commerce, Science, and Transportation convened a hearing entitled “Hands Off: The Future of Self-Driving Cars⁶.” During that hearing, Senator Nelson (a former astronaut) described his experience in a vehicle with driver assist technology where his “instincts could not resist, and I grabbed the wheel, touched the brake, and took over manual control.” He then went on to state “[u]nderserved communities without reliable means of transportation could finally be integrated into the national economy. In so many states, this technology could be particularly beneficial for seniors and those with disabilities.” These statements summarize the important mobility opportunities and one of the biggest impediments for ADS-equipped vehicles – consumer trust and adoption.

Unfortunately, many of the complicated policy issues addressed in the initial policies and guidance, and the 2016 Senate hearing, including safety, oversight, funding, consumer trust, and public and private coordination continue to be barriers to the widespread adoption of ADS-equipped vehicles. These barriers are exacerbated by lack of national regulatory coordination, the great cost for the development of proprietary systems for safe ADS operations, and the reality of the diverse infrastructure, operating, and weather considerations that exist across the country.

⁶ *Hands Off: The Future of Self-Driving Cars*. (2016). <https://www.govinfo.gov/content/pkg/CHRG-114shrg22428/pdf/CHRG-114shrg22428.pdf>



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Image Source: Courtesy of New Hampshire Department of Transportation

Even with identified challenges, the opportunities around a safer, more inclusive, and efficient transportation system continue to fuel warranted interest around the integration of ADS into vehicles. This is evidenced by the continued investment in the development of ADS by both traditional and non-traditional players in the automotive space; the increasing number of advocacy organizations focused on ADS; the formation of subcommittees within traditional transportation organizations like the American Association of State Highway and Transportation Officials (“AASHTO”) and the American Public Transportation Association (“APTA”) focused on ADS; and the growing size of chapters within state and local transportation plans centered on mobility and innovation, including ADS-equipped vehicles. A common theme from policy documents being released by such entities is the need for a national strategy and vision to address the different layers around the operation of ADS-equipped vehicles on public roads⁷.

⁷ AASHTO *Connected and Automated Vehicle Policy Principles*. (2021). AASHTO. <https://cav.transportation.org/wp-content/uploads/sites/61/2021/11/CAV-Policy-Principles-v4-press.pdf>; Alliance for Automotive Innovation. (2020). *Policy Roadmap to Advance Automated Vehicle Innovation*. <https://www.autosinnovate.org/innovation/AVRoadmap.pdf>



1.5 Current Deployment and Regulatory Landscape

While ADS-equipped vehicles are not yet mainstream across the nation's roads and highways, their presence on roadways is growing, including through on-demand ride hailing,⁸ freight and transit use cases. Having a clear understanding of the capabilities and proposed uses of ADS is an important discussion point around the integration of ADS into ground vehicles. Through ongoing testing and development of ADS technologies, the following use cases are evolving in the short-term:



Image Source: Stantec

- Commercially operated fleets of vehicles for passenger services focused on demand responsive mobility or ridehailing
- On-road commercial vehicles focused on the movement of freight on highways with focus on specific corridors
- Fleet and purpose-built vehicles without any in-vehicle operator for local goods delivery, including both road and sidewalk delivery
- Public transportation, including both agency operated or procured services from private companies
- State-owned fleets of vehicles for maintenance services

⁸ CPUC Issues First Driverless Autonomous Vehicle Passenger Service Deployment Permit. (2022). <https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-issues-first-driverless-autonomous-vehicle-passenger-service-deployment-permit>

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Figure 22: NHSTA Test Tracking Tool Map



Image Source: Esri, Bureau of Transportation Statistics, GeoSystems Global Corporation in association with National Geographic Maps and Melcher Media, Inc. | Esri, FAO, NOAA, USGS, NRCAN (May 2, 2022)

At this point in time, the operation of ADS-equipped vehicles on public roads is somewhat limited geographically across the country. As part of the “AV TEST” Initiative launched in June of 2020, NHTSA developed an interactive map that shows ADS testing locations, state information, and company information (“Tool”)⁹. States and companies voluntarily submit information about ADS operations to NHTSA, which then compiles the information into the Tool. The Tool shows locations of ADS operations, and the map reflects the amount of operations by dot size.

Increasing opportunities for the operation of ADS-equipped vehicles in the Northeast is an important goal of this Project, including its focus on a coordinated approach around policy, legal, and regulatory issues for the NE States.

While the Tool does not capture all ongoing operation of ADS-equipped vehicles on public roads, it does provide an informative snapshot around where testing appears to be focused. In the Northeast, there is very limited operation at this time. Besides the City of Boston now and the CTfastrak project in central Connecticut starting in 2023, the majority of ADS operations are happening in locations where there is already an existing industry, government interest, and/or research institution interest or presence for ADS, business/market share opportunity, and/or geography or climate suitable to industry and the use case and readiness status of the ADS technologies.

⁹ Automated Vehicle Test Tracking Tool | NHTSA. (n.d.). <https://www.nhtsa.gov/automated-vehicle-test-tracking-tool>



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While ADS testing and deployment across modes and use cases have continued, there has been a lag in the implementation of federal ADS safety regulations. Although federal regulations are still forthcoming, it is important to note there are a number of standards and best practices focused on ADS that have been developed and adopted by industry.¹⁰ In fact, NHTSA is presently considering many of these standards as it reviews comments submitted to a recent advanced notice of proposed rulemaking focused on developing a framework for ADS safety¹¹. These standards also provide insights for states seeking to foster, coordinate, and assist with the permitting of safe testing and deployment of ADS-equipped vehicles on public roads. Without a nationally coordinated approach for ADS testing and deployment that fosters public and provide collaboration in support of ADS deployments in all parts of the country, barriers have arisen through the different policy, legal, and regulatory approaches states are taking around ADS-equipped vehicles.

Through the research for this Project, five general approaches being taken by states have been identified:

- Implementation of state policies, legislation, and/or regulations directly focused on the testing and/or full scale commercial operations of ADS
- Implementation of state policies, legislation, and/or regulations seeking to establish a commission or working group to study and make recommendations around potential state regulatory changes needed for the safe testing and/or operation of ADS
- Issuance of a Governor's Executive Order promoting the testing of ADS-equipped vehicles or establishing a commission or working group to study and make recommendations around potential regulatory changes needed for the safe operation of ADS-equipped vehicles
- Intentionally not implementing new ADS policies, legislation, and/or regulations as an active and flexible strategy to attract and engage ADS industry or to implement ADS pilots, or following a determination that no policies, legislation, and/or regulations are needed at this time due to very limited full scale commercial deployments of ADS
- Intentionally not implementing new ADS policies, legislation, and/or regulations as a strategy to remain inactive in this space while ADS technology, use cases, and regulatory issues continue to evolve and standards continue to evolve from USDOT and industry

Each of these approaches informs the different opportunities and risks that will be discussed further in Section 3 of this report. With such a backdrop in mind, the NETC has engaged this Project to proactively evaluate policy, legal, and regulatory issues around ADS from a regional perspective. This Project seeks to help advance the important and difficult conversations needed across sectors to further the multi-state

¹⁰ These industry standards include SAE J3061 and SAE 21434 for cyber security and computer security; ISO 26262 for functional safety and equipment faults; ISO 21448 and SaFAD/ISO TR 4804 for dynamic driving function and environment and edge cases; and UL4600 for system safety or safety beyond dynamic driving, including the totality of an ADS safety case. In addition to the above deployment industry standards, there are also other SAE standards and industry best practices focused on testing of ADS-equipped vehicles, including: SAE J3018 for Safety-Relevant Guidance for On-Road Testing of Prototype Automated Driving System (ADS)-Operated Vehicles; AVSC Information Report for Adapting a Safety Management System (SMS) for Automated Driving System (ADS) SAE Level 4 and 5 Testing and Evaluation; AVSC Practice for Metrics and Methods for Assessing Safety Performance of Automated Driving Systems (ADS); and others.

¹¹ *Framework for Automated Driving System Safety*. (2020, December 3). Federal Register.

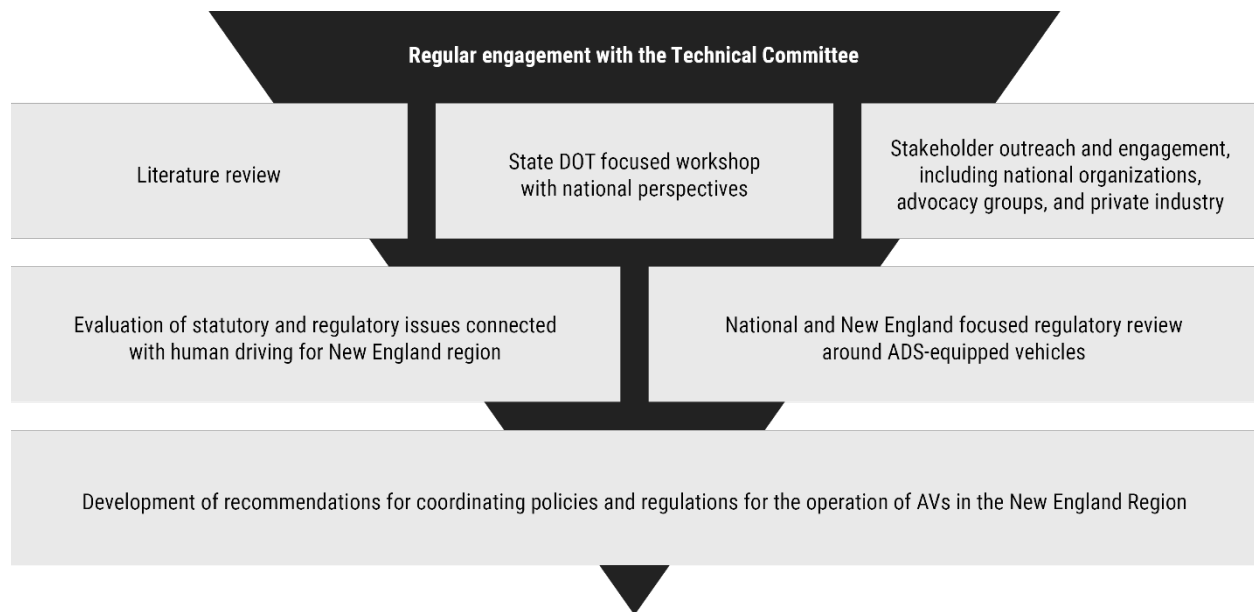
<https://www.federalregister.gov/documents/2020/12/03/2020-25930/framework-for-automated-driving-system-safety>



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use of ADS-equipped vehicles while also addressing new risks and grey areas that come with the deployment of an emerging and imagination capturing technology.

1.6 Research Process



In coordination with the TC, the research team developed a multi-phase process for the Project that included the following steps:

1. Regular engagement with the TC
2. Literature review
3. State transportation agency focused workshop with national perspectives
4. Stakeholder outreach and engagement, including national organizations, advocacy groups, and private industry
5. Evaluation of statutory and regulatory issues connected with human driving
6. National and New England focused regulatory review around ADS-equipped vehicles
7. Development of recommendations for coordinating policies, laws, and regulations for the operation of ADS-equipped vehicles in the New England Region

While the scope of this Project is large when one considers an issue like ADS-equipped vehicles, the focus on policy, legal, and regulatory issues kept the Project grounded around issues focused on vehicle operations and roles and responsibilities, particularly state and federal governance and oversight roles. It is also necessary to note that participants in the stakeholder outreach are not identified as part of agreement to promote more candid information sharing to inform development of more robust recommendations as part of this Project.

Technical Committee Engagement



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The TC, comprised of representatives from each of the New England state transportation agencies (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) was set up to provide guidance, input, and feedback to the Principal Investigator to ensure the research was useful to each of the states involved. This Project has been informed by feedback from the Technical Committee on a regular basis. This included monthly meetings where Project issues were discussed. The Technical Committee was highly engaged during the review of all drafts of the final report.

Literature Review

Using the Project scope as guidelines, the literature review scanned 40 documents with a focus on policy, legal, and regulatory matters for ADS, primarily assessing these ADS matters in the United States (though the team did include a few international examples).

The reviewed documents included:

- Reports from ADS state-level working groups;
- Comprehensive research published by the Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP);
- Papers published by research institutions and individual transportation researchers and advocacy groups; and
- Policy and guidance documents from several state departments of transportation, USDOT, and national associations addressing ADS.

Through the literature review, the research team identified key ADS legal and regulatory issues for discussion with stakeholders and the TC. Key notes and observations from the documents reviewed can be found in Appendix A – Annotated Literature Review. The research focused on a review of documents that did not just identify issues, but included robust discussions around policy, legal, and regulatory issues facing ADS. The key findings of the literature review are included in Appendix B – Literature Review. This appendix also includes the full bibliography of documents reviewed.

Stakeholder Outreach



Image Source: Stantec

The research team created a stakeholder outreach discussion guide to help collect feedback from representatives from different organizations and stakeholder groups relevant to ADS. For the guide, see Appendix C – Stakeholder Outreach Discussion Guide. The stakeholders that met with the research team



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for virtual meetings reflected a diverse set of opinions and perspectives in ADS. This was to ensure that the discussions would be representative of the scope and interests of the Project, including the challenging issues included within the scope of research.



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The stakeholders interviewed for the Project can be put into the following categories of organization types:

Private industry vehicle manufacturers (5 stakeholders)

- Passenger vehicles
- Freight vehicles
- Local delivery vehicles

Governmental/transportation professional organizations (5 stakeholders)

- National advocacy organization for municipalities
- Public transportation professional organization
- Motor vehicle administration
- Law enforcement and highway safety

Legal organizations (2 stakeholders)

- Law firm representing coalition with focus on ADS-equipped vehicles
- Professional association

High tech transportation manufacturer (1 stakeholder)

- Professional organization

Development and deployment of ADS (1 stakeholder)

- Consultant firm

Insurance (1 stakeholder)

- Insurance company

A major goal of the outreach was to educate interviewees about the Project and its goals, and to find opportunities and solutions for collaboration across sectors to support the safe deployment of ADS.

Discussion topics included:

- Areas of ADS operation that states should try to coordinate
- Areas of law where states should strive for reciprocity
- Use cases for passenger or goods movement that would lend themselves to operation across state lines
- Appropriate terms of ADS operations i.e., “testing/pilot,” “deployment,” or “commercial use”
- Experience in codifying or litigating issues related to ADS operations
- Lessons learned from experiences, along with any sharable documentation from pilot projects

State DOT Focused Workshop

As part of the research and engagement, a workshop was also held with representatives from state and local departments of transportation outside of the New England states that are actively involved with ADS testing and deployment activities. The invited speakers were asked to share ongoing initiatives and approaches around the deployment of ADS-equipped vehicles in their states. The goal was to include a national spectrum of viewpoints around complicated issues like risk-sharing and safety, how to approach terminology like “deployment,” and how to approach legislation around ADS. The perspectives included representatives from Arizona, Florida, Maryland, Minnesota, Ohio, Pennsylvania, and Washington.

A sample of questions discussed during the workshop included the following:



While the need for national coordination was mentioned throughout the literature review and stakeholder engagement, the notion of multi-state regional coordination was received with interest and positive feedback.

- Tell us about what policy and regulatory approach you are taking in your state and why?
- If you did implement new policies or regulations, how did you achieve elected / stakeholder / public buy-in on your current approach?
- How did you get dedication of resources for ongoing efforts focused on ADS integration in your state?
- What do you think is needed to promote collaboration around a national testing program to overcome challenges like risk management, safety verification, and information sharing?
- What are roles and responsibilities of the public and private sector in the absence of federal regulations?
- What is the right regulatory balance – safety vs. promoting innovation?

