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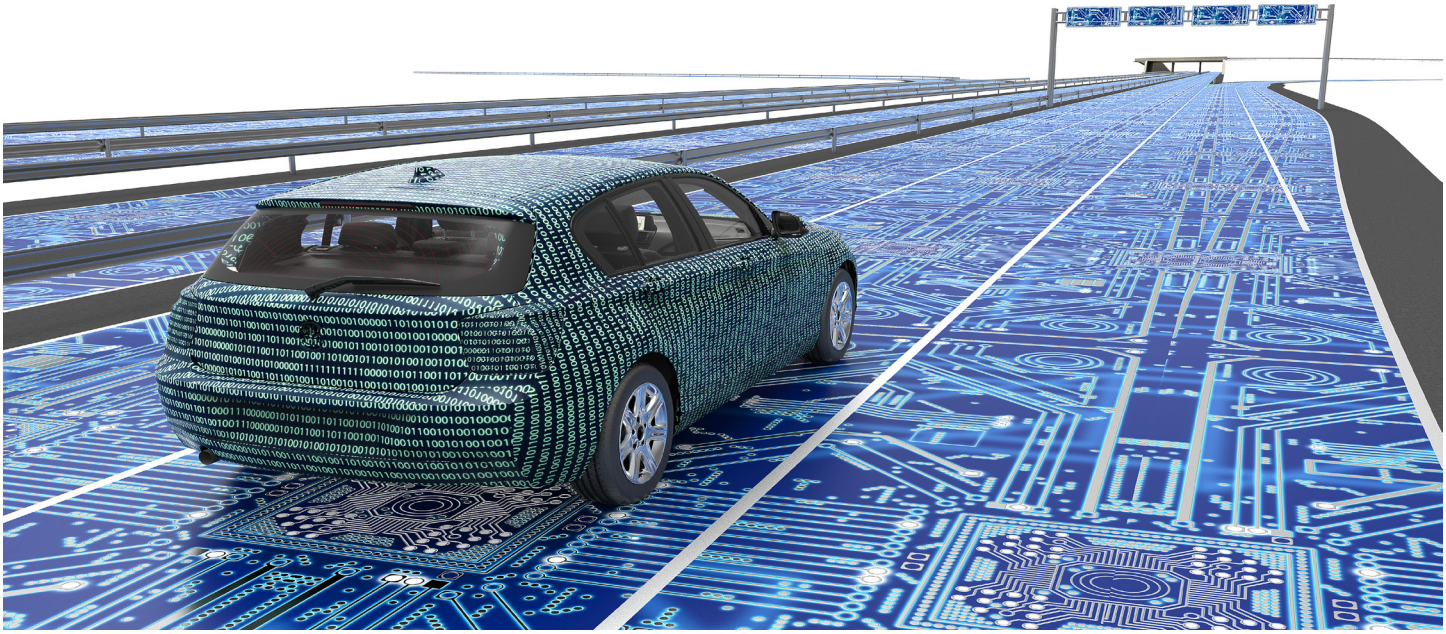
Apportionment of Liability in Autonomous Vehicle Accidents



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INTRODUCTION

By Dennis D. Fitzpatrick

The burgeoning area of autonomous vehicles has garnered much attention in recent years spawning many articles about the impact of this technology. There is one area that is of vital interest to litigation counsel and insurance carriers: how the courts will undertake to apportion liability in vehicular accident cases involving autonomous vehicles. To experienced litigation counsel, this judicial analysis and determination will follow a familiar pattern.

There are three areas American courts will probably examine and rely upon in future, first impression litigation involving autonomous vehicles to guide their decisions on assessing and apportioning property damage, personal injury and wrongful death liability in accidents involving an autonomous vehicle.

The courts will first begin their analysis by looking at state and federal legislation to determine if the lawmakers have addressed any relevant issues. This judicial examination will extend beyond what the lawmakers may have enacted to include a review of any standards promulgated by public and private administrative bodies whose standards are a part of the auto industry.

This judicial analysis will continue by examining the existing body of tort law governing the apportionment of liability for vehicular property damage, personal injury and wrongful death accidents. In making this examination, the courts will be guided by the discussion of these issues by legal scholars in various law review commentary. The courts may also attempt to divine if there are any prevailing legal views on how such liability should be apportioned in autonomous vehicle accidents.

Finally, to make a complete analysis, the courts will probably look to what other courts have done in apportioning liability in accidents involving other automated and autonomous devices such as drones, robotic medical equipment, and other “smart devices”. Such analysis may prove useful in carving out the boundaries for liability apportionment in autonomous vehicular accident cases.

Our Clausen Miller White Paper examines each of these three areas providing information and our conclusions on the following:

Chapter I-- Current legislation and public/private regulatory standards.

Chapter II—The prevailing legal views on apportionment of liability.

Chapter III—How courts have apportioned liability regarding other autonomous devices.