2.0 Discussion of ADS Challenges and Opportunities Identified Through Research Process

There is great opportunity for coordination around the development of testing and deployment regulations that align ADS use cases with the identified transportation needs of the NE States and region.

The literature review and stakeholder outreach processes helped the Project team identify key topics and considerations for policies, laws, and regulations arising from ADS-equipped vehicles in a regionally coordinated manner. The discussion below presents the issues raised during the literature review and stakeholder outreach phases of the Project and informed the focus of the analysis in Section 3, in addition to the findings and recommendations in Section 4. While ADS technologies present the opportunity to enhance the transportation system, they also challenge existing paradigms and accordingly, raise questions towards existing policy, legal, and regulatory boundaries.

Important questions that were raised and discussed during the research included:

- What are the different potential use cases and operational design domains for ADS?
- How to understand and mitigate evolving risks for pilot projects and limited deployments without a clear timeline for when ADS will be ready for full scale commercial deployment operations?
- How will ADS be available to consumers? For example, will this be a shared fleet subscription format or personal ownership?



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- How will existing roles and responsibilities change or not change between all levels of government (federal, state, local)?
- How can states promote safe and effective ADS testing and deployment opportunities in support of advancing ADS technologies while being mindful of untested liability questions for states as federally adopted safety standards are further developed?
- What are the industry standards that exist today for ADS and are they enforceable or do they provide a legally defensible position?
- What are specific actionable steps (adoption of policies, laws, regulations, etc.) that can be taken today and in the near-term or mid-term collectively by the NE States to advance ADS development, performance, and adoption? Are any of these steps more important, effective, or essential to take compared to others?
- What needs to happen to support a coordinated and collaborative approach around the adoption of policies, laws, and regulations by the NE States?

These topics considered as part of this Project and the resulting findings and recommendations in Section 4 provide a foundation for the NE States to continue to coordinate resources around actionable steps to implement the region’s vision for seamless operation of ADS-equipped vehicles.

2.1 State Coordination

Through the completion of both the literature review and stakeholder engagement, a common theme arose – increased and better state coordination will benefit and help the continued maturation of ADS. While challenges have been identified for regional collaboration, including overcoming different individual state interests that influence legislative decision-making, the safety, economic, and accessibility interests around ADS offer an opportunity for a regional coordinated approach to maximize the positive benefits of ADS-equipped vehicles on public roads. From the research, key issues identified for focused multi-state coordination in consideration of ADS include commercial freight, insurance, safety certification, and information sharing.

In considering ADS commercial freight operations, an important state safety consideration may be: what is the maximum number of vehicles that should be allowed to platoon, and what are safe following distances?

Commercial freight traffic is one area where coordination may be easier, in part because commercial freight operations are accustomed to being regulated at the federal level more comprehensive than passenger vehicles. ADS-equipped vehicles focused on commercial trucking are already crossing state lines with regularity, albeit on specific corridors primarily in the Southwest and through states with a permissive regulatory structure. In many cases, these limited deployments are working closely with law enforcement to plan and coordinate for ADS operations. Further, through the Federal Motor Carrier Safety Administration (FMCSA), most regulatory activities have already been determined to be under federal jurisdiction, including information sharing around safety and driver hours. This avoids some of the



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ongoing tensions around federal, state, and local control associated with the regulation of ADS for passenger movement.

Insurance coordination was a priority area for several stakeholders. The Project research identifies that five million dollars is a commonly seen insurance cap in many states that have ADS-related insurance requirements, and that insurance was an effective way to resolve incidents in the current deployment stage of ADS. However, whether a state supported “at fault” or “no fault” insurance policies was one area that would affect fleet owners’ ability to cross state lines while taking on risk of potential crashes.

ADS-equipped vehicles bring new replacement and sustainability considerations due to the current costs of replacement parts and recalibrating ADS monitoring systems following an accident. This creates a sustainability challenge around what could be viewed as vehicles that cannot be operated again after a minor accident and how vehicles with significant e-waste can be safely scrapped.

In speaking with a prominent global insurance company providing coverage to ADS operators, the following points were made that inform both future insurance and operational considerations:

- Operating environments impact insurance costs. This includes consideration around how complicated the operational environment is, which impacts the risk around an insurable incident.
- New risks with ADS include “ADS bullying” with people looking to challenge ADS-equipped vehicles and causing accidents, which may provide an opportunity for a new law to disincentivize such behavior by human drivers.
- The fleet operations model will create a new chain of liability that may look similar to the leasing and operation of commercial airplanes. Another model in consideration of the on-demand subscription use case is the insurance approach used for rental cars where the renter decides what level of insurance to pay for.

Safety certification is an area that state and local stakeholders identified as important to consider for possible coordination. Currently, differences in required certifications for various pilots and deployments could lead to inconsistent evaluation of safety issues and the development of effective and coordinated responses to safety concerns identified through testing. Inconsistent approaches to safety can also inhibit or deter testing/deployments and slow the maturation of ADS. The research suggests better coordination is needed across the public and private sector to address and overcome safety concerns in consideration of existing federal jurisdiction for vehicle safety.



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What information should be required to be shared concerning crashes, disengagements, and operating environment presents both an important collaboration opportunity and challenge for states and private companies testing and deploying ADS-equipped vehicles.

Coordination around **information sharing** is more realistic at the state level than the federal level, even though the latter would be more ideal for private industry since there is concern around inconsistent privacy laws being enacted by states. Currently, there are no specific federal laws that address data collection and sharing by ADS-equipped vehicles, including considerations around consumer protection. Municipal stakeholders noted that data sharing concerns are complicated by the uneven levels of wireless and broadband connectivity from place to place (such as rural versus urban areas), the different types of data that are collected by ADS (as well as some data types still being unknown), including potential rider information, and sensitivity around confidential and proprietary systems information. While some freight stakeholders are comfortable sharing their data, others, like package shippers or technology companies (whose day-to-day operations are built on proprietary data) have greater concern about the need to protect their data. Legal stakeholders noted that, at the moment, states do not take the same approach to crash data reporting and disclosing. Nevertheless, the trucking industry in general is much more transparent with its crash data than the passenger vehicle industry because their bar for reporting data is traditionally higher.

Existing laws will serve these new ADS technologies, but only if there is a named entity who is the driver.

2.2 ADS Terminology

One of the identified barriers for state coordination is the differing taxonomy used to describe ADS and their technological and operational capabilities. As noted in this report, whether formally or informally, a number of states have adopted the “Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles” found in SAE J3016.

Legal stakeholders urged preservation of the current definition of “**driver**” because this term is legally meaningful in maintaining a separation between product liability and driver responsibility law. Stakeholders commented that states should regulate ADS operators as driving entities, similar to human drivers (bearing in mind that tests would be different, and regulations on human drivers should arguably be tougher). Purpose-built ADS vehicle stakeholders expressed that their industry would benefit if the same access and privileges granted to human drivers were granted to ADS delivery vehicles so that they could deliver goods where metro areas straddle state lines.



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There was disagreement between some stakeholders on the application of the term “**testing**”. Consultant stakeholders noted that testing is the only stage the industry is truly in right now because there is a robust test phase needed to prove to the public that these technologies are safe; only after this phase can there be real proliferation of the technology. This was also an issue brought up during the DOT-focused workshop that generated the most robust discussion. Attendees provided different perspectives around whether the term “**deployment**” should be incorporated into policies and legislation right now or not based on the types of ADS operations occurring and state of the technology.

On the other hand, the research identified that a path to “**deployment**” must be baked into any limited stepwise approach. Other stakeholders added that regulation specific to deployment is important to establish, and that examples on deployment rules for drone integration could be useful for the ADS space in terms of allowing some level of operation (with defined limitations and restrictions), then monitoring and expanding deployments for adherence to project specifications or “good behavior.” Through a pilot model supporting public/private collaboration, testing or limited deployments can be approved based on operational data and decisions can be based on safety and risk considerations. Such operational data can also be used to coordinate with the public and address any concerns.

Real-time information sharing brings with it potential liability considerations for state DOTs as infrastructure deficiencies may be reported by an ADS-equipped vehicle, which may be interpreted to put a DOT on notice of an infrastructure hazard.

The terminology also leads to further difficulties in supporting a definition for “**commercial deployment**.” It was noted through stakeholder interviews that jumping from testing to commercial deployment is not easy and some sort of collaborative path forward around a “limited deployment approach” may be beneficial towards achieving collaboration between the public and private sector, reducing risks, and ensuring consumer buy-in. However, taking the California permitting and regulatory approach as an example, sequential permitting is currently working in California, but the process does not have room in it for a third phase in the sequence; in that state’s process, the requirement to go through extensive testing and reporting precedes deployment, but the application process for deployment begins in the testing stage. Inserting a third stage in between could change and lengthen the testing/reporting stage to an extent that would not be sustainable for product development.

2.3 Liability

There was consistent agreement in the literature that insurance requirements should remain a state responsibility, and legal stakeholders felt certain that liability could be accommodated by existing law. The legal system has integrated new technologies for years and is robust enough to accommodate the technologies introduced by ADS-equipped vehicles. Stakeholders also felt it is unwise for states to try to predict the legal needs of an emerging ecosystem before it has matured; even if there is a need to design a liability system, it makes more sense to let it develop through the courts as legal uncertainties arise. For example, the ideal safety outcome of ADS over the long term is that crashes may go down, meaning that



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the context of liability should reflect that change, and the need for legal action should actually abate. In addition, Terms of Use agreements will mainly serve to pass on a share of liability from the company to the rider; this has occurred in other transportation market segments as well (such as ride hailing), and stakeholders felt that the ADS context for transportation should not be solely targeted. This being said, stakeholders did acknowledge that relying on courts will not produce expedient results, especially considering these cases will be cases of first impression that may make their way to the Supreme Court; a process that normally takes many years – sometimes decades.

Further thoughts from the legal perspective are that the risk of ADS should be spread amongst the parties who share the risk, and no entity should be granted immunity because then the victim pays for it (this includes public agencies). In crash incidents when an ADS disobeys the rules of the road, the driver responsibility needs to be properly assigned; the risk and liability should be distributed among the parties who have the ability to prevent the harm that would produce liability.

All stakeholders agreed it is important to consider ADS use cases, operational design domains, functional design specifications, and whether or not and if so the extent upon which a human driver may be expected to take over or operate an ADS-equipped vehicle when determining what types of ADS operations would or should be allowed on public roadways or public rights-of-way in each state. In addition, each of these factors will determine what part of the code or which regulatory agency will govern the given vehicle use or type. For example, agency stakeholders noted that delivery vehicles may need to be subject to licensing and titling requirements since they operate on roadways, while delivery devices operate on sidewalks and therefore will not need to undergo licensing and titling (depending on the jurisdiction of the road adjacent to the sidewalk).



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Image Source: Courtesy of New Hampshire Department of Transportation



2.4 Legislative Approaches and Use Case Considerations

From the private passenger vehicle industry perspective, too much legislation is premature; laws need to remain flexible as the technology grows. For example, companies seeking to provide ADS on-demand subscription services advocated that Arizona has a good model bill, while Texas' bill provides decent flexibility. Meanwhile, California's dual regulatory approach creates jurisdictional challenges and is not an example preferred by private industry. This also includes concerns around the regulation of subscription fleets by the California Public Utilities Commission¹².

While the U.S. typically relies on self-certification in the manufacturing of vehicles for compliance with FMVSS, there is still a public need to know what state regulations have done to protect them (especially regarding issues like safety and cybersecurity for emerging vehicles technologies). The British model for this, known as "trialing", allows developers to develop their own safety cases, then prove to the government that their criteria are effective and that they have met them¹³.

¹² California Public Utilities Commission. (n.d.). *Autonomous Vehicle Programs*. <https://www.cpuc.ca.gov/regulatory-services/licensing/transportation-licensing-and-analysis-branch/autonomous-vehicle-programs>

¹³ *Code of Practice: automated vehicle trialing*. (2022, January 29). GOV.UK. <https://www.gov.uk/government/publications/trialing-automated-vehicle-technologies-in-public/code-of-practice-automated-vehicle-trialing>



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Building a foundation for a public / private / federal collaboration to support consumer understanding and to provide technical assistance to states around ADS focused legislation is opportunity identified through this research to support coordinated and informed regulation of ADS.

State and local stakeholders likened the operational safety certification process to the discussions around scooter integration into a city's transportation eco-system, in that new vehicles and integrated technologies must have certain parameters for approval and places to operate (even as they are insured and safety certified). For cities, these concerns in approving operations of ADS arise from managing public space and well-being. From an industry perspective, there is concern that new mobility innovations are being targeted with regulations that are stricter than those imposed on human driven vehicles.

One stakeholder perspective offered that mobility hubs in metropolitan areas for ADS providing delivery of goods to rural communities across state lines may present strategic commercial ADS freight opportunities for regions like the Northeast.

From the freight perspective, the need for regulations has shifted for ADS in recent years. The freight industry would like to eliminate the many gray areas existing in the legal and regulatory space around ADS, thus confirming concerns that inconsistencies in regulation have become a significant barrier towards ADS advancement. Logistics for refueling infrastructure will continue to be important, especially with ongoing movement towards zero-emission vehicles. Additionally, coordination with law enforcement was emphasized as an important priority, including around truck inspection stops.

2.5 Politics, Consumer Confidence, and Education

The research identified the need for facilitation of bipartisan conversations about ADS. The current challenges around bipartisan legislation is made more complicated by the fact that many lawmakers introducing and supporting ADS legislation do not always fully understand the capabilities of the technology. There is also continued and increasing confusion around the difference between ADS and ADAS,¹⁴ in addition to concerns that ADS will increase vehicles miles traveled, which directly conflicts with some states' and local governments' desires to reduce the number of vehicles on roads. Industry can help to educate policy makers by facilitating conversations around the potential use cases and business models for ADS (including goods delivery, first/last mile connections, and shared subscription/fleet

¹⁴ Singer, J., & Jennes, J. W. (2020). *Impact of Information on Consumer Understanding of Partially Automated Driving System*. AAA Foundation for Traffic Safety. <https://aaaafoundation.org/wp-content/uploads/2020/07/Impact-of-Information-on-Consumer-Understanding-of-a-Partially-Automated-Driving-System.pdf>



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models). Transportation regulators can also provide this education service as well, hosting facilitated conversations between multiple stakeholders and identifying gaps in stakeholder conversations and issues that require further research and exploration. At the federal level, continuing efforts to collect and share information around ADS deployments to support the development of best practices and technical support is also desired.

Regarding consumer confidence, the industry perspective is that consumer confidence will grow with consumer education and technology demonstration and experience. From the standpoint of organizations representing ADS interests, the best way to accomplish this is to allow more ADS on the roads so that people can get used to them through interactions and understand them and their capabilities. Legal stakeholders noted that the misuse of terminology for ADAS systems has caused consumer confusion¹⁵. This blurring of technology through terminology causes consumers and regulators to doubt the entire ADS industry. The ongoing investigations and orders being administrated by NHTSA appear to be focused on closing this understanding gap and focusing on the difference in technology capabilities between ADS versus ADAS, in addition to informing the development of federal safety standards for ADAS and ADS.

High tech professional organization stakeholders noted that it was very important to distinguish between connected vehicles and ADS, since they do not function in the same ways and have different technical requirements.