Our Paper goes one step further. Our seasoned and experienced task force of trial litigators provides the “Clausen Miller” view in Chapter IV on how we see things “shaping up” on the judicial front regarding the assessment and apportionment of liability.

Table of Contents

Chapter I

Current Legislation And Public/ Private Regulatory Standards

Executive Summary

Although thirty-eight (38) states and the District of Columbia have enacted legislation governing the use and operation of autonomously operated vehicles[1], no state has enacted a law specifically delineating the apportionment of liability for the injuries or damages arising from the use of such vehicles.[2] Eight (8) states[3] have attempted to address the issue, however each respective state has failed to clearly outline the apportionment of liability from the manufacturer to the individual consumer. These eight states have passed or enacted legislation that simply defaults to existing concepts of tort law by stating that, "Liability for a crash involving an automated driving system driving a motor vehicle that is not under human control is determined in accordance with applicable state law, federal law or common law."[4] Similarly, the federal government through the Department of Transportation ("DoT") and the National Highway Traffic Safety Administration ("NHTSA") has not enacted any legislation addressing the apportionment of liability for the injuries or damages arising from the operation of an autonomous vehicle.[5]

However, several of the leading proponents and manufacturers of autonomous vehicles have already affirmed that they will assume the liability for the failure of their vehicle while being operated in fully automatic mode if it is proven that the vehicle was responsible for the accident. Of course, under the current common law and strict liability statutes a product manufacturer is already liable for the injuries and damages caused by a failure to warn or due to the defects in the design and/or manufacture of its product. Therefore, the concession of the manufacturers of autonomous vehicles to simply restate their current responsibility to provide adequate warnings and for the safe design and manufacture of their products is not especially impactful or enlightening in determining how the liability arising from the operation of autonomous vehicles will, or should be, addressed in the future.

While individual autonomous vehicle manufacturers have agreed to accept liability for the damages and injuries caused by their products, the leading trade associations in the automobile industry have remained silent on the issue. Perhaps of greater concern to the auto industry as a whole is the ownership and protection of the considerable data that will be collected from the autonomous vehicles they manufacture. As autonomous vehicles become more connected and integrated into the daily lives of their users, so too will the opportunities for criminal elements to coopt, ransom, or perform other acts of malfeasance to the detriment of the user. Left unaddressed are the liabilities resulting from insufficiently protected, expired or unsupported software responsible for the safe operation of autonomous vehicles. Of course, the response of the automotive industry may be to shift the risk to the consumer through private insurance. The thought is that insurance companies can help mitigate these risks through consumer ownership incentives related to vehicle ownership and technology. Insurance premiums would be adjusted

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[1] In this section, the terms "autonomous operated vehicles," "autonomous vehicles," "automated vehicles," and "automated driving systems" are used synonymously to refer to a vehicle capable of sensing its environment and operating without or with limited human involvement.

[2] Attached is our Appendix containing our survey of Autonomous Vehicle Legislation and Apportionment of Liability, which can also be accessed via this link: https://securetransfer.clausen.com/link/yyrZBsDrL8EnlKxXBv70yP

[3] Colorado, Delaware, Florida, Maine, Tennessee, Nevada, Nebraska, & Hawaii.

[4] SB17-213 – Executive Order enacted in Colorado in 2017. For more information: https://leg.colorado.gov/bills/sb17-213.

so users of conventional transportation are penalized, and discounts offered to policyholders who invest in more sophisticated driverless technology. In sum, drivers are lured to adopt advances in technology with insurance savings to ensure that they have secure, up-to-date software installed in their vehicle so that it operates safely and properly.

Engineering groups regularly issue standards and guidelines in an effort to promulgate regularity and predictability in a given discipline. These standards become industry norms, or best practices in a multitude of areas impacting everyday life. Such standards may eventually become adopted, or at least referenced, by government regulatory bodies. The development of autonomous vehicles is no exception. Although well over seven hundred (700) different engineering standards have been proposed, very few—and none related to the apportionment of liability for the damages or injuries resulting from the use or operation of autonomous vehicles—have been formally adopted. The leading automobile engineering organizations such SAE, International Organization of Standardization (ISO), and the Insurance Institute for Highway Safety (IIHS), have reached relatively few consensus standards, other than SAE J3016 which addresses the descriptions and definitions of levels of driving automation. While these evolving standards may eventually be referenced to prove that a manufacturer of an autonomous vehicle is liable for an accident while it was being operated in fully-automatic mode, none of the standards directly address issues of how such liability should be apportioned between the manufacturer, user or other third parties.

Trade Association Consensus Standards, Policy Positions, Public Comments on the Apportionment of Liability for the Damages and Injuries Resulting From the Use or Operation of Autonomous Vehicles

Four primary types of risk are associated with AV technology: safety, liability, privacy, and cybersecurity. Our research has not revealed that any major trade association connected with the automotive industry has taken a public position on the liability associated with AV technology. However, and as noted above, some individual carmakers have promised to accept liability whenever one of their cars is operated in autonomous mode (SAE Level 4 or 5).

In January 2020, the two largest automobile associations in the United States announced the formation of a new association, The Alliance For Automotive Innovation, to help guide its members through the transitions in the industry caused by AV technology. Significantly, the association includes not only traditional automotive manufacturers, but also supply chain partners that develop and manufacture AV software and hardware. This is important because the association's members will presumably have vested interests and expertise in all four types of risk associated with AV technology. This may prove beneficial as new legislation and regulations are proposed to deal with the both the potentially enormous benefits and risks associated with the advancements in AV technologies.

Regulatory and Engineering Standards on the Apportionment of Liability for the Damages and Injuries Resulting From the Use or Operation of Autonomous Vehicles[6]

Concomitant to the advent of autonomous vehicles has been the promulgation of regulations and engineering standards proposed by many different organizations encompassing a multitude of disciplines concerning their development and operation. Currently, there are no specific Federal or State regulations or consensus engineering standards that explicitly allocate or apportion fault resulting from the development or operation of autonomous vehicles or automated driving systems ("ADS"). However, the currently existing regulations and proposed standards offer insight on the emerging liability issues that will have to be considered by the Federal and State governments and the engineering community to develop the autonomous vehicle industry to assure its societal functionality. While it is impractical, if not impossible, to identify each and every regulation or proposed engineering standard that explicitly or tangentially contains a reference to the development or operation of autonomous vehicles, some merit specific discussion.

The regulatory and engineering entities leading the way in the development of standards for autonomous vehicles include:

- National Highway Traffic Safety Administration (NHTSA)
- SAE
- International Organization of Standardization (ISO)
- Insurance Institute for Highway Safety (IIHS)

The Role of the National Highway Traffic Safety Administration

The National Traffic Safety Administration ("NHTSA") is part of the U.S. Department of Transportation ("DoT"). NHTSA was founded in 1970 after passage of the Highway Safety Act of 1970. NHTSA's main focus is to "save lives, prevent injuries and reduce economic costs due to road traffic crashes, through education, research, safety standards and enforcement." NHTSA issues Federal Motor Vehicle Safety Standards ("FMVSS") to implement laws to prevent and reduce vehicle crashes.

In September 2017, NHTSA issued its policy on the development of automated driving systems in, *A Vision for Safety (AV 2.0).* In October 2018, NHTSA offered new multimodal safety guidance, clarified its policies and role, and outlined the work of the DoT as automation technology evolved in its publication, *Preparing for the Future of Transportation (AV 3.0)*. In January 2020, the DoT released, *Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0 (AV 4.0)*. The intent of AV 4.0 was to unify the efforts of thirty-eight (38) different Federal departments, independent agencies, commissions, Executive Offices of the President, and provide high-level guidance to state and local governments, innovators, and all stakeholders in the U.S. government's approach regarding autonomous vehicles. In each of its policy statements,

[6] For the purposes of this article, autonomous vehicles refer only to passenger and light truck vehicles. This article neither considers nor discusses the regulatory or engineering standards that apply or are being considered for low speed, non-passenger, commercial trucks, or platooning vehicles.

NHTSA has clearly delineated the respective roles of the Federal and State governments as follows:

NHTSA's Responsibilities

- Setting Federal Motor Vehicle Safety Standards (FMVSSs) for new motor vehicles and motor vehicle equipment (with which manufacturers must certify compliance before they sell their vehicles)
- Enforcing compliance with FMVSSs
- Investigating and managing the recall and remedy of non-compliance and safety-related motor vehicle defects nationwide
- Communicating with and educating the public about motor vehicle safety issues

State's Responsibilities

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

Importantly, NHTSA has encouraged *the States to consider* issues of liability and insurance. Initial considerations include the relegation of liability during an incident and the insurance obligations of the driver, entity, and/ or ADS. NHTSA has acknowledged that these considerations may take time and require a broad discussion of incident scenarios, understanding of technology, and knowledge of how the ADSs are being used (personal use, rental, ride share, corporate, etc.). Additionally, the States have to consider that the operator of an ADS, in a given circumstance, may not necessarily be determinative of establishing liability for the crash involving the ADS. In its *AV 2.0* policy statement, NHTSA asked the States to begin to consider: (a) how to allocate liability among ADS owners, operators, passengers, manufacturers, and other entities when a crash occurs; (b) for insurance purposes, determine who (owner, operator, passenger, manufacturer, other entity, etc.) must carry motor vehicle insurance; and (c) consider rules and laws allocating tort liability amongst the involved entities.

The Role of SAE

SAE, formerly known as the Society of Automotive Engineers, is based in the United States. It is a global association of more than 128,000 engineers and related technical experts in the aerospace, automotive and commercial vehicle industries. SAE develops voluntary consensus standards. If a SAE standard (in whole or in part) is incorporated by reference in a FMVSS, NHTSA will provide an interpretation of the FMVSS, and any applicable SAE standard included in that FMVSS.