3.0 Policy, Legal, and Regulatory Considerations for Vehicle Operations and ADS-Equipped Vehicles

The lack of federally focused regulations for ADS has arguably created uncertainty around some issues like liability for states allowing for the testing and deployment of ADS-equipped vehicles on public roads, in addition to questions about how states may need to update or adjust their traditional roles for governing operator licensing, vehicle registration, safety and emissions inspections, insurance requirements, crash reporting requirements, information sharing requirements, and enforcing traffic laws. Thinking through the opportunities and uses cases for ADS-equipped vehicles), including considering that for some ADS-equipped vehicles licensing may no longer be needed for anyone in the vehicles, these are areas where more emphasis on new statutes, regulations, and changes to existing roles and responsibilities are expected to be seen.

Through a lens considering how the existing policy, legal, and regulatory approaches to vehicles and vehicle operations may change with the deployment of ADS, this Section 3 of the report looks at existing roles and responsibilities around vehicles and vehicle operations on public roads, as well as how ADS-equipped vehicles might change those responsibilities. Like other mobility innovation-related issues right now, there may be some grey areas with ADS as legal concepts catch up to new innovative solutions that

¹⁵ AV Industry Statement on NHTSA's Planned Standing General Order Reporting. (2022, June 8). Autonomous Vehicle Industry Association (AVIA). <https://theavindustry.org/newsroom/press-releases/av-industry-statement-on-nhtsas-planned-standing-general-order-reporting>



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challenge existing regulatory and governance structures governing the transportation system. With this Section 3 analysis, the Section 4 recommendations are informed with what issues the NE States can prioritize to focus on and allocate resources towards.

3.1 What is the role of the federal government?

When getting into a vehicle, almost no one stops to think about how the vehicle is determined to be safe when it is first sold, and then how and when safety responsibilities may shift between the manufacturer, the government, the owner, and the driver of the vehicle. ADS-equipped vehicles have brought the issue of safety into the spotlight, including roles and responsibilities among federal, state, local, and industry entities around how to support the continued deployment and maturation of ADS technologies in vehicles.

National Highway Traffic Safety Administration (NHTSA)

NHTSA has federal jurisdiction over the safety of motor vehicles. NHTSA's federal authority over vehicle safety is recognized through its powers to: 1) issue letters of interpretation; 2) exempt motor vehicles from existing standards; 3) issue rulemakings to amend existing standards or create new standards; and, 4) exercise enforcement authority to address defects in vehicles that pose an unreasonable risk to safety¹⁶.

In a 2013 Preliminary Statement of Policy Concerning ADS-equipped vehicles, NHTSA indicated that states are competent in regulating the testing, permitting, licensing, test-driver training, and operational conditions for ADS operation without analysis of the different Levels of Automation¹⁷. Versions of the Federal Automated Vehicles Policy have provided that existing roles and responsibilities of states around vehicles are expected to remain¹⁸. Accordingly, in the short term, NHTSA appears to take the position that states are well situated to address licensing, driver training, and conditions for ADS operations. While NHTSA has recommended testing principles in their Preliminary Statement, they do not expressly require any implementation before allowing for testing. In line with the approach taken in the 2013 NHTSA Preliminary Statement, states have not faced preemption in ADS testing. However, over the long term, NHTSA's Preliminary Statement implies that it can be expected to create safety regulations and standards for new ADS which will likely preempt state laws that are found to be in conflict with those federal regulations and standards established.

As additional background, NHTSA has authority to regulate two areas of safety standards: new vehicles and equipment, and after-market technologies and modifications to used vehicles. Broad statutory definitions give NHTSA extensive authority to issue safety standards for vehicles originally manufactured with ADS, and/or equipment that enables vehicle operations using ADS¹⁹. NHTSA can preempt state tort

¹⁶ *Understanding NHTSA's Regulatory Tools: Instructions, Practical Guidance, and Assistance for Entities Seeking to Employ NHTSA's Regulatory Tools*. (n.d.). NHTSA.

https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/understanding_nhtsas_current_regulatory_tools-tag.pdf

¹⁷ Autonomous Vehicles Team. (2014). *The Risks of Federal Preemption of State Autonomous Vehicle Regulations*. Technology Law and Policy Clinic, School of Law University of Washington. <http://techpolicylab.uw.edu/wp-content/uploads/2014/12/UW-Law-Clinic-Research-Memo-to-the-ULC-The-Risks-of-Federal-Preemption-of-State-Regulations-of-Autonomous-Vehicles.pdf>

¹⁸ *USDOT Automated Vehicles Activities* | US Department of Transportation. (n.d.). <https://www.transportation.gov/AV>

¹⁹ *NHTSA Statutory Authorities*. <https://www.nhtsa.gov/laws-regulations/statutory-authorities>



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law “only” where that law conflicts with a “significant regulatory objective.” However, given the reasoning of courts in leading cases²⁰, it is likely that courts will defer to NHTSA on when to exercise such preemption. The Supreme Court has turned to the NHTSA Safety Act of 1966 which provides an express preemption for federal agency regulative authority in the auto industry. But, of note is that the Supreme Court has also interpreted the Safety Act to say, “the absence of a regulation itself does not necessarily constitute regulations²¹.” Based on such a finding and since Federal Motor Vehicle Safety Standards (FMVSS) have not been updated to accommodate ADS, an argument can be made that a state can enact its own safety standards for ADS-equipped vehicles until NHTSA acts. That being said, such safety standards will likely face a preemption challenge sooner or later based on NHTSA’s recognized authority and may not be the best use of resources for a state.

The comments to the 2020 NHTSA ANPRM also address policy considerations around both the opportunity and implementation challenges for ADS and anticipated positive enhancements to mobility, especially when paired with electrification, connectivity, and shared mobility.

NHTSA has increased rulemaking activity around ADS over the past two years with the most notable being focused on establishment of an ADS safety framework²². With this 2020 Advanced Notice of Proposed Rulemaking (“ANPRM”), NHTSA seeks to move forward considerations through public comment for how NHTSA can use its authority over national vehicle safety to implement a safety framework specifically tailored to ADS, which can ultimately operate partially or completely without a human driver. NHTSA received over 700 comments on the ANPRM from a wide range of stakeholders, including automakers, software developers, trade associations, researchers, companies focused on ADS deployment, and state and local government agencies.

As the design and use cases for ADS continue to evolve, so do the considerations around safety and performance, which are traditionally within the jurisdiction of NHTSA. However, how that jurisdiction does or does not move into the built environment based on the policy considerations raised by comments will be interesting to track. This also dovetails with the comments focused on jurisdictional considerations for the regulation of vehicles and operation, particularly ADS where human operation is minimal or none at all.

Many of the comments from automakers to the 2020 ANPRM recommended that NHTSA work with industry stakeholders to develop a coordinated and consensus framework as the technology evolves and

²⁰ See *Geier v. American Honda Motor Co.*, 529 U.S. 861 (2000); *Williamson v. Mazda Motor of America, Inc.*, 562 U.S. ____ (2011).

²¹ Matthew Roth. (2020). *Regulating the Future: Autonomous Vehicles and the Role of Government*, 105 Iowa L. Rev. 1411. <https://ilr.law.uiowa.edu/assets/Uploads/ILR-105-3-Roth-9.pdf>, See *Freightliner Corp. v. Myrick*, 514 U.S. 280, 286 (1995).

²² U.S. Department of Transportation Seeks Public Comment on Automated Driving System Safety Principles | NHTSA. (n.d.). [Text]. <https://www.nhtsa.gov/press-releases/us-department-transportation-seeks-public-comment-automated-driving-system-safety>



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more data can inform intelligent rulemaking. There was general consensus that the federal government should be working closely with stakeholders in the private sector and with state and local governments to define what a safety framework should ultimately look like.

In June 2021, and subsequently amended in August 2021, NHTSA released a general order about mandatory crash reporting for SAE Level 2 ADAS and ADS equipped vehicles²³. The order was released under NHTSA's authority under the Safety Act and aligns with NHTSA's interpretation that its authority is preventive, and NHTSA does not need to wait for injuries or deaths, but tries to identify safety defects before they occur. The information collected and shared under the general order is anticipated to assist states in evaluating the safety of ADS, but it will likely take time to standardize and interpret such data. The first summary of this reporting was released by NHTSA in June of 2022²⁴.

Federal Motor Carrier Safety Administration (FMCSA)

The FMCSA was created through the Motor Carrier Safety Improvement Act of 1999 and is a separate administration within the USDOT. The FMCSA's primary mission is to reduce crashes, injuries, and fatalities involving large trucks and buses. It creates standards for testing and licensing commercial motor vehicle drivers, collects data on and directs resources to motor carrier safety, operates a program to improve safety and remove high-risk carriers from the highways, coordinates research and development to improve the safety of motor carrier operations and commercial motor vehicles, provides financial assistance to states for roadside inspections, and helps develop unified motor carrier safety requirements for North America.

The FMCSA is responsible for regulating and providing safety oversight of commercial motor vehicles and has jurisdiction over commercial trucking companies, interstate bus companies, and commercial driver's license holders. The FMCSA has authority to determine that state laws on commercial vehicle safety are preempted.²⁵ This is because Motor Carrier Safety Act gives the Secretary of Transportation express power to preempt state law. A state law or regulation is on commercial motor vehicle safety if it "imposes requirements in an area of regulation that is already addressed by a regulation promulgated under § 31136." This can include a regulation about work hours and mandatory breaks for commercial motor vehicle drivers. The FMCSA's jurisdiction also relates to established federal jurisdiction around interstate commerce.

Accordingly, and similar to state considerations for seeking to implement regulations for ADS-equipped passenger vehicles, any state regulation should consider FMCSA jurisdiction and considerations around interstate commerce. As a part of USDOT, the FMCSA is also tracking and researching issues with ADS and motor carriers. The FMCSA is doing its own testing on rear radar, braking system, and sensor performance testing. Outside of testing, the FMCSA has published an advance notice of proposed

²³ NHTSA. (2021). *Incident Reporting for Automated Driving Systems (ADS) and Level 2 Advanced Driver Assistance Systems (ADAS)* (Standing General Order 2021-01). NHTSA. https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-08/First_Amended_SGO_2021_01_Final.pdf

²⁴ NHTSA. (2022). *Summary Report: Standing General Order on Crash Reporting for Automated Driving Systems* (DOT HS 813 324). <https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-06/ADS-SGO-Report-June-2022.pdf#:~:text=Crashes%20involving%20an%20ADS%20Dequipped,report%20on%20July%2013%2C%202021>

²⁵ *Intl. Bhd. of Teamsters, Loc. 2785 v. Fed. Motor Carrier Safety Administration*, 986 F.3d 841 (9th Cir. 2021)



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rulemaking (ANPRM) about ADS and is reviewing comments received²⁶. Current issues being looked at around highly automated commercial vehicles (HACV) include: driver seating; hours of service; vehicle markings; licensing; and balancing emerging technology with rulemaking. The agency is also considering a pilot program that allows temporary exemptions for HACVs and how information sharing requirements may need to change with ADS.

²⁶ *Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles*. (2019). Federal Motor Carrier Safety Administration. <https://www.govinfo.gov/content/pkg/FR-2019-07-31/pdf/2019-16331.pdf>



Congress and ADS-focused Legislation

There is also a possibility of future preemption in areas other than ADS safety via legislation from Congress. In 2017, the House passed the “SELFDRIVE” Act which had express preemption of federal safety regulation over the design, construction, and performance of ADS-equipped vehicles. The same year, the Senate considered the “AVSTART” Act which had a corresponding preemption provision focused on education and public safety, data and privacy, and a definitional hierarchy. With Congress also actively monitoring the progress of ADS-equipped vehicles, including through hearings, proposals around future roles and responsibilities can be expected, and states will need to be in a position to advocate for continued authorities around the operation of ADS.

3.2 What is the role of industry?

Commercially focused operations around ADS are materializing, including around the movement of commercial freight and goods, and on-demand passenger services. While standards are being worked on, updated, and adopted by industry, there are no federal safety regulations that have been adopted for ADS at this time.

What is role of industry in the safe deployment of ADS? This question is especially relevant as federal safety requirements are catching up to a maturing technology that offers the opportunity to transform the experience in vehicles – from passenger vehicles to transit to freight and local goods movement.

With the movement of goods, the existing jurisdiction of the FMCSA over interstate commerce is clear and the evaluation of ADS technologies being integrated into heavy commercial trucks appears less complicated than passenger vehicles. However, nuances are developing with the introduction of low-speed ADS-equipped purpose-built vehicles designed to operate on public roads and without any space for a driver²⁷.

While ADS-specific safety regulations are developed at the federal level, there is a collaborative opportunity that involves the public and private sector to better understand and mitigate ADS operational risks in the short term. As the private industry seeks a clear path to the full scale commercial deployment of ADS, state DOTs reasonably seek a clear understanding of ADS capabilities as operations are being approved or allowed on public roads. The research for this Project identifies that finding the right model for this collaboration in the short term will also benefit public trust and adoption for ADS.

²⁷ NHTSA Grant of Temporary Exemption to Nuro, Inc. for low-speed ADS-equipped vehicles. https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/nuro_grant_notice_final-unofficial.pdf



Industry organizations have been focused on the development of voluntary technical standards for ADS, including the Society of Automotive Engineers, the government's National Institute of Standards and Technology, and the International Organization for Standardization.

3.3 What are the roles of state and local governments for operating motor vehicles with a focus on New England region?

State governments are traditionally responsible for driver licensing, vehicle registration, titling, insurance requirements, safety and emissions inspections, traffic laws and enforcement, and crash reporting. With the increased deployment of ADS, states are interested in supporting the safe testing and deployment of ADS-equipped vehicles and confirming the roles and responsibilities of jurisdictions and the federal government²⁸.

Home Rule Considerations

Within New England, it is necessary to consider the concept of “home rule.” Under home rule, a municipality may have authority to exercise powers of governance delegated to it by the legislature unless the state legislature passes laws to expressly deny that power. Generally, when a matter is of “state-wide concern,” it is beyond the scope of home rule authority and should be decided by the state legislature rather than by the county or municipality. Whether a matter is of state-wide concern is left up to the discretion of the court reviewing a challenge to home rule authority. In the context of ADS, if a court decides roadway safety in association with ADS is a matter of state-wide concern, then state authority to regulate ADS likely exists, but if it is not a matter of state-wide concern, a home rule municipality could create ordinances to regulate ADS in that municipality. A state's constitution may also grant powers associated with home rule and should be looked at with any analysis. The issue of home rule will be an important consideration for the NE States as they consider what level of coordination at the local level will be warranted for ADS testing and deployment.

How should existing reciprocities around the operation of motor vehicles be considered?

The primary source of reciprocity is Article IV, § 1 of the United States Constitution, which is commonly called the “full faith and credit clause.” This clause requires each state to recognize the public acts, records, and judicial proceedings of other states in areas where states exercise state level jurisdiction. For instance, this clause requires each state to recognize the public acts and legal judgments of other states. In the context of vehicle operations, the public act of granting a license or registration by one state should be recognized by all the other states. This is known as the doctrine of reciprocity.

²⁸ American Association of Motor Vehicle Administrators - AAMVA. (2020). *Safe Testing and Deployment of Vehicles Equipped with Automated Driving Systems Guidelines, Edition 2*. American Association of Motor Vehicle Administrators. <https://www.aamva.org/assets/best-practices-guidance/guidelines-for-testing-drivers-in-vehicles-with-ad>



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While there are many exceptions to this rule based on decisions of federal courts (e.g., marriage), this framework provides context for the prevailing view that licenses and registrations issued by one state will be recognized in all other states.