NHTSA adopted the six levels of automation outlined in SAE J3016 for use in its Federal Automated Vehicles Policy. Consistent with industry practices, the standard was issued, in part, to speed the delivery of an initial regulatory framework and best practices to guide manufacturers and other entities in the safe design, development, testing, and deployment of highly automated vehicles (HAVs). SAE J3016 is a convention, not a specification, containing definitions and explanations for a variety of terms relating to AVs.

SAE J3016 provides and defines the six levels of driving automation, from no automation to full automation. SAE J3016 helps to eliminate confusion by providing clarity in the levels and functional distinctions of the operation of HAVs. Initially issued in 2014, J3016 was updated in 2018 with input from insurance companies, the American Automobile Assoc., and the Transportation Research Board, while it was under development.

The taxonomy and definitions of SAE J3016 have been adopted internationally by the International Standards Organization ("ISO") under ISO 22736 and the Organisation Inernationale des Constructeurs d' Automobiles ("OICA")

The chart below summarizes SAE J3016

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	No Automation	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	Conditional Automation	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	High Automation	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	Full Automation	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

Level 1 automation requires the driver to be physically operating the vehicle, with perhaps the assistance cruise control. The National Highway Traffic and Safety Health Administration ("NHTSA") developed and issued standards on electronic stability control found in Level 1 vehicles mandatory on all 2011 model year light vehicles. Self-parking technologies are an example of Level 2 automation. Drivers are required to continue to monitor the roadway and to resume the operation and control of the vehicle at all times and on short notice. Other commonly used Advanced Driver Assist Systems in Level 1 and 2 vehicles include: Adaptive Cruise Control ("ACC"); Blind Spot Monitoring System ("BSMS"); Automatic Emergency Braking ("AEB" including Dynamic Brake Support ("DBS") and Crash Imminent Braking ("CIB"); Lane Departure Warning ("LDW"); Forward Collision Warning ("FCW"); Lane Keep Assist ("LKA"). Currently, there are no commercially available vehicles beyond Level 2 automation.

With Level 3 automation, the driver is expected to be available for occasional control, but with a sufficiently comfortable transition time. An example of a Level 3 vehicle is one that can navigate on the highway, including on-ramps and off-ramps, on its own without driver intervention. At Level 4, the driver must provide destination or navigation input and the vehicle, is capable of completing an entire trip from origin to destination without driver input or intervention. Level 1 through 4 vehicles require drivers to monitor the vehicle's automated system to make sure it is performing as expected and must intervene (resume control) in situations that the automation cannot handle. Alexander Eriksson & Neville Stanton, *Takeover Time in Highly*

Automated Vehicles: Noncritical Transitions to and from Manual Control, Human Factors: J. Human Factors and Ergonomics Soc'y, June 2017, at 689.

SAE has engineering standards for a number of the Advanced Driver Assist Systems in Level 1 and 2 automated vehicles including:

- J2399 – Adaptive Cruise Control
- J2400 – Human Factors in Forward Collision Warning Systems
- J2802 – Blind Spot Monitoring Systems
- J2808 – Lane Departure Warning
- J3048 – Lane Keep Assist Systems and Driver Interface

SAE has also issued standards relating to Automatic Emergency Braking ("AEB") (J3087, AEB Performance Testing), Active Safety Sensors (J3088), and Guidelines for Safe On-Road Testing of SAE Level 3, 4, and 5 Prototype Automated Driving Systems Operated Vehicles (J3018).

International Organization of Standardization

The International Organization for Standardization ("ISO") is an independent, non-governmental international organization comprised of 165 national standards bodies. The ISO, through its members, seeks to develop voluntary, consensus based, international standards.

ISO has developed several engineering standards pertaining to autonomous vehicles. None of these standards, other than perhaps evidencing an applicable standard of care, have the force of law. None of the standards deal with the apportionment of fault between the manufacturer, owner, or operator of an autonomous vehicle in an accident.

The ISO standards related to autonomous vehicles include:

- 15623 – Forward vehicle collision warning systems
- 20035 – Cooperative Adaptive Cruiser Control (CACC)
- 22078 – Bicyclist Detection and Collision Mitigation Systems (BDCMS)
- 22839 – Forward vehicle collision mitigation systems
- 22840 – Devices to aid reverse maneuvers, Extended Range Backing Aid systems (ERBA)

Insurance Institute for Highway Safety

The Insurance Institute for Highway Safety (IIHS) is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from motor vehicle crashes. The IIHS is wholly supported by auto insurers and insurance associations. In March 2020, the IIHS published, *Addressing driver disengagement and system misuse: human factors recommendations for Level 2 driving automation design*. This publication provided design recommendations for Level 2 driving automation to encourage driver engagement and comments on when the system can safely be used. As noted in its Abstract, the publication contains…

> recommendations pertaining to driver engagement concern driver monitoring systems that detect signs of driver disengagement, driver attention reminder methods, escalation processes, consequences for sustained noncompliance when monitoring systems have detected driver disengagement, and proactive methods for keeping drivers engaged with respect to driver-system interactions and system functionality considerations. We also provide guidance on how the operational design domain should be communicated and restricted.

While not offering specific standards, the recommendations of the IIHS seek to improve how drivers interact with Level 2 autonomous vehicles to minimize driver disengagement and misuse.

Summary and Analysis

NHTSA has noted that several State automated vehicle laws consider the person who activates the automated vehicle system to be the "driver" of the vehicle even if that person is not physically present in the vehicle. However, NHTSA has conceded that there are currently no prototype automated vehicle systems that are capable of operating on public roads without the presence of a driver in the driver's seat who is ready to control the vehicle. *National Highway Traffic Safety Administration, Preliminary Statement of Policy Concerning Automated Vehicles.* As a result, important liability concerns regarding the human/automation interface are presented. These issues involve the driver-vehicle interface with dynamic driving tasks such as: evaluating communication methods between the driver and vehicle to ensure safe vehicle operation; ensuring proper allocation of vehicle control functions between the driver and the vehicle; transitions between vehicle and driver control; driver override of the automated vehicle control; driver acceptance or rejection of false alarms, nuisance warnings, automation system availability and reliability; and vehicle cybersecurity protection. As NHTSA develops and institutes its standards, they will become the force of law and the failure of the vehicle manufacturers to comply with them, in either design or manufacture, will cause them to be found in "noncompliance" and likely subject them to liability. The establishment of government regulations, engineering guidelines and industry consensus standards only direct or suggest minimum standards. Such standards mean that manufacturers can do no less, not that they cannot—or should not--do more than the minimum standards.

How will insurance allocate risk for the development and ultimate deployment of autonomous vehicles? One school of thought involves expanding the role of insurance. Such an expansion could provide at least three benefits. First, providing sufficient compensation to those injured by an autonomous vehicle could relieve some of the pressure on the tort system. Second, enhanced vehicle insurance requirements, especially if combined with greater flexibility in the administration of this insurance, could provide a third-party check on the safety of automated driving systems. Third, such requirements could also help remedy the potential market failures associated with the successful mass deployment of autonomous vehicles. Ultimately, however, as automation increases, liability could gradually shift from drivers or operators, based on the incremental use of autonomous vehicles, to manufacturers and OEMs of the vehicles as the model transfers from private ownership to subscription use. For example, even under the subscription model, if the subscriber is determined to be the operator by programming the vehicle for its autonomous operation and has done so negligently, can it not be argued that the manufacturer should be responsible for any resulting injury due to the operation of the vehicle by allowing it to operate as negligently programmed?[7]

[7] The authors of this section gratefully acknowledge the contribution of Emmanuel (Noel) Jay F. Manuel, Senior Staff Consultant of Engineering Systems, Inc. ("ESi").

To date, 38 states and the District of Columbia have introduced legislation and executive orders laws relating to the research and development of autonomous vehicles and the eventual use of autonomous vehicles without a driver on public roadways. However, no states or territories in the United States have clearly outlined the apportionment of liability downstream from the initial manufacturing and assembly of the parts and components of the autonomous vehicles. 8 states (Colorado, Delaware, Florida, Maine, Tennessee, Nevada, Nebraska, & Hawaii) have enacted legislation that briefly discusses boundaries of the apportionment of liability in terms of insurance requirements, application of local, federal and common laws and included language relating to some manufacturers accepting liability for systems failing without user error. No state has clearly outlined the apportionment of liability for the use of autonomous vehicles and we look for state legislative and executive branches to clarify this gap in tort law and product liability law in the near future.