To memorialize the basis of reciprocity, states often enter into legal agreements referred to as compacts. Compacts are sanctioned by the U.S. Constitution (see Article I, § 10, Clause 3) and are frequently used to regulate relationships between states. Compacts must be approved by Congress and can only be dissolved by an act of Congress.

Since 1960, there has been a **Driver License Compact**, which obligates signatory states to report motor vehicle infractions to the home state of the vehicle operator. However, this compact does not obligate signatory states to recognize the driving privileges of the citizens of other signatory states. Of the NE States, only Massachusetts is not a signatory. However, Massachusetts passed legislation enabling the state to enter into the compact, but has not yet joined the compact²⁹.

There is also a **Multistate Reciprocity Agreement**, which governs vehicles that are used in interstate travel (e.g., charter buses). This compact allows interstate travel vehicles to operate in any of the signatory states without paying additional registration fees. None of the New England States is a signatory to this compact. While no New England states are signatories to this compact, it serves as an example of how differing rules in neighboring states (New York, in this case) can cause disharmony in the context of interstate travel.

Perhaps the most relevant compact to this research is the **Drivers License Agreement**, which obligates, among other things, signatory states to honor licenses issued by other member states. This agreement came into force in 2002, with the first state to become a signatory. Connecticut and Massachusetts are both signatories.

Applying this background to the context of ADS operations, the use of an interstate compact could be the basis of coordinating state laws pertaining to the operation of ADS-equipped vehicles throughout the New England states.

Existing Statutory and Regulatory Environment for Vehicles

Before examining ADS-specific laws and regulations, it is helpful to examine the current statutory and regulatory framework for motor vehicle operations across the six NE states. As part of such analysis, this section also analyzes potential future scenarios for registration and operation in an ADS environment, with special emphasis on the potential to coordinate the statutory and regulatory landscape across the New England region. Finally, it surveys considerations for regional and national consideration as ADS become more prevalent. For a review of state level ADS legislation outside of New England that guided these considerations, refer to Appendix D – State Level ADS Legislation Outside of New England.

²⁹ American Association of Motor Vehicle Administrators. *Driver License Compact, Non-Resident Violator Compact, Member Joinder Dates*. accessed January 9, 2020. <https://www.aamva.org/getmedia/6baff2c2-4a63-49f3-8338-cdfb5b968f9b/Driver-License-Compact-Non-Resident-Violator.pdf>



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Also complementing this analysis is Appendix E – Key Considerations for ADS Regional Coordination, which is a working review addressing specific vehicle operational questions and future-forward coordination considerations that guided the analysis in Section 3 and development of Section 4 Recommendations.

Driver's Licenses

Driver's licenses are issued by each state and authorize the licensee to operate a motor vehicle, within the limits established by statute in each state. The requirements for licensing vary by state, to include such matters as residency, age, and testing (see Table 1). However, the essential premise of a state-level licensing regime is focused on authorizing a natural person to operate a motor vehicle on public roads and ensuring an understanding of requirements for the safe operation of a vehicle.

Table 1: NE States' Driver Licensing Requirements for Vehicle Operation

	Statutory References	Vehicle Operator Licensing
CT	C.G.S 246A, Sec. 14-36	Citizenship and residency required; license issued to a natural person; minimum age of 16
ME	29-A MRSA§1751	Citizenship and residency required; minimum age of 16
MA	MGL c.90 Sec. 7A; MGL c.90 Sec. 8	Citizenship and residency required; minimum age of 16.5
NH	RSA 263:5-e; RSA 263:14	Citizenship and residency required; minimum age of 16
RI	RI Gen L § 31-10-1; RI Gen L § 31-10-3	Citizenship and residency required; minimum age of 16
VT	23 V.S.A. § 601; 23 V.S.A. § 607	Citizenship and residency required; minimum age of 16

What are the ADS considerations for the NE States' for drivers licenses?

National context: In the ADS focused statutes reviewed outside of the NE states, “driver” or “operator” are defined generally as a licensed person who has control of a vehicle, or a person who causes an ADS to engage. More specific examples include Texas defining human operator and ADS separately to be explicit about who is controlling the vehicle. Florida and Utah also define a remote human operator/driver as a person who has control over a vehicle that they are not physically present in. Several states also require the operator or driver of an ADS to have a valid driver's license. Though there is some variation in the definitions, most states have or are in the process of accommodating legislation to include “control of an ADS-equipped vehicle or ADS” under the definition of operator and driver.

ADS Implications: In an ADS future with driverless vehicle operations, the role of a natural person may in some cases be relegated to simply being a passenger. However, not all ADS-equipped vehicles will be driverless, nor will all driverless vehicles be driverless all the time.



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- *ADS-equipped vehicles with a Level 3 ADS or “conditional driving automation” system* will require a dynamic driving task fallback-ready user (a licensed driver) who is receptive to ADS-issued requests to intervene, as well as to dynamic driving task performance-relevant system failures in other vehicle systems, and will respond appropriately.
- *ADS-equipped vehicles with a Level 4 ADS or “high driving automation” system* do not require a fallback-ready user (licensed driver) to perform dynamic driving task fallback, but these ADS-equipped vehicles are limited to operate only in specific operational design domains (ODD) and would require a licensed driver to operate these vehicles outside its ODD.
- *ADS equipped vehicles with a Level 5 ADS or “full driving automation” system* do not require a fallback-ready user (licensed driver) to perform dynamic driving task fallback, and these ADS-equipped vehicles are not limited to operate only within specific ODDs, meaning a licensed driver would never be required. That said, vehicles equipped with a Level 5 ADS are likely several generations away, if they ever get developed at all.

The varying deployment scenarios ahead for ADS-equipped vehicles, and whether they may necessitate a licensed driver or operator or not, present a dilemma for states as they consider how or if they should regulate “operators” of motor vehicles in an ADS environment. The likely scenario is that for dual-mode vehicle operations, existing driver licensing requirements issued by states will continue. However, if the regulation of ADS technology ultimately becomes a federal responsibility pursuant to the Commerce Clause (see Article 1, § 8, Clause 3) and FMVSS (See 49 CFR 571), as enforced by NHTSA, the role of the state in the licensing of motor vehicle operations, particularly for Level 4 and Level 5 ADS, may be a relic of the past. Also, the elimination of licensing requirement for an “operator” of a driverless vehicle (whether a dual-mode vehicle or an ADS-dedicated vehicle) also makes sense when considering the positive social benefits of allowing access to additional mobility options for those with disabilities, including those who are blind and not able to obtain licenses under the current licensing regime.

New England Considerations: The following are considerations for the NE States around driver licensing requirements in consideration of ADS in vehicles:

- Consideration should be given to modifying state statutes and/or regulations to reflect that a driver can be either a natural person or a non-natural person, and that age requirements are not applicable to non-natural persons.
- Consideration should be given to modifying state statutes and/or regulations to reflect that a prospective operator who is a non-natural person does not need to present a birth certificate to be eligible for a driver’s license.
- Consideration should be given to modifying state statutes and/or regulations to reflect that a prospective operator who is a non-natural person does not need to take a qualifying exam, but rather needs to be approved based on testing and evaluation data. The requirements around such a qualification may be preempted by future NHTSA action.
- Consideration should be given to modifying state statutes and/or regulations to reflect an alternative driver’s license format for ADS, including potential user expectations around systems operations.

Motor Vehicle Registrations



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Each state registers motor vehicles for the purpose of protecting the health, safety, and welfare of its citizens. However, each state has a different approach to the public act of registering motor vehicles for operation on public roads. In the context of a private consumer registering a motor vehicle, there are differences from state to state as shown in Table 2.



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Table 2: Ownership and Residency Requirements for Registration within NE States

	Statutory References	Registration and Titling
CT	C.G.S 246, Sec. 14-12a; C.G.S 246, Sec. 14-12	Identity of owner and owner residency required; required as part of a sale and for all ownership
ME	29-A MRSAS351; 29-A MRSAS406	Identity of owner and owner residency required; required as part of a sale and for all ownership
MA	MGL c.90 Sec. 2	Identity of owner and owner residency required; required as part of a sale and for all ownership
NH	RSA 261:45; RSA 261:32	Identity of owner required; owner residency is not required; required as part of a sale and for all ownership
RI	RI Gen L § 31-3-3; RI Gen L § 31-3-4	Identity of owner and owner residency required; required as part of a sale and for all ownership
VT	23 V.S.A. § 301; 23 V.S.A. § 321	Identity of owner and owner residency required; required as part of a sale and for all ownership

What are the ADS considerations for the NE States for motor vehicle registrations?

National context: In states where ADS-equipped vehicles are not mentioned in licensing and registration statutes, the general vehicle registration and licensing laws are followed. These laws usually require clearly displaying registration plates and having a valid driver’s license. The states that have express licensing and registration laws for ADS-equipped vehicles have different procedures for how an ADS equipped vehicle should obtain a license or registration. These include requiring state departments of motor vehicles to approve testing.

ADS Implications: The issue of vehicle registration is expected to continue to be a state issue no matter what level of automation. States will want to know how many vehicles are operating in their states for planning and asset allocation purposes. However, the issue of registration may be impacted by how ADS-equipped vehicles are utilized. Will vehicles continue to be personally owned or will operations be more focused on subscription and fleet models? What classification category should purpose-built vehicles fall into when they are designed to not have any drivers or operators in the vehicles, but still use public roads? Regardless of ADS use case, states requiring vehicles equipped with an ADS to be registered as an “ADS-equipped vehicle” would enable more opportunities within states and across states for identifying ADS-equipped vehicles operating on public roadways. This in turn could be foundational for helping aid law enforcement responding to incidents involving ADS-equipped vehicles; could help better ensure more complete information or fields be included or standardized on crash report forms to accommodate ADS-operated vehicles; and could ultimately aid in the overall information sharing possibilities of ADS-equipped vehicles within and across states, including with NHTSA to improve the reporting received via the Standing General Order for ADS crash reporting.



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New England Considerations:

Aligning vehicle registration processes and requirements across the New England states will ensure that vehicles operating in multiple states and across state lines are adhering to the same standards, thus increasing or improving possibilities for information sharing, and ultimately helping the NE states achieve the region’s vision for seamless ADS operations. For instance, if the registration regulations in one state require an ADS-equipped vehicle to be equipped with an on-board processor that has been independently tested and validated while a neighboring state does not, there will be a clear regulatory barrier to multi-state use of ADS. As noted throughout this report, it will be important to balance such potential requirements with NHTSA’s existing jurisdiction around vehicle safety. Further, with the freight context, it will be important to consider the jurisdiction of the federal government around interstate commerce. The fees generated from vehicle registrations will also be a consideration. Finally, any vehicle registration process also needs to be nimble enough to account for evolving capabilities of ADS-equipped vehicles, including over the air updates. State regulators collaborating with industry and law enforcement for updating the vehicle registration process is essential for success.

Insurance Requirements

All the NE States except New Hampshire currently have proof of insurance requirements. Moreover, the amount of required insurance varies from state to state. This environment leads to inconsistent laws from state to state, with implications for multi-state travel. For instance, with different amounts of insurance required from state to state, a motor vehicle registered in one state that is involved in a crash in another state may cause financial hardship due to a lesser amount of insurance (see Table 3).

Table 3: Insurance Requirements for Registration within the NE States

Statutory References		Insurance Requirements for Registration
CT	CGS §§ 38a-334 to 38a-343; Sec. 38a-372-1	Proof of insurance must be presented. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$25,000 for property damage, and \$25,000 / \$50,000 per accident for uninsured motorist bodily injury coverage.
ME	29-A MRS Sec. 1605; 29-A MRS Sec. 402	Evidence of insurance required for registration. Minimum requirements: \$50,000 / \$100,000 per accident for bodily injury, and \$25,000 for property damage. Combined single limit of \$125,000 is also acceptable.
MA	MGL c.90, Sec 1A; MGL c.175, Sec 113A	Insurance stamp required on application for registration (or electronic equivalent). Minimum requirements: \$20,000 / \$40,000 bodily injury liability coverage, \$5,000 property damage coverage, \$20,000 / \$40,000 uninsured motorist bodily injury coverage, and \$8,000 personal injury protection.
NH	N/A	Insurance is not required; no minimum requirement



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Statutory References		Insurance Requirements for Registration
RI	RI Gen L § 31-32-19; RI Gen L § 31-32-24	Proof of insurance must be presented. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$25,000 for property damage, and \$25,000 / \$50,000 per accident for uninsured motorist bodily injury coverage.
VT	23 V.S.A. § 800	Self-certification that registrant meets insurance requirements. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$10,000 for property damage liability coverage, and \$50,000 / \$100,000 per accident for uninsured motorist bodily injury coverage.

What are the ADS considerations for the NE States for insurance requirements?

National Context: The issue of insurance continues to be a high-ranking consideration for the deployment of ADS-equipped vehicles. Generally, most states around the country (including some of the NE states) that legislatively allow ADS-equipped vehicle operations on public roadways in some way (even just for testing) often have a \$5 million insurance minimum requirement for ADS-equipped vehicles (see Appendix D – State Level ADS Legislation Outside of New England for more details). Presently, insurance minimums applicable to ADS-equipped vehicles around the country range from whatever existing minimums there are in each state for conventional motor vehicles (e.g. \$25,000 / \$50,000 per accident for bodily injury, \$25,000 for property damage \$25k-\$50k) to as high as \$10 million in at least one state, with several states requiring \$5 million for damages by reason of bodily injury, death, or property damage caused by an ADS-equipped vehicle. One of the stakeholders interviewed as part of this report points out that the USDOT sets a statistical value of human life at \$11.6 million for 2020, with yearly increases³⁰. This stakeholder contends that such an amount should be taken into consideration when setting minimum insurance minimum requirements, which should be per person, not per incident based.

ADS Implications: As more ADS-equipped vehicles deploy onto public roads, finding the right balance for insurance is important. Considerations around insurance for ADS-equipped vehicles may involve a variety of factors, including but not limited to the type of ADS use case or intended use of the ADS-equipped vehicle, the vehicle class or size and weight of the ADS-equipped vehicle, the responsibility or potential level of automation and potential human role in driving operations, whether the vehicle is an ADS-dedicated vehicle or dual-purpose vehicle, whether or not self-insurance and surety bonds should be permitted as a form of insurance and if so for whom. Further, there is a danger of inadvertently imposing insurance requirements that are too low or limited to not ensure a duty of care for the safety of all users (especially vulnerable users) operating on public roadways, especially in the nearer term as the technology for ADS-equipped vehicles is still relatively new and in development. From a regional

³⁰ Koopman, P., & Widen, W. H. (2022, February 1). *Five Principles for Regulation of Highly Automated Vehicles. Safe Autonomy*. <https://safeautonomy.blogspot.com/2022/02/five-principles-for-regulation-of.html>



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deployment perspective there is also a risk of inadvertently imposing insurance requirements that are too high that may deter industry from deploying ADS-equipped vehicles in the New England region, especially in the nearer-term.

New England Considerations: The importance of consistent and uniform insurance requirements can be highlighted by discussing the type of insurance to be required on an ADS-equipped vehicle with consideration of its proposed use. During the early stage of deployment of ADS, there is also potential for risk-sharing models between the public and private sector such as approaches known as owner-controlled insurance program or contractor controlled insurance program which have both sides contributing towards insurance coverage. If each state legislature takes its own approach, the lack of harmony creates the same issues as the current automobile insurance regime in New England.