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
Illinois	No	HB 2575	Autonomous Vehicle Act	Pending - House Rules Committee - February 2019	Creates the Autonomous Vehicle Act. Provides that a fully autonomous vehicle may drive or operate upon the highways of this State, regardless of whether a human operator is physically present in the vehicle.	https://www.ilga.gov/legislation/BillStatus.asp?DocNum=2747&GAID=14&DocTypeID=HB&SessionID=91&GA=100
Illinois	No	HB 0791	Defines: Automated Living System Equipped Vehicle	Enacted 2017	"any vehicle equipped with an Automated Driving System of hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis regardless of whether it is limited to a specific operational domain."	
Illinois	No	IL H 4758	Highly Automated Work Zone Vehicles	Pending House Rules Committee - Feb 2020	Amends the Vehicle Code, defines highly automated work zone vehicle and remote autonomous vehicle operator, provides that a provision related to following too closely shall not apply to the operation of a highly automated work zone vehicle, provides that the Toll Highway Authority shall establish a 2-year highly automated work zone vehicle pilot program, provides that the Authority shall annually report to the Governor and the General Assembly on the outcomes and the effectiveness of the program.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:IL2019000H4758&ciq=ncsl&client_md=7e12e5157125433181eb33c41d75c3b4&mode=current_text
Illinois	No	IL S 3204	Autonomous Vehicles Testing Pilot Program	Pending - Senate Committee on Assignments Committee- Feb 2020	Amends the Vehicle Code, defines highly automated work zone vehicle and remote autonomous vehicle operator, provides that a provision related to following too closely shall not apply to the operation of a highly automated work zone vehicle, provides that the Toll Highway Authority shall establish a highly automated work zone vehicle pilot program.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:IL2019000S3204&ciq=ncsl&client_md=487704eac191d24e1a9e8ea0079891c2&mode=current_text
Illinois	No	Exectutive Order 2018-13		2018	Order supporting the Autonomous Illinois Initiative.	
Wisconsin	No	Executitive Order 245			Report of the Governor's Steering Committee on	https://wisconsindot.gov/Documents/about-
Wisconsin	No	Senate Bill 695	Defines: Vehicle Platoon	2018	"a group of individual motor vehicles traveling in a unified manner at electronically cooordinated speeds."	
Indiana	No	HB 1290	Defines: Vehicle Platoon	Enacted 2018	"a group of motor vehicles that are traveling in a unified manner under electronic coordination at speeds and following distances that are faster and closer than would be reasonsalbe and prudent without electronic coordination."	
Indiana	No	HB 1341	Autonomous Vehicles	Effective July 2018	Autonomous vehicles. Provides that a political subdivision may not enact a measure, ordinance, policy, regulation, rule, or other restriction that prohibits the authorized use of: (1) an automated driving system; (2) an automated vehicle; or (3) an on demand automated vehicle network. Provides that a person in possession of a valid driver's license may operate an automated vehicle at a Level 1, 2 or 3 on a public highway...	http://iga.in.gov/documents/09b96c96
Michigan	No	SB 995-SB998	Comprehensive AV legislation	2018	Permits the use of autonomous vehicles under certain conditions and creates provisions for the operation of autonomous vehicles without the presence of a human operator; Main goal of Michigan laws is to stimulate Michigan Businesses that develop AV technologies; Laws are intended to attract jobs stemming from this developing industry.	http://www.legislature.mi.gov/(S(vhqt3apbpilripwcrmgirce2))/mileg.aspx?page=GetObject&objectname=2018-SB-0997
Minnesota	No	Executitive Order 18-04	Establishes Governor's Advisory Council on Avs & forms Interagency Connected and Automated Vehicle Team (I-CAV Team)	Mar-18	I-CAV Team is responsible for implementing the executive order; ensuring interagency coordination; and providing operational support to the Advisory Council.	http://custom.statenet.com/public/resources.cgi?id=ID:exec_order:MN201918&ciq=ncsl&client_md=9835fe34d97bada0f2d6d0889576d0e6&mode=current_text
Minnesota	No	HB-6	MnDOT Connected and Automated Vehicle Strategic Plan 2019	2019	Allows autonomous vehicle operators to apply for permission to use a platooning system of self-driving vehicles. Beyond the use of autonomous platoons, the state has no law governing the use of independent self-driving vehicles.	
Minnesota	No	MN S 674	Automated Driving Systems Prohibition	Pending - Senate Transporation Finance and Policy Committee - January 2019	Prohibits the use of automated driving systems.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MN2019000S674&ciq=ncsl&client_md=a55233f21f4ef1283150cd376cfa4a67&mode=current_text

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
Minnesota	No	MN H 1996 (2173 - similar)	Motor Vehicles	Pending - House Transportation Finance & Policy Division Committee - March 2019	Relates to motor vehicles, regulates autonomous vehicle testing, establishes a penalty, requires a report.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MN2019000H1996&ciq=ncsl&client_md=6a32552e7d00ea59cf7c3b74b9ef24f3&mode=current_text
Alabama	No	SJR No. 81	Joint Legistlative Committee	Passed in 2016	Establishes a Joint Legistlative Committee to study self driving vehicles, including issues of public safety and economics.	
Alabama	No	AL S 229 ; AL H 361 (companion bill)	Automated Commercial Vehicles	Pending - Senate Transportation & Energy Committee - February 2020	Provides for the operation of automated commercial motor vehicles and commercial motor vehicles with teleoperation systems.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:AL2020000S229&ciq=ncsl&client_md=eecff9e09c65109a2f91d237b0f7042a&mode=current_text
Arkansas	No	House Bill 1754	Driver-Assistive Vehicle Platooning	Enacted in 2017	Defines a driver-assistance truck platooning system.	
Arizona	No	AZ H 2060	Autonomous Vehicle and Safety Features	Pending Senate - February 2020	Relates to autonomous vehicles, relates to safety features, provides that a person may not install or use a defeat device to override a safety feature of a vehicle that is equipped with level two, three, four or five driving automation that is designed to ensure that the driver is alert and attentive while the vehicles level two, three, four or five driving automation features are engaged, provides for exceptions.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:AZ2020000H2060&ciq=ncsl&client_md=2cc8b1a5c4c1358010cf74e82d3e6f87&mode=current_text
Arizona	No	AZ H 2340	Autonomous Vehicles	Pending - Transportation Committee- January 2020	Relates to autonomous vehicles, relates to Arizona Department of Transportation (ADOT) director's duties.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:AZ2020000H2340&ciq=ncsl&client_md=7dbe63cdbb9d643b1b8f6f44ed4357db&mode=current_text
Arizona	No	Executive Orders: 2015-09; 2018-04; 2018-09	Autonomous Vehicle	Enacted in 2015 & 2018 respectively	Allows the operation of self-driving vehicle pilot programs, where an operator may not be present in the vehicle. EO 2018-09 creates the Insititute of Automated Mobility.	
California	No	CA S 59	Autonomous Vehicle Technology: Statewide Policy	Pending - Assembly Appropriations Committee - July 2019	Requires the chair of the commission to establish an advisory committee, the California Council on the Future of Transportation, to provide the Governor and the Legislature with recommendations for changes in state policy to ensure that California continues to be the world leader in autonomous, driverless, and connected vehicle technology.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:CA2019000S59&ciq=ncsl&client_md=e5755970a89651e80216b56ca6eebf96&mode=current_text
California	No	**CA S 336**	Transportation: Fully-Automated Transit Vehicles	Pending - Assembly Transportation Committee - April 2019	Requires a transit operator, as defined, to ensure each of its fully-automated transit vehicles, as defined, is staffed by at least one of its employees, who has had specified training, while the vehicle is in service. Requires a transit operator that deploys a fully-automated transit vehicle to report the results of that deployment.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:CA2019000S336&ciq=ncsl&client_md=e858291ec01eb305f18cdd580ef3e9ca&mode=current_text
California	No	**CA A 516**	Authority to Remove Vehicles	Pending-Senate Appropriations Committee- July 2019	Deletes the authority of a peace officer or public employee to immobilize a vehicle under certain circumstances. Modifies the authority to remove a vehicle parked or left standing for more than a certain period of time in violation of a local ordinance. Requires local authorities to provide specified information on parking notices.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:CA2019000A516&ciq=ncsl&client_md=8de09660f63572b96500485bab2fa5ac&mode=current_text
California	No	**CA A 1964**	Autonomous Vehicles	Pending - Assembly Transportation Committee - January 2020	Expands the definition of the term autonomous vehicle to also include a remotely operated vehicle, defined as a specified type of vehicle that is capable of being operated by a driver or operator that is not inside of the vehicle. Specifies that a vehicle is not an autonomous vehicle if it is equipped with a collision avoidance system that is not capable of driving the vehicle without the active control or monitoring of a human operator that is seated in the vehicle.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:CA2019000A1964&ciq=ncsl&client_md=f6b786eb7c593146882f5953ee83d086&mode=current_text
Colorado	Yes	**Senate Bill 213**	Autonomous Vehicles	Enacted in 2017	A person may use an automated driving system to drive a motor vehicle if the system is capable of complying with every state and federal law that applies to the function that the system is operating. Further, Colorado law addresses liability for a crash involving an AV: Liability for a crash involving ADS driving a motor vehicle that is not under human control is determined in accordance with applicable state, federal or common law.	https://leg.colorado.gov/bills/sb17-213