Safety and Emission Inspection Requirements

Each NE State has some safety and emissions inspection requirements, but they vary (see Table 4). Only Connecticut does not require safety inspections; all other states require annual or biennial safety inspections. Emissions tests vary from state to state along the lines of the age of the vehicle to be inspected.

Table 4: NE States' Safety and Emissions Inspection Requirements by State

Statutory References		Safety and Emissions Inspection Requirements
CT	C.G.S 246A, Sec. 14-164c	Safety inspection only required for certain vehicles. Most passenger vehicles exempt. Emissions test biennially. Exemptions for vehicles less than 4 years old and more than 25 years old
ME	29-A MRSA§1751	Safety inspection is required once a year; vehicles registered in Cumberland County require an emissions test.
MA	MGL c.90 Sec. 7A	Safety inspection is required once a year; vehicles under 15 years old require an emissions test.
NH	RSA 21-P:14, V(a); RSA 266:59-b IV; CHAPTER Saf-C 3200	Safety inspection is required once a year; vehicles under 20 years old require an emissions test.
RI	RI Gen L § 31-38-3; 280-30-15 R.I. Code R. § 3.3	Safety inspection is required biennially; emissions test is required biennially.
VT	23 V.S.A. § 1222	Safety inspection is required once a year; emissions test is required once a year.

What are the ADS considerations for the NE States for safety and emissions inspections?

National context: Currently, most states with ADS operations require manufacturers of ADS-equipped vehicles to self-certify and comply with federal laws and FMVSS (this is consistent with model legislation from the Autonomous Vehicle Industry Association, formerly known as the Self-Driving Coalition for Safer Streets). Generally, the ADS statutes of other states allow manufacturers to obtain an exemption in lieu of FMVSS compliance. A couple of states have put together task forces to research ADS and determine safety standards to recommend to lawmakers.



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In the case of the NE States, there is variation in how to address safety in the context of ADS-equipped vehicles. Some states require a safety certification prior to testing or using the vehicle. The safety certification programs vary, with some requiring that FMVSS compliance and others requiring a more in-depth plan.

One popular national trend is requiring a plan for interaction with emergency responders, also known as law enforcement interaction plan. However, plans vary greatly with one state requiring that different municipalities must preapprove testing, another state requiring geographic boundaries, and another adding the USDOT's voluntary safety self-assessment. The variation in safety requirements indicates that each state is approaching safety verification differently in the absence of federal safety standards.

ADS Implications: Looking forward, safety inspections are already evolving with the integration of electric vehicles into the fleet since electric vehicles do not require emissions inspections. Whether or not states will continue to see a need to inspect vehicles that are electric (no longer emissions concerns) or have ADS, or rely more on the verifications of manufacturers and regulations by NHTSA as part of the safety verification process, will be an important consideration moving forward. States may still want to confirm a vehicle has the most up to date software with knowledge of all existing traffic laws within a state, but that will likely require investment in new equipment and workforce training. Further, whether or not this conflicts with NHTSA jurisdiction remains an untested legal issue.

New England Considerations: The need for consistent safety inspection regulations from state to state reflects different policy preferences on the part of each state. As ADS technology advances, some states are likely to have greater hesitancy in trusting the technology than others. Given the technical complexity of ADS-equipped vehicles, a patchwork approach will cause great challenges for manufacturers trying to field vehicles that meet standards for the NE States, as well as the rest of the United States and the world. Accordingly, this issue warrants investment in public / private coordination and cooperation. This is anticipated to become less of an issue as federal ADS safety standards are adopted and more safety data is collected and evaluated from ADS operations.

Commercial Vehicle and Fleet Considerations

The registration regime becomes more complex when registering a commercial vehicle. Commercial vehicles, which may be operated by private persons or by corporations as part of a commercial fleet on an intrastate basis, have a different set of regulations to satisfy (see Table 5). For instance, the FMCSA may have concurrent jurisdiction over the vehicle and may require the owner to obtain a USDOT number. In addition, commercial vehicles require business insurance and distinctive commercial plates.



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Table 5: Insurance Requirements for Commercial Registration within NE States

Statutory References		Insurance Requirements for Commercial Registration
CT	CGS §§ 38a-334 to 38a-343; Sec. 38a-372-1	Proof of insurance must be presented. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$25,000 for property damage, and \$25,000 / \$50,000 per accident for uninsured motorist bodily injury coverage.
ME	29-A MRS Sec. 1605; 29-A MRS Sec. 402	Evidence of insurance required for registration. Minimum requirements: \$50,000 / \$100,000 per accident for bodily injury, and \$25,000 for property damage. Combined single limit of \$125,000 is also acceptable.
MA	MGL c.90, Sec 1A; MGL c.175, Sec 113A	Insurance stamp required on application for registration (or electronic equivalent). Minimum requirements: \$20,000 / \$40,000 bodily injury liability coverage, \$5,000 property damage coverage, \$20,000 / \$40,000 uninsured motorist bodily injury coverage, and \$8,000 personal injury protection.
NH	N/A	Insurance is not required; no minimum requirement.
RI	RI Gen L § 31-32-19; RI Gen L § 31-32-24	Proof of insurance must be presented. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$25,000 for property damage, and \$25,000 / \$50,000 per accident for uninsured motorist bodily injury coverage.
VT	23 V.S.A. § 800	Self-certification that registrant meets insurance requirements. Minimum requirements: \$25,000 / \$50,000 per accident for bodily injury, \$10,000 for property damage liability coverage, and \$50,000 / \$100,000 per accident for uninsured motorist bodily injury coverage.

What are the ADS considerations for the NE States for commercial vehicle and fleet considerations?

National context: Fleet vehicles providing on-demand passenger services and goods delivery present interesting oversight considerations in the ADS context. Fleet vehicles operating in interstate commerce are regulated by the International Registration Plan (IRP). The IRP is an interstate agreement providing for registration reciprocity among member jurisdictions across the U.S. and Canada. The IRP requires that only a license plate and cab card are issued for each vehicle in a fleet by the base jurisdiction. However, the IRP provides for the payment of apportioned registration fees based on the proportion of miles driven in all jurisdictions by the vehicle fleet.



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A fleet vehicle subject to the IRP may be operated both between member jurisdictions and within any single jurisdiction where it is registered. The IRP applies to a wide range of commercial fleets, including moving companies (U-Haul), parcel companies (FedEx), and passenger buses (Greyhound). Notably, it also applies to rental car companies. All New England states are member jurisdictions of the IRP.

ADS Implications: Consideration of commercial and fleet registration regimes is important to formulating approaches to the registration of ADS-equipped vehicles. This is because it is widely anticipated that many ADS-equipped vehicles may operate as part of large fleets of commercially owned vehicles providing on-demand ridehailing or goods movement. While the prospect of individual private ownership certainly exists in the long-term, in the short-term and medium-term, it is much more likely that freight, mobility on demand, or shared mobility will be the dominant near term models for the use of ADS-equipped vehicles. While several factors may contribute towards why certain ADS use cases like freight, mobility on demand, or shared use mobility may outpace individual private ownership and other ADS use cases to market, the main drivers for predicting market readiness come down to the business case, the complexity of the use case, and whether or not or when the status or trajectory of ADS technologies is capable of meeting both.

New England Considerations: Commercial and fleet registration regimes may present a useful approach to considering how ADS-equipped vehicles are regulated and registered. A fleet registration approach offers the potential additional benefit of using the IRP framework (or a similar compact) to manage such matters as safety inspections, crash reporting, and insurance requirements. Coordinating fleet regulations across the NE states in such a manner provides a potential means of targeting the largest share of ADS-equipped vehicles without states relinquishing significant sovereignty over the registration process for the average citizen. Moreover, regulations governing TNC's may also provide a regulatory vehicle for ADS operations covering on-demand ridehailing.

Crash Reporting

The crash reporting laws, regulations, and policies of the six New England states represent another area of opportunity where more coordination and harmonization between or among the states is needed to improve roadway transportation safety and to better prepare for and achieve the NE States' vision for seamless ADS operations across the region and beyond. Table 6 below references the existing minimum legal or statutory requirements for crash reporting in each NE State.

Today, while basic statutory similarities exist between the NE States that require the completion of crash reports for roadway traffic crashes resulting in fatality, injury, or property damage, nuanced statutory differences between or among the states' approaches towards crash reporting does exist. For example, all NE states except Vermont maintain a minimum statutory threshold of \$1,000 in property damage to trigger crash reporting requirements (Vermont has a \$3,000 statutory threshold). Also, all NE states except Connecticut put the statutory responsibility on the driver, operator, or owner of the motor vehicle(s) involved in the crash to report to authorities to complete and submit required crash report(s). Connecticut statutes put the responsibility for crash report completion squarely on the investigating law enforcement officer (if any) and remain silent on whether the driver, operator, or owner involved in a crash needs to contact law enforcement, regulators, or other parties involved in a crash. In addition, all NE States except Maine statutorily require crash reports get submitted to a state transportation agency (Department of



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Transportation, Department of Motor Vehicles, Registry of Motor Vehicles, etc.) to manage and maintain the crash report records. Maine law requires the state police to receive and maintain crash report records. Beyond the statutory differences, other policy or practice differences between the NE states also exist including differences in some of the data elements and attributes collected on the required crash reports as well as the percentage of alignment each state has towards following national standards and best practices for documenting crashes and completing crash reports.

Table 6: Crash Reporting

Statutory References		Crash Reporting
CT	C.G.S 246, Sec. 14-108a	Law enforcement must complete a uniform crash report for any investigated crash causing death or injury, or in which damage to the property of any one individual, including the operator, in excess of \$1,000, is sustained. Law enforcement must submit a copy of the uniform crash report to the Commissioner of Transportation within five (5) days of completing the investigation.
ME	29-A MRSA§2251	Must report when the crash is unintentional, occurs on a public way, with bodily injury or death to a person or apparent property damage of \$1,000 or more. Reported to State Police, or Sheriff or Deputy Sheriff of location of accident, or to police in the municipality of the accident.
MA	MGL c.90 Sec. 26	Must report any crash causing death, personal injury, or combined vehicle/property damage in excess of \$1,000. Reported to Registry of Motor Vehicles and police department having jurisdiction.
NH	RSA 264:25	Must report any crash causing death, personal injury, or combined vehicle/property damage in excess of \$1,000. Reported to Department of Motor Vehicles and local police.
RI	RI Gen L § 31-26-6	Must report any crash causing death, personal injury, or combined vehicle/property damage in excess of \$1,000. Reported to Department of Motor Vehicles.
VT	23 V.S.A. § 1129	Must report any crash resulting in injury or total property damage of at least \$3,000. Reported to Department of Motor Vehicles.

What are the ADS considerations for the NE States around crash reporting?

National context: According to NHTSA³¹, a “crash” means “any physical impact between a vehicle and another road user (vehicle, pedestrian, cyclist, etc.) or property that results or allegedly results in any property damage, injury, or fatality.” Two noteworthy components about this definition are that (1) unlike most states, NHTSA does not include a minimum property damage threshold for what constitutes a property damage crash leaving it open to any collision being defined as a crash and thus potentially reportable, and (2) NHTSA expressly includes the term “allegedly” within its crash definition to more broadly include a subject vehicle’s contribution (i.e. steering, braking, acceleration, or other operational performance) to another vehicle’s physical impact with another road user or property.

³¹ NHTSA Incident Reporting for ADS. https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-08/First_Amended_SGO_2021_01_Final.pdf



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In many jurisdictions across New England and across the country, crash reports or summaries of crash reports are considered public record and can be made available to others upon request or by completing a public records request. Crash reports are commonly used by insurance companies to further investigate, negotiate, and settle insurance claims. Crash reports may also be used in court cases, subject to rules of evidence. Whether a crash report is admissible or not in court, copies of crash reports do often in every state get submitted to the state's transportation agency responsible for managing the state transportation system and overseeing transportation safety. The crash reports provide statistics for the state transportation agencies to make informed transportation safety decisions and develop transportation safety plans, including federally required transportation safety plans to address identified transportation safety problems.

The ANSI D16 is the American National Standard which identifies, defines, and classifies the specific terminology associated with motor vehicle traffic crashes. Additionally, Model Minimum Uniform Crash Criteria (MMUCC) guidelines cooperatively developed and updated by NHTSA, the Governor's Highway Safety Association, states, and other safety advocates identify a voluntary minimum set of motor vehicle crash data elements and their attributes that states should consider collecting and including in their crash reports and in their state crash data system. The MMUCC conveys the minimum data elements using terminology from the ANSI D16 that a state's crash report form should have on it for nationally common data collection.

Refinement of the MMUCC guidelines are ongoing. As presented by NHTSA in August 2021, overall national alignment to MMUCC is just under 50%, with individual state alignment to MMUCC ranging from 21% - 83%. To increase individual state and national alignment for the next edition of MMUCC (6th Edition that NHTSA expects will get published in 2024), NHTSA will be conducting a comprehensive evaluation of the MMUCC program that will include:

- Developing and conducting a study on the feasibility of the MMUCC data elements and attributes
- Addressing opportunities for improvement discovered through the study
- Identifying opportunities to better align with what (and how) states are collecting data
- Identifying if there is a need for standardized training

The process NHTSA is taking to hear from states and other stakeholders to improve the 6th MMUCC Edition and increase national alignment towards MMUCC creates a great opportunity for states, including the NE states, to get engaged with NHTSA and play a proactive role towards shaping the future of crash reporting standards and best practices across the country, which will include better crash reporting standards and guidelines for ADS-equipped vehicle related crashes. Presently, the current version (5th Edition) of MMUCC that was published in 2017 recommends states include on their crash report form a dynamic element for ADAS and ADS that includes three attributes: (1) whether there is an "Automation System or Systems in Vehicle" (e.g. ADAS, ADS), (2) specifically what "Automation System Levels in Vehicle" (SAE Levels 1-5), and (3) what "Automation Systems Levels Engaged at Time of Crash."

According to NHTSA, in August 2021, only 4.4% of States are completely or partially aligned with the MMUCC 5 dynamic element for ADAS and ADS on state crash reports. Various improvements and refinements to the dynamic ADAS and ADS element and attributes are being considered as part of the MMUCC 6 update. Ultimately, whatever gets included for ADAS and ADS in MMUCC 6 should also be



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coordinated with efforts in states to update ADAS and ADS information as part of vehicle registration and renewals so that a baseline of ADAS and ADS information gets shared with investigating law enforcement and insurance upon crash to assist law enforcement with understanding how to properly investigate or respond to ADAS-equipped and ADS-equipped vehicle crashes.

Further, with NHTSA's Standing General Order for incident reporting for ADS, NHTSA obtains notification of real-world crashes associated with ADS and Level 2 ADAS vehicles from manufacturers and operators. NHTSA anticipates using this information to investigate crashes that raise safety concerns about ADS and Level 2 ADAS technologies. NHTSA will also be able to use this information to determine whether any enforcement actions, including recalls, are warranted. Prior to the implementation of the Standing General Order, NHTSA's sources of timely crash notifications related to ADS were limited and generally inconsistent.

Outside of New England and within the context of law enforcement coordination around ADS, most states that permit ADS operations on public roadways (even if just for testing) have laws that require ADS operators to coordinate with local law enforcement but prohibit local government and political subdivisions from regulating ADS. There is some variation with some states requiring interaction with law enforcement in the case of a crash and others requiring a law enforcement interaction plan prior to testing. In New England, many states require ADS-equipped vehicles to comply with traffic and motor vehicle safety laws and have first responder interaction plans. Also, there are not preemptive laws prohibiting regulation of ADS by local governments at this time.

ADS Implications: In the ADS context, due to the novelty and potential of the technology, there is significant public interest and attention being paid to the safety of ADS-equipped vehicles. As a result, there is a strong desire among state and local governments that allow testing and deployment of ADS-equipped vehicles on public roads and among federal safety regulators to closely track vehicle performance to identify any technological glitches and patterns of malfunction. However, getting significant access to ADS data is very complicated, oftentimes requiring non-disclosure agreements or not being accessible given concerns that ADS manufacturers and providers have around proprietary information and the context of such reporting from an investment and consumer trust perspective.

There are also several policy considerations at stake. Should crash reporting for ADS-equipped vehicles require automatic reporting, capitalizing on the inherent technology in use? Should these reports be protected as confidential to prevent unfair competitive advantages and disadvantages? How does such information impact insurance rates and coverage? This is an issue that will require continued evaluation and tracking, especially with NHTSA now requesting incident reporting through its standing general order.

The greatest consideration for consistent and uniform data requirements is the potential for the use of crash data in automatic reporting and the potential for that data to be shared across state jurisdictions. If automatic reporting becomes mandatory, manufacturers will want one standard to be built into the vehicle, rather than the standards of six individual states, or 50 states. This creates another opportunity for NHTSA and states to consider as part of the next and future MMUCC updates.

New England Considerations: The NE States have the opportunity to align new laws, regulations, policies, and practices in each state to address the complex nature of the crash records question around



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ADS operation and across modes and use cases. This includes the important considerations in balancing the public interest in disclosing safety information versus protecting confidential and proprietary information related to vehicle systems. Ensuring greater consistency of ADS information and updating fields included on crash reports across the NE states, and nationally, will ultimately ensure better and more consistent data for ADS-related crashes, which will help NHTSA, states and industry improve ADS safety. Any broadly sharable data will likely need to be aggregated to a prescribed level to ameliorate proprietary and privacy concerns as is being done for geo-location data collected from cell phones that is used for transportation planning.

Additional issues that need to be considered from a policy, legal and regulatory perspective for ADS-Equipped Vehicles?

Development and Enforcement of Traffic Laws

As enforcement via digital means, including cameras and license plate readers, is anticipated to grow, particularly to address complicated issues like curb management, it will be necessary to make sure existing laws allow for the issuance of violations via electronic and likely paperless means.

The development and enforcement of traffic laws is an area of ADS operations that holds a lot of promise, and yet has been elusive to date. Many involved in the policymaking domain have suggested that ADS-equipped vehicles will be pre-programmed to follow motor vehicle laws to a fault. In contrast, other policy makers wonder how motor vehicle laws will be enforced if there is no operator to recognize that the ADS-equipped vehicle has been signaled to stop for a violation. These two lines of thought reflect divergent views on the challenges of ADS-equipped vehicles and traffic enforcement.

Traffic enforcement against ADS-equipped vehicles may be challenging and training for law enforcement will be needed given there may be no “operator” to pull the vehicle over and issue a citation against. As an example of how such a scenario may play out, will a law enforcement officer be able to put an electronic “hold” on the ADS until the traffic stop is completed? Addressing this scenario likely involves a combination of technology and a new motor vehicle citation regime. State administrative agencies will need to adopt regulations to administer these new enforcement regimes. Further, NHTSA will likely need to adopt federal regulations pursuant to its FMVSS authority to mandate uniform technological systems for these approaches.

The issuing of the citation is less technologically difficult. If the cognizant authorities in the home state have adopted a definition of operator that includes ADS as operators, the law enforcement officer can issue the citation electronically and release the “hold” on the ADS-equipped vehicle. These citations would be transmitted electronically to the cognizant authorities, and the owner of the vehicle would be informed of the violation and directed to pay the fine.



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Over the long-term, there may be considerations around whether traffic speeds are nationalized to allow for easier programming of ADS-equipped vehicles. However, such an approach would likely receive considerable objections.

Information Sharing

Few states outside of New England have data and privacy laws, however the number is expected to grow, and some states have legislation about the data storage and sharing capacities of ADS-equipped vehicles. A few states require information sharing in the event of a crash. One state notes ADS-equipped vehicles store collision data and the state specifies how that data should be stored. Some states have laws requiring disclosure to a consumer about the information being collected. Other states have laws specific to the collection of biometric data, which applies to ADS-equipped vehicles that use facial scans and similar techniques to collect data. Notably, California, Virginia, and Colorado all have privacy laws that include biometric indicators and geolocation in the definition of personal information.

In New England within the context of ADS, data remains mostly unaddressed, with only Rhode Island and Vermont having guidance for information sharing. These states have different laws with Rhode Island requiring information sharing in the event of a crash and Vermont requiring information sharing practices related to ADS testing.

Information sharing policies are important for consumer transparency, equity, and to avoid liability. Recently in Illinois, plaintiffs were able to bring a class action against Subaru for collecting their biometric data without consumer consent³². More states are creating privacy and data sharing laws and the NE States will want to consider whether laws around data sharing, privacy, and cybersecurity are warranted for ADS testing, deployment, and full scale commercial operations.

Open Records Laws

One of the concerns limiting information sharing between the public and private sector around ADS testing and deployment is the inconsistent approach to open records laws across the country. Open records laws are important for ensuring transparency when projects are undertaken by public entities using public funds. However, due to the ongoing investment into the development of ADS-equipped vehicles and early development stages of the technology, there are important considerations around protecting trade secrets and proprietary information for the ADS technology, market strategy, and data analysis and use. The NE States also take varying approaches to requirements around open records laws, including when exemptions are recognized.

In **Connecticut**, a public record is defined as recorded data in any format related to the conduct of the public's business and prepared, owned, used, received, or retained by a public agency. Connecticut allows anyone to request public records without stating their purpose for requests. Connecticut does provide an exemption for trade secrets.

³² Giron v. Subaru, No. 2021CH05971 (Circuit Court of Cook County, Illinois). https://s3.amazonaws.com/jnswire/jns-media/1f/1e/11645550/giron_v_subaru.pdf



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In **Maine**, public records are defined as any written, printed, graphic, or electronic data compilation possessed by the state or its agent from which information can be obtained and is prepared for a transaction of public or governmental business. Maine provides a number of exemptions around confidential or personally identifying information.

In **Massachusetts**, a public record is defined broadly as any record made or received by a government entity or employee unless expressly exempted by a statute or common law. Massachusetts does provide an exemption for trade secrets, commercial, or financial information voluntarily provided to an agency for use in developing governmental policy and upon a promise of confidentiality, but this does not apply to information received as part of a government contract or condition or receiving a government benefit.

In **New Hampshire**, public records are defined as any information in any form held or produced by a public body in furtherance of its official function. New Hampshire does not provide an express exemption for trade secrets.

In **Rhode Island**, public records are considered all documents in any form that relate to the business of a government agency. Rhode Island does recognize exemptions for trade secrets and commercial or financial information that is determined to be privileged or confidential.

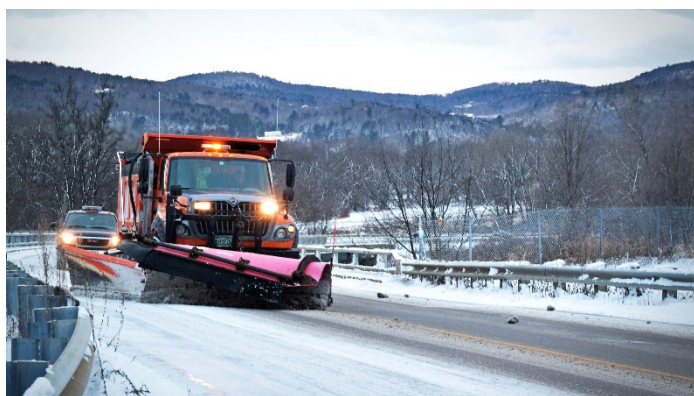


Image Source: Vermont Agency of Transportation

In **Vermont**, public records include documents in any form that are produced or acquired during public agency business. Vermont provides an exception for trade secrets, which are defined as confidential business records or information which a valid commercial concern warrants keeping secret.

Through its testing guidelines³³, Vermont recognizes the issues around open records laws and has developed the following process:

“The Agency of Transportation shall immediately notify the Applicant of any request or demand for information of the Applicant, so that the Applicant may seek an appropriate protective order or otherwise

³³ Vermont Automated Vehicle Testing Permit, Guidance and Application.
<https://vtrans.vermont.gov/sites/aot/files/planning/documents/planning/VT%20AV%20Testing%20Guidance%20and%20Application101520.pdf>



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defend any right it may have to maintain the confidentiality of its information under applicable State law. The Applicant shall have only three (3) business days from the date of the AOT's receipt of any such records request to seek a protective order or otherwise defend its information. Again, the Agency is obligated to review the responsive records independently. Should the Agency deem any information to be exempt from disclosure under the PRA, the Agency will not release such information to the public under the PRA. However, nonexempt information will be released unless the Applicant files for an appropriate protective order."

The guidance goes on to provide that:

"The Applicant may include an optional Confidential Information Attachment to the Automated Vehicle Testing Permit that discloses confidential information that the Applicant determines is necessary to adequately address a requirement in the permit application. Any documents included with the Attachment should be clearly marked as "Confidential Information" on each page by the Applicant. With the exception of the Confidential Information Attachment, the Automated Vehicle Testing Permit Application will not be considered Confidential Information by the Agency and will be made available to the public by publishing it on a website or by other means. In the event a public records request is made for the Confidential Information Attachment, the General PRA Process described above will apply."

The NE States should coordinate around exemptions related to information gathered for the purposes of supporting and evaluating ADS testing. In the short-term, this issue is important for public and private collaboration around potential safety concerns. However, as safety standards are implemented by NHTSA, there will be less pressure on information sharing from a safety perspective, but there will be interests in standardizing information sharing around operations to assist with long-range transportation planning and modeling by states and local governments. State DOT interest will also come in the form of law enforcement coordination as discussed above. Coordinating around this issue now and developing a multi-state approach will reduce barriers for ADS testing and deployment.



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Image Source: Courtesy of Maine Department of Transportation



4.0 Key Project Findings and Recommendations

This section of the report includes the key findings and recommendations for the NE States to consider. Each of these findings considers the different phases of the Project, including regular engagement with the technical committee, stakeholder engagement, and the policy, legal, and regulatory analysis. Before finalization, the recommendations were also shared for comment and feedback with stakeholders that participated in the outreach portion of the Project, including both industry and national organizations.

The goal of the key findings and recommendations is to inform future ADS policy, legal, and regulatory coordination for the NE States. A draft memorandum of understanding (“MOU”) is also included in this Section 4 that is focused on implementing steps for continued coordinated actions by the NE States around ADS testing and deployment in the region. The MOU seeks to provide a foundation for coordinated action among the NE States to continue the work that has been done by the region to date, and to focus efforts on the priority recommendations discussed below. The MOU is intended to be executed by all the NE States at the secretary or commissioner level at each state’s DOT.

<p>ESTABLISHING ADS POLICIES, LAWS, AND REGULATIONS</p> <p>Coordinate around the passage of ADS legislation and consider when legislation is warranted and a productive use of resources to advance the safe testing and deployment of ADS in the region. A priority focus is incorporating the concept that a “person” shall include a non-human in the context of ADS-equipped vehicles.</p>	<p>DATA</p> <p>Support the standardization of ADS focused data exchange between the public sector and industry, including a more consistent approach to protecting data that may be considered proprietary, confidential, or trade secrets.</p>	
<p>COORDINATION</p> <p>Develop a multi-state regulatory approach to ADS testing and deployment that is deliberate around different use cases. Proposed tools include a Memorandum of Understanding signed by each state and exploring the creation of an ADS regional entity to coordinate and streamline processes for ADS deployment.</p>	<p>OUTREACH AND EDUCATION</p> <p>Proactively educate the public and stakeholders about ADS technology and its potential benefits. Outreach should focus on the capabilities for different types of ADS-equipped vehicles through use cases and expected responsibilities for human monitoring, if any.</p>	<p>PILOTS/DEPLOYMENTS</p> <p>Draft and approve a regionally focused ADS operations permit prioritizing on-demand ridehailing services, commercial freight, and purpose-built vehicles for local goods movement and delivery.</p>

Below is a condensed summary of the key findings by topic area. This is followed by a detailed description of the identified key findings and recommendations from all phases of the Project. They are organized and color coded by topic area and are further broken down by recommended near-term (next 1-2 years) and mid-term (next 3-5 years) action items.



4.1 Establishing ADS Policies, Laws, and Regulations

Findings

- Factors to Consider for ADS Integration - Evaluating ADS technologies based on a variety of factors such as modes of transportation, use cases, operational design domains, functional design specifications, and the extent upon which a human driver may or may not be expected to stay engaged and take over, or operate, an ADS-equipped vehicle are important for states to consider when identifying statutory and regulatory opportunities, and barriers, to the deployment of ADS.
- Role of Existing Governance Structures - Existing policy, legal, and regulatory governance structures will likely continue to have a dominant role in the regulation of ADS-equipped vehicles. However, when dealing with vehicles equipped with a Level 4 (High Driving Automation) or Level 5 (Full Driving Automation) ADS, there may be challenges to existing regulatory structures for vehicle operations that warrant proactive planning and consideration.
- Cooperative Path Towards Commercial Deployment – Both the public sector and industry reasonably desire a safe, efficient, and clear path towards ADS full scale commercial deployment. However, more consistent and collaborative solutions between government, at all levels, and industry is needed around issues like safety, data collection and sharing, and infrastructure considerations. Collaboratively addressing these issues presents an important and essential opportunity between government and industry to ensure public safety, and reassure public trust and adoption for ADS technologies, including supporting informed decision-making by lawmakers.
- Avoiding Unnecessary Requirements - The path forward from the perspective of industry considers the government not adding unreasonable, unnecessary, or duplicative layers to the deployment process, including being mindful of regulatory processes already in place at the federal level. At the same time, the path forward from the government perspective entails industry being open to providing government with safety metrics or data access, based on reasonable and focused requests, determined necessary to ensure public safety, reassure public trust, supporting transportation planning, and resource allocation. Government will need to be mindful of not compromising the proprietary integrity of ADS industry players.
- Role of Federal Government to Oversee ADS - Broad statutory definitions give NHTSA extensive authority to issue safety standards for vehicles originally manufactured with ADS, and/or equipment that enables vehicle operations using ADS. While NHTSA's jurisdiction to regulate vehicles with ADS appears clear, federal preemption over existing standards is normally predicated upon the implementation of federal standards, which has yet to be done by NHTSA for ADS. This is seen as one of the reasons states are seeking to pass laws and regulations.
- Role of State Governments to Oversee ADS Operations - Although the design and construction of the ADS itself within a vehicle is a federal responsibility, state governments do and can have a role to legislate, regulate, and issue polices for many other aspects of ADS operations on public roadways. For now, this includes, but is not limited to: licensing and training human drivers; registering and titling ADS-equipped vehicles; setting of insurance rules on limits and liabilities; creating requirements for ADS-equipped vehicle inspection; coordinating information sharing



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requirements; and, developing responsibilities and processes for testing and deploying ADS technologies on public roadways.