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Connecticut	No	**Senate Bill 260**	Autonomous Vehicles	Enacted in 2017	Establishes a Task Force to study AV technology and make recommendations related to AV regulation and establishment of Pilot Program to test AVs.	
Delaware	Yes	**Executive Order: 14**	Automous Vehicles	Enacted in 2017	Establishes an Advisory Council on AVs with support from Delaware DOT will provide staff and support to the Advisory Council. The University of Delaware's Institute for Pulic Admin created a comprehensive report on AV technology, law and policy and important issues of liability: To avoid some uncertainty and clarify the liability landscape that will evolve in US courts, some manufacturers are announcing that they will simply accept responsibility if there are incidents involving their AVs.	
District of Columbia	No	DC B 232	Autonomous Vehicle Testing Program	Pending - Transportation and the Environment Committee - April 2019	(Amendment) Amends the Autonomous Vehicles Act to establish an Autonomous Vehicles Testing Program to be administered by the District Department of Transportation, authorizes the Department to issue permits for the testing of autonomous vehicles on public roadways in the District, authorizes the Department to suspend or revoke permits, authorizes the Department to restrict testing under certain conditions.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:DC2019000B232&ciq=ncsl&client_md=f540c263015fa1efb0c1700189f30c12&mode=current_text
District of Columbia	No	DC B 248	Autonomous Vehicle Act	Pending - Transportation and the Environment Committee - April 2019	(Amendment) Amends the Autonomous Vehicle Act to modernize the framework for autonomous vehicles operating within the District of Columbia.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:DC2019000B248&ciq=ncsl&client_md=f4cabf9af88e15b0fb8319445dd90c1b&mode=current_text
Florida	Yes	FL H 771 (FL 395 and 378 - Similar)	Motor Vehicle Insurance	FAILED - January 2020	Relates to motor vehicle insurance, amends the Motor Vehicle No Fault Law, revises a requirement for proof of security on a motor vehicle and the applicability of the requirement.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:FL2020000H771&ciq=ncsl&client_md=91d14d0321bfd636feab68641fd80164&mode=current_text
Florida	Yes	**FL H 4713**	Apporpriations Project	FAILED - January 2020	Provides an appropriation for the Autonomous Transit AV Technology, Workforce and Economic Opportunity.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:FL2020000H4713&ciq=ncsl&client_md=39865e73394b1754d3ef2c866a002fe5&mode=current_text
Florida	No	**HB 7027**	Autonomous Vehicles	Enacted in 2016	Allows person with valid DL to operate AV on public roads. Further, the FDOT created the Florida Automated Vehicles program to educate the public.	
Georgia	No	**SB 219**	Autonomous Vehicles	Enacted in 2017	Allows person to operate AV on public roads. Further, the Georgia House Autonomous Vehicle Technology Committee issues a Report which addressed AV technology, law and policy.	
Georgia	No	**GA G 862**	Cybersecurity Task Force	Pending - House Public Safety and Homeland Security Committee	Relates to the Georgia Bureau of Investigation, so as to provide for the establishment of a Cybersecurity Task Force, provides for its membership, powers and duties, reports and recommendations, and dissolution, provides for definitions, provides for related matters, repeals conflicting laws.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:GA2019000H862&ciq=ncsl&client_md=dd0fe4c8f29581e5ea04271d592ef964&mode=current_text
Hawaii	Yes	**HI H 1183**	Autonomous Motor Vehicles	Pending - House Transportation Committee - January 2019	Authorizes for testing purposes the operation of autonomous vehicles in the state, requires Department of Transportation to establish an application and approval process and report annually to the legislature, makes an appropriation.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:HI2019000H1183&ciq=ncsl&client_md=1c13791ef400ec85fc340eabdac182db&mode=current_text
Hawaii	**No**	**HI H 1725**	Automatic Public Transit Interference Offense	Pending- House Finance Committee	Includes as a Class C felony the offense of interference with the operation of an automated public transit vehicle, system, or service.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:HI2019000H1725&ciq=ncsl&client_md=4538f5139eada714b27a5ac40f7acbc2&mode=current_text
Hawaii	**No**	**HI H 2590**	Autonomous Vehicles Testing Pilot Program	Pending - Multiple Committees - May 2020	Establishes within the Department of Transportation a two-year autonomous vehicles testing pilot program, requires report to the legislature, appropriates funds.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:HI2019000H2590&ciq=ncsl&client_md=eb5c8aeda61c16d16b63735d8938a944&mode=current_text
Hawaii	Yes	HI S 3060	Autonomous Vehicles Testing Program	Pending - Multiple Committees - January 2020	Requires the Director of Transportation to establish the autonomous vehicles testing program, requires the program to authorize the testing of a vehicle in the State by an automated driving system, exempts a vehicle with an engaged automated driving system from licensure, provides protocol in case of an accident involving an autonomous vehicle, requires a vehicle equipped with an automated driving system to be properly titled, registered, and insured, preempts the counties from regulating the testing.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:HI2019000S3060&ciq=ncsl&client_md=9d88fa2d3002a3bd7ed4744ca89ec0da&mode=current_text

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
Idaho	No	Executive Order No 2018-01	Autonomous Vehicles	Signed in 2018	Created the Committee devoted to AV testing.	https://itd.idaho.gov/autonomous/
Iowa	No	IA HSB 122	Automated Driving System Motor Vehicles	Pending - House Transportation Committee - February 2019	Relates to motor vehicles operated by an automated driving system, makes penalties applicable.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:IA2019000HSB122&ciq=ncsl&client_md=05a52077136bc6cccf38255c7dbb6054&mode=current_text
Iowa	No	IA S 302 (H 535 is a similar bill that was failed/withdrawn)	Automated Driving System Motor Vehicles	Enacted/Signed by Gov - May 2019	Establishes regulations for motor vehicles operated by an automated driving system.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:IA2019000S302&ciq=ncsl&client_md=9cdcfa9cd395ad65d87b102c218ab714&mode=current_text
Iowa	**No**	IA SSB 1128	Automated Driving System Motor Vehicles	Pending - Senate Transportation Committee - Feb 2019	Relates to motor vehicles operated by an automated driving system, makes penalties applicable.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:IA2019000SSB1128&ciq=ncsl&client_md=22ca9660711885af111316bf738dfb96&mode=current_text
Kentucky	**No**	SB 116	Vehicle Platooning	Passed in 2018	Allows for Vehicle Platooning subjec to specific requirements. University of Kentucky issued a comprehensive Report on AV technology, law and policy.	
Louisiana	**No**	HB 1143	Autonomous Vehicles	Passed in 2016	