- Considerations for Passing State ADS Legislation – Each state should carefully consider whether and the extent upon which the passage of comprehensive state legislation and/or regulation is needed at this time to support more seamless approaches to testing and deployment of ADS-equipped vehicles when considering: 1) the ADS industry is relatively still in the development phase of ADS technologies, which are constantly evolving; and, 2) the legislative process typically lags behind technology development, and laws can quickly become obsolete as technology changes or advances. Additionally, the federal government will continue to regulate the design and construction of ADS installed in vehicles under its jurisdiction over vehicle safety. It is anticipated that any state-specific laws or regulations interpreted to deal with the design or construction of the ADS itself within vehicles will likely be subject to federal preemption.
- Right Sizing State Approach for ADS Oversight - While ADS technologies continue to evolve, limited or targeted policy, legal, or regulatory actions may be the prudent governmental approach for states to take at this time. This would include actions focused on coordinating with industry and other states to develop seamless ADS testing requirements on public roadways and to develop more uniform approaches or pathways towards deployment that ensures public safety, but also supports innovation. Developing a coordination-focused agreement process or policies at the executive level between states is recommended and could include, but not be limited to, amending existing compacts related to vehicle operation across state lines.
- Coordination with Freight Industry - The freight industry has a long history of being regulated and working with federal agencies on data reporting and safety compliance, making it more familiar to government regulation than ADS companies focused on introducing new passenger subscription services or localized goods delivery that is arguably not focused on interstate commerce. States can work with freight industry stakeholders to understand their varying perspectives on regulation while distilling regulatory needs to those that are essential and clear for ADS operations, including focus on law enforcement coordination and platooning. Opportunities to merge regulations with the likely emergence of “hub” delivery models are ripe.
- Insurance for ADS-equipped Vehicles - The ADS industry perspective regarding the topic of insurance is that existing liability and insurance laws for motor vehicles in states are currently flexible enough to apply to ADS-equipped vehicles. Other stakeholder perspectives captured as part of this Project indicate that additional insurance requirements are warranted at this early deployment stage, especially higher insurance minimums to properly accommodate new perceived risks that come with ADS operations, especially in mixed operational environments with human and ADS operated vehicles. The differing insurance perspectives by stakeholders, including the differing insurance approaches by states will require coordination with a focus on new possible risks and liabilities stemming from ADS-equipped vehicles as discussed in Section 3. Regardless of what insurance rules and minimums may be, the regulation of insurance requirements for ADS-equipped vehicles will likely remain a state responsibility. While the ADS industry does not see the need for complete uniformity for insurance rules given that states now have differing insurance approaches, there seems to be broad consensus across the different stakeholder groups that greater consistency for adopting ADS insurance approaches across state lines supports better harmonization and increased adoption of ADS technologies nationally.



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Insurance to accommodate ADS is also a candidate for new collaborative-focused risk sharing models between the public and private sector.

Recommendations

Licensing, registration, and insurance are key state responsibilities that states should focus on updating to accommodate ADS-equipped vehicles in the short-term and medium-term. Although the state transportation agencies in each state may not have direct oversight over each of these issues, it is recommended that the state transportation agencies (e.g. State DOTs) in each state play an active role to help coordinate these efforts with the respective agencies, Governor's Office, and legislature in each state. Having one central agency for industry and other stakeholder groups to coordinate with regarding these matters is a request from industry and a best practice recommendation from USDOT³⁴.

Short-Term (1-2 years)

- The NE States should develop a common set of definitions for “operator” and/or “driver” in the context of ADS-equipped vehicles used for both testing and deployment. Consideration should be given to modifying existing state statutes and regulations, and/or adding new ones to reflect that an operator or driver can be either a natural person or a non-natural person, including corporate entities, and that age, testing, and other existing licensing requirements are not applicable to non-natural persons.
- The six NE states should develop a common registration regime for testing and deployment focused on information gathering, operational awareness, law enforcement education, and information sharing between the ADS operator and states. The common registration regime for the NE states should be informed by the different evolving use cases and transportation modes being contemplated and deployed for ADS operations.
- The NE states should develop a uniform approach to law enforcement coordination. Such coordination should be focused on the operational design domains for ADS and include applicable state and local level authorities.
- The NE states should work towards aligning insurance requirements for ADS testing and deployment. This could include considerations around use cases for ADS and new tensions that models like passenger subscription services and local goods delivery may place on existing insurance regimes. Rather than establishing insurance limits based on arbitrary numbers, minimums should be established that are connected to ensuring the safety of the motoring public while avoiding burdensome requirements that are not connected to risk from operations and unnecessarily impact ADS-equipped vehicles.
- With a focus on risk mitigation and to promote testing in the New England region, NE states can explore pooled insurance mechanisms to support testing and deployment within the region. Existing models to look at include the Owner-Controlled Insurance Program that is used for large public works projects. The goal of such an approach would be to address the potential increased costs for insurance in the New England region due to challenging operational domains and weather, in addition to demonstrating to potential ADS operator partners that the region

³⁴ U.S. Department of Transportation. (2017). *Automated Driving Systems: A Vision for Safety 2.0*. U.S. Department of Transportation. https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13069a-ads2.0_090617_v9a_tag.pdf



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understands the benefits of risk sharing to promote the potential positive benefits of ADS for the New England region.

Medium-term (3-5 years)

- Develop a new regulatory approach for the licensing or certification of human operators within the context of ADS-equipped vehicles. This regulatory approach will need to consider the different levels of automation of associated driver or operator responsibilities and the anticipated human interactions with the ADS. State and regional coordination with industry and federal government is essential to develop this approach.
 - For Level 3 - Conditional Automation, the existing driver licensing regime is anticipated to still be needed due to the driver or operator still needing to be ready to take back control of the vehicle at all times. However, the NE States can coordinate around developing a driver education program and updating driving tests that incorporate learning and testing for operation of ADS and interaction with ADS-equipped vehicles. The focus of education applies to all levels discussed below.
 - For Level 4 – High Driving Automation, a licensed driver is anticipated to only be required when a vehicle is operating outside of the designated operational design domain. This presents an opportunity to rethink when licenses should be required, especially if fleets of carsharing vehicles with Level 4 ADS are designated to operate only within an approved operational design domain, also known as ADS-designated vehicles. Some states outside of the New England region take the approach that the ADS is considered to be licensed to operate the vehicle and a licensed driver is not required to be present in the vehicle when the ADS is engaged.
 - For Level 5 – Full Driving Automation, a licensed driver is not anticipated to be needed. However, when and if ever such level of ADS is available for any use case remains uncertain. Even without a licensing requirement, states may still want to ensure drivers or operators understand vehicles' capabilities and training for how to respond in emergency situations.
- Develop a more consistent or uniform vehicle registration regime that tracks evolving use cases with focus on ADS and considers requirements such as discreet markings signifying use case, operational design domain, whether fleet or individually owned, whether the vehicle is an ADS dedicated vehicle or an ADS dual mode vehicle, and (if applicable), whether or not a human operator at any time may be expected to monitor environment or intervene by taking over ADS operations. Ultimately, having better information about the capabilities and limitations of ADS equipped vehicles as part of the vehicle registration process will provide states and law enforcement with more clarity around how to best oversee ADS operations, including crashes on public roadways.
- With regard to vehicle inspections, the NE States should consider the development of self-certification requirements to ensure that ADS-equipped vehicles are able to comply with all applicable traffic and motor vehicle safety laws.
- Continue to coordinate around insurance requirements through national and regional testing, and update requirements based on operational data.



4.2 Data

Findings

- Further information around what data will be collected by ADS, including both outside and inside the vehicle, is needed to better evaluate what consumer protection laws may be needed.
- Liability for IOOs like state DOTs may come with reporting of infrastructure deficiencies from ADS-equipped vehicles by putting infrastructure owners on notice of an existing safety issue. Considering exemptions and reasonable timelines for addressing such notices is warranted.
- Data sharing laws or practices are unlikely to be successfully coordinated until the data collection and transmission is standardized between states and vehicle operators, and proprietary data can be protected. Crash report forms in particular should be more consistently formatted or standardized across state lines so that law enforcement, states, industry, and NHTSA can better understand crashes involving ADS-equipped vehicles. The NE States should work together with law enforcement, Governor's Highway Safety Association (GHSA), the ADS industry, and NHTSA to ensure that the next Model Minimum Uniform Crash Criteria (MMUCC) update (version 6) and subsequent updates provides adequate coverage for capturing crashes involving ADS-equipped vehicles.

Recommendations

Short-term (1-2 years)

- Update public records laws to include uniform approach to considerations around data that may be considered proprietary, confidential, or trade secrets when considering ADS information sharing requirements between ADS operators and states.
- Establish a information sharing framework focused on collaboration between public sector and industry that mutually benefits both, including the sharing of information collected from the operation of ADS on public roads and travel data to support modeling and forecasting completed as part of long-range transportation planning.

Medium-Term (3-5 years)

- Align new legislation in each state to address the complex nature of the crash records reporting around ADS operation and across modes and use cases. This includes the important considerations in balancing the public interest in disclosing safety information versus protecting confidential and proprietary information related to vehicle systems.

4.3 Pilots / Deployments

Findings

- Safety concerns (whether founded or unfounded) around ADS-equipped vehicles continue to be a barrier to increased deployment on public roads. Collaboration around safety, risk mitigation, and operational design domain identification presents an opportunity for the public and private sector.
- Multi-step approval layers and varied definitions on types of ADS operation are barriers to ADS deployment. Industry stakeholders have clearly identified the need for a path to full scale



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commercial deployment. For the NE region and its vision of seamless operations across state lines, clarity on ADS operational types and determination of roles and responsibilities for testing and deployment will be important.

- Testing environments with differentiating topography, varied road geometries, and harsh weather conditions are important for determining ADS technology viability (and considered as such by private industry). This presents an important opportunity for the NE States to support the maturation of ADS. It remains unknown when ADS technology will be ready to operate in such environments.
- Law enforcement should be notified at the outset of ADS operations. Requiring operators of ADS-equipped vehicles to submit a law enforcement interaction plan to a state agency (e.g. state transportation agency like the State DOT), which would then be responsible for making this plan available to law enforcement, would allow law enforcement to be notified in advance of ADS-equipped vehicles operating in a state.
- Without an approval or notification process for ADS operations within a state or region, public agencies may not know whether companies are testing or operating on public roads, thus leading to potential liability and a missed opportunity around coordination with the private sector to support the safe and effective operation of ADS-equipped vehicles.

Recommendations

Short-term (1-2 years)

- Complete analysis to declare regional corridors to be ADS testing and/or deployment ready. With ongoing development of electric vehicle implementation plans by states, this presents opportunity to collaborate around ongoing electric vehicles implementation strategies and to align with alternative fuel corridor designations for ADS. Corridors may start off as only ADS Testing Ready, but they can transition to ADS Deployment Ready following successful testing and operational data analysis to support designation. Corridors can identify and encourage particular use case operations, including freight, bus rapid transit, or other potential ADS services.
- Develop more consistent or uniform approaches to crash reporting for ADS with a focus on testing and deployment.
- Develop coordinated regulations focused on on-demand ridehailing services with focus on cross-state operations and with consideration of incorporation of ADS ridehailing services³⁵.
- Develop regionally focused testing permit with the following considerations³⁶:
 - Consider the AAMVA road testing guidelines for ADS-equipped vehicles, which are primarily administrative in nature rather than technical
 - Consider the Pennsylvania Department of Transportation Automated Vehicle Testing Guidance (or other accepted best practice guidance), which is a combination of administrative and technical requirements for ADS testers and others

³⁵ The California CPUC provides a use case for ridehailing regulations and the regulation of ADS used for providing on-demand passenger services. <https://www.cpuc.ca.gov/regulatory-services/licensing/transportation-licensing-and-analysis-branch/autonomous-vehicle-programs>

³⁶ The following list is taken or adapted from Autonomous Vehicle Testing Guidance for State & City DOTs (safeautonomy.blogspot.com) and is intended to provide a baseline for discussion.



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- Consider requiring ADS testers to provide a statement of areas of intended operation and level of ADS technology in a manner that does not compromise any claimed trade secrets as to operations and also flexible from a geographic operational perspective
- Consider requiring ADS testers to conform to the SAE J3018 or other industry accepted standards for safe road testing, including safety driver training and protocols
- Consider defining how safe testing should occur when contemplating the safety driver and the vehicle system as a whole, including confirmation of how the stated level of technology will be monitored and verified to support public safety
- Consider requiring ADS testers to have a credible safety management system approach in place before ADS testing begins on public roads
- If ADS testing takes place without continuously monitoring safety driver, including chase or remote, consider requiring ADS testers to conform to industry-consensus safety standards for the ADS-equipped vehicle itself and operations (e.g., per ISO 26262)

Medium-term (3-5 years)

- Coordinate legislative updates for the region focused on the following:
 - Vehicles Exclusively Operated by ADS for All Trips: Consider adopting legislation focused on ADS for purpose-built vehicles not designed to have human drivers or operators, such as certain goods delivery vehicles. Such legislation may consider eliminating vehicle requirements like pedals, side view mirrors, and windshield wipers.
 - Traffic Violations: Assuming a “person” is redefined as described above, to include both natural and non-natural persons, legislators may wish to amend their statutes to increase fines for non-natural persons to provide for meaningful deterrence. Legislators may also wish to include provisions for suspensions and revocations for repeat offenders. That being said, such fines should be correlated to provable concerns and not arbitrary or a means to arbitrarily target emerging technologies.
 - Distracted Driving: Distracted driving laws are now commonplace. These laws prohibit texting and handheld cell phone use for all drivers, as well as operation of other handheld devices. However, for vehicles equipped with a Level 4 ADS or a Level 5 ADS, a person formerly considered a driver may not be engaging in the operation of the vehicle, and potentially should be able to text, watch a movie, or engage in other screen related activities - provided that they would not have any need whatsoever to take over. When a vehicle is equipped with a Level 3 ADS, policymakers should not allow hand held texting or calling because even when a vehicle is in an automated driving mode, that mode may require the driver to take over.
 - Platooning: State statutes require that motor vehicles being driven on a highway in a caravan be operated so as to allow sufficient space between vehicles or a combination of vehicles to enable any other vehicle to enter and occupy the space without danger. These laws may need to be modified if state officials choose to allow or promote platooning. Platooning may be conditioned on certain technological and physical conditions and safety standards related to safe operational distances and number of vehicles allowed to platoon.



4.4 Outreach and Education

Findings

- Significant interest, and both excitement and trepidation, has been seen with public outreach and education around ADS-equipped vehicles. Public outreach and education are a priority for the federal government, states, industry, and national organizations focused on ADS.
- The NE States should proactively and collaboratively explore ways to educate the public and stakeholders about ADS technology and its potential benefits. Outreach should focus on the capabilities and safety systems being implemented for ADS technologies to facilitate a clear understanding of the ability for vehicles to operate in different operational domains, including expected responsibilities for human monitoring. This includes outreach and education being focused on both the general public, and decision-makers, including elected officials and legislators.

Recommendations

Short-Term (1-2 years)

- Work with existing regional and national organizations, within which the NE States are engaged, to present the findings and recommendations from this report.
- Identify partner organizations, including academic institutions, within the New England region to develop a workshop focused on legal, operational, and policy issues associated with the deployment of ADS, including the issues discussed in this report.
- Plan and host an industry demonstration day with a focus on an identified ADS testing and deployment ready corridor.

Medium-Term (3-5 years)

- Invest in the development of a New England regional ADS focused outreach and engagement strategy, including outreach and engagement with decision-makers and elected officials at state and local levels, those living in the New England region, businesses in the New England region, and students in the region as the next generation of drivers (or, potentially not!).
- Identify opportunities for technical assistance for states and local governments around the integration of ADS-equipped vehicles into the transportation, including policy, legal, and regulatory considerations.

4.5 Coordination

Findings

- Consistency is needed for requirements, laws, and regulations adopted by the New England region to support the testing, limited deployment, and full scale commercial operation of ADS. A key part of establishing this consistency is communication, which the NE States already have a strong foundation for through the ADS-focused working group.
- Strong federal leadership is desired to foster industry collaboration and community engagement. A uniform national policy to authorize the safe testing, deployment, and full scale commercial



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operations of ADS is essential to avoid the current inconsistencies and varying state approaches around policies, laws, and regulations that lead to uncertainty and reluctance to deploy ADS technologies, especially seamlessly across state lines. This also includes coordinating resources and best practices for ADS operations for national dissemination.

- In line with the goals of this Project around promoting the seamless operation of ADS across state lines within the region, determining how existing frameworks for reciprocity (i.e. driver's license compacts) evolve for ADS will be important. Existing compacts present an opportunity to develop new frameworks focused on reciprocity and cross-state operation of ADS.
- While goals and vision for ADS deployment may differ across the NE States, there is a common objective to see the region be a leader for the deployment of ADS to meet regional transportation needs. A regional entity that is completely focused on coordination and understands the ADS approaches of each NE state with a focus on collaboration would help to further ADS testing and deployment, and it could circumvent the conflicts and gaps in expertise and resources that often arise when existing agencies are tasked with regulating new technologies. Such an entity can also lead coordination with states outside of the region, local governments, and industry as well.
- More resources are needed from the federal government to support regional efforts such as this Project that will help inform the development of a multi-state approach to ADS operations that considers safety, risk, and liabilities, and strategies for risk mitigation, for states and infrastructure owner operators that support new innovative mobility solutions.

Recommendations

The following recommendations seek to provide additional actions for the NE States to achieve the important goal of regional coordination around the testing, deployment, and full scale commercial operation of ADS. The purpose for unifying, harmonizing, and coordinating ADS policies, laws, and regulations is to enable seamless operations of ADS equipped vehicles across all jurisdictional boundaries and to attract, speed up, simplify, safeguard, and improve adoption of ADS-equipped vehicles in New England. The NE States have a strong foundation with an identified common vision for the operation of ADS-equipped vehicles in New England. The next step is working together to align resources and coordination towards actions to implement the vision.

Short-Term (1-2 years)

- Agree to and execute a memorandum of understanding focused on coordination around testing and deployment of ADS-equipped vehicles in the New England region.
- Develop coordinated testing goals to inform development of a multi-state approach for ADS. This framework needs to differentiate between different use cases, including, but not limited to, commercial freight, local goods delivery, and passenger movement via on-demand fleets and transit.
- Coordinate within USDOT, including NHTSA, FHWA, FTA, FMCSA, Volpe, pooled funds and consortiums, and other ADS focused organizations, for funding and implementation opportunities. Through such collaboration, the NE States can continue to engage in information sharing, continue to evaluate and refine identified best practices for ADS operations on public roads, and identify companies willing to test in the region.



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- Coordinate and engage in information sharing, including the findings and recommendations of this Project, with other regional and corridor focused efforts around ADS testing and deployment.
- Explore the use of identified interstate compacts to coordinate implementation of laws and recommendations to support the multi-state operation of ADS-equipped vehicles across state lines. This will require coordination with Congressional delegations for any amendments determined necessary and requiring Congressional approval.
- Closely monitor federal legislation and rulemakings focused on ADS, and coordinate engagement with Congressional delegations and submissions of comments to USDOT, to inform development of ADS policies, regulations, and standards and ensure the New England focus is included in final rules, regulations, and procedures.
- Track mergers and acquisitions of companies developing ADS not only to understand marketplace, but to also understand how such transactions may impact existing or future testing or deployment approvals, including from safety management and risk consideration perspective.

Medium-Term (3-5 years)

- Review and refine existing fleet regulations across the New England states as a potential means of targeting the largest share of anticipated ADS-equipped vehicles operating on public roads without states relinquishing significant sovereignty over the registration process. This recommendation focuses on the expected growth of on-demand subscription services via ridehailing as a near-term use for ADS deployments.
- Invest in the creation of a **regional coordinating entity** among the New England States to manage the New England region ADS program. (Note: This entity could coordinate regional efforts around Connected Vehicles as well, which are not covered in this report.) While the region has already invested in the New England Connected and Automated Vehicle Coordination Group, this coordinating entity would move the focus on ADS from research to implementation.

With such a proposal, there are important governance and jurisdictional considerations that will need to be analyzed and discussed. The purpose of the proposed entity is not to absorb any existing authority of the NE States (i.e. licensing or registration), but instead to ease and streamline coordination for the testing and deployment of ADS in the region. This entity may be a new entity that is created or can be actions that an existing entity, such as The Eastern Transportation Coalition, takes on. Examples of other entities with a coordination and supporting role around the integration of technology focused solutions include the Colorado Smart Cities Alliance, Urban Movement Labs, and Smart Belt Coalition.

Proposed responsibilities for such an entity include:

- Develop and coordinate implementation of operational approach supporting ADS testing and deployment across NE States, including supporting and coordinating legislative efforts in the region
- Conduct outreach and coordination with ADS providers around proposed use cases for testing and deployment that align with the operational goals adopted by the NE States
- Administer the testing and deployment process adopted by the NE States, including coordination around registration, information sharing, and law enforcement coordination



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- Manage public outreach and education for ADS-equipped vehicles with focus on ADS experience through testing and deployment
- Coordinate regional partnerships focused on ADS between industry, academic institutions, federal government, and other interested stakeholders
- Implement digital mapping of cross-state corridors identified by the NE States as “Automated Operation Corridors” to prioritize and support initial testing and deployment across state lines; this effort can include analysis of anonymized geo-location data to also identify use of corridors that would inform use cases for ADS-equipped vehicles; this can either be done by the NE States or in partnership with industry
- Support long-range transportation planning by the NE States and municipal planning organizations in the region to ensure a consistent approach towards next generation mobility solutions like ADS
- Invest and coordinate resources to move towards the adoption of uniform requirements for the deployment of ADS in the region leveraging and coordinating data review from testing projects within one or multiple NE States
- Provide technical assistance for local governments seeking to test and deploy ADS-equipped vehicles



Image Source: Courtesy of Connecticut Department of Transportation



4.6 Sample Memorandum of Understanding focused on ADS Regional Coordination

MEMORANDUM OF UNDERSTANDING

Advancing Testing and Deployment of ADS-Equipped Vehicles in New England through Coordination, Partnerships, Outreach, and Education

This MEMORANDUM OF UNDERSTANDING (“MOU”) is entered into as of _____, 20____ by and between the [INSERT ENTITIES – proposed to be state departments of transportation].

RECITALS

The New England region (“Region”), comprising of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (collectively, the “NE States”), has expended significant resources to coordinate discussion and research towards the establishment of a collaborative vision for realizing the operation of vehicles equipped with automated driving systems (“ADS-equipped vehicles”) in the Region.

The Region is committed to safety on its roadways and increasing mobility options for those living, working, and doing business in the NE States.

ADS-equipped vehicles offer important opportunities to increase safety, improve mobility, reduce emissions, and support economic growth in the NE States and the Region as a whole.

The proximity of the NE States to each other provides an important and valuable multi-state operational domain for ADS-equipped vehicles, in addition to opportunities for international ADS operations with the location of the Canadian border.

The NE States have established a vision for ADS deployment that focuses on the seamless operation of ADS-equipped vehicles across New England and surrounding regions of the United States and Canada. The mission of the collaborative efforts of the NE States is to share resources and information, and work collaboratively with neighboring transportation agencies and other stakeholders to facilitate the deployment of ADS-equipped vehicles for freight and passenger movement.

The Region is mode agnostic and seeks to support the safe testing and deployment of all use cases for ADS-equipped vehicles, including commercially operated fleets of vehicles for passenger services focused on demand responsive mobility, or ridehailing; on-road commercial vehicles focused on the movement of freight on highways with focus on specific corridors; purpose-built fleet vehicles without any in-vehicle operator for local goods delivery; and public transportation.

The NE States acknowledge the challenging operational environment of the Region, which also presents the opportunity to support the maturation of ADS technologies, gain consumer trust, and assist with the development of a national operational strategy for ADS.



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The NE states agree the coordination of resources around the safe ADS deployment is in the best interests of each state and the Region as a whole, including to educate, cultivate, and advance the ability for ADS-equipped vehicles to operate safely in all operational domains, including all-weather and regions with varying infrastructure. In addition, there is a need to have operational structures in place that are adaptable to accommodate advancing ADS technologies and to avoid overregulation.

It is agreed that in addition to coordination between the NE States, collaboration is also needed among local governments, businesses, educational and research institutions, nonprofit organizations, and ADS manufacturers to support the safe deployment of ADS in the Region and in consideration of a future-forward mobility ecosystem that merges innovation, workforce training, land use and development, infrastructure investments, public transportation, and health and safety.

The NE states are invested in reducing operational barriers to ADS through coordination with each other and collaborating around partnership opportunities with ADS providers to support the development of use cases that incentivize enhancing mobility in the Region and support a path to the safe full scale commercial deployment of ADS-equipped vehicles.

NOW THEREFORE, the NE States hereby direct the following actions to be taken in support of advancing testing and deployment of ADS-equipped vehicles in the Region:

The NE States agree to continue to pool resources towards the implementation of the multi-state regional vision for the seamless operation of ADS-equipped vehicles across New England.

The NE States agree to explore the establishment of a regional entity focused on coordinating ADS testing and deployment in the Region. The potential role for such an entity includes the following:

- Develop and coordinate implementation of operational approach supporting ADS operation across NE states, including supporting and coordinating legislative efforts in the region
- Administer and coordinate the testing and deployment process adopted by the NE States, including coordination around registration, information sharing, and law enforcement coordination, and any approvals determined necessary by the individual states
- Manage public outreach and education for ADS-equipped vehicles with focus on ADS experience through testing and deployment
- Coordinate ADS focused regional partnerships between industry, academic institutions, federal government, and other interested stakeholders
- Provide technical assistance for local governments seeking to test and deploy ADS-equipped vehicles

The NE States agree to collaborate around the development of a uniform approach to address the following ADS operational topics within the next 2 years, which list may be added to or subtracted from as work is completed by the NE States:

- Licensing and Registration
- Insurance
- Safety Management
- Information Sharing and Crash Reporting



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- Law Enforcement Coordination, including local and state
- Protection of information determined to be proprietary or trade secrets
- Platooning

The NE States agree to closely coordinate future legislative activity with the goal of passing complementary legislation on ADS if such legislation is determined necessary.

The NE States agree to collaboratively monitor federal legislation and rulemakings, and to pool resources for submitting comments to ensure the interests of the NE states and Region are considered in the continued development of federal ADS regulations and programs.

The NE States agree to coordinate to establish an outreach and engagement strategy focused on consumer and decision-maker education of ADS technology and capabilities.

The NE States agree this MOU will terminate with regard to a party or the NE States on the earlier of: (i) written notice by a party or all the NE States seeking to terminate the MOU; or (ii) five (5) years. The NE States may extend the term of this MOU by written agreement.

All notices under this MOU shall be in writing and shall be given by electronic mail (e-mail) or U.S. mail. E-mail shall be documented by the sending party with transmission receipts and the transmissions will be deemed received on the date of transmission with delivery confirmation. Transmissions by U.S. mail shall be deemed to have been received forty-eight (48) hours after deposit in the U.S. mail in registered or certified form with postage fully prepaid. The contacts for each of the NE States for purposes of this MOU are the following, which contact should be timely updated by a party as needed:

Name: _____
Phone: _____
Email: _____

Name: _____
Phone: _____
Email: _____

Name: _____
Phone: _____
Email: _____

Name: _____
Phone: _____
Email: _____

Name: _____
Phone: _____
Email: _____



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Name: _____
Phone: _____
Email: _____

No third-party beneficiaries are created or intended by this MOU. This MOU may be executed in counterparts, each of which shall constitute an original, but all of which together shall constitute one and the same instrument.

IT WITNESS WHEREOF, the following New England States have signed this Memorandum of Understanding.

By: _____

Name: _____
Title: _____
Agency: _____

By: _____

Name: _____
Title: _____
Agency: _____

By: _____

Name: _____
Title: _____
Agency: _____

By: _____

Name: _____
Title: _____
Agency: _____

By: _____

Name: _____
Title: _____
Agency: _____

By: _____

Name: _____
Title: _____
Agency: _____



5.0 Conclusion

The viability of proposed use cases for ADS is now coming into clearer focus. In the short term, these use cases include on-demand passenger services operating as fleets, purpose-built vehicles designed to not have an operator and deploying at low-speeds, and heavy-duty commercial freight operations. As the technology continues to mature, it is important to manage legislative efforts while being mindful of the pace of technology development and existing federal jurisdiction around vehicle safety requirements.

In the short term, these use cases likely have minimal impacts on the status quo for vehicle regulation for personally owned vehicles. Instead, it is recommended that the NE States focus legislative resources on managing fleet operations, including on-demand passenger services, local goods delivery using purpose-built vehicles, and commercial freight operations. Such efforts should include coordination around legal issues with the goal of risk identification and mitigation while being mindful that gray areas will arise through increased ADS integration at different levels of automation.

Over the medium to long term, considerations around federal versus state roles and responsibilities over safety and vehicle operations will inevitably arise as higher levels of ADS scale onto public roads. Additionally, continued public and private coordination will be important around untested legal issues like privacy, integration of ADS guided purpose-built vehicles into the transportation system, and liability around information sharing - both from vehicle to state DOT and vice-versa.

The NE States have been national leaders in laying a foundation to implement their vision of “seamless operation” across state lines. With this report, the NE States have building blocks to focus their discussion and resources towards developing a policy, legal, and regulatory approach that supports the safe testing and deployment of ADS. Through the research for this Project, proposed implementation tools such as the execution of a Memorandum of Understanding by the NE States focused on coordination and the potential leveraging of a regional coordinating entity around ADS testing and deployment have been suggested to support next steps for the NE States.

With this Project, the NE States have taken the important first step in moving their vision of seamless multi-state regional operation of ADS-equipped vehicles towards implementation.



Acronyms / Abbreviations

ADAS	Advanced Driver Assistance Systems
ADS	Automated Driving System
ANPRM	Advanced Notice of Proposed Rulemaking
C/AV	Connected and Autonomous Vehicle
DDT	Dynamic Driving Task
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FMVSS	Federal Motor Vehicle Safety Standards
FTA	Federal Transit Administration
HACV	Highly Automated Commercial Vehicles
IOO	Infrastructure Owner Operator
IRP	International Registration Plan
MOU	Memorandum of Understanding
NCHRP	National Cooperative Highway Research Program
NECAV	New England Connected and Automated Vehicle Coordination Group
NETC	New England Transportation Consortium
NHTSA	National Highway Traffic Safety Administration
ODD	Operational Design Domain
PDD	Personal Delivery Devices
SAE	Society of Automotive Engineers
TETC	The Eastern Transportation Coalition
TRB	Transportation Research Board
USDOT	United States Department of Transportation
V2I	Vehicle to Infrastructure
V2V	Vehicle to Vehicle

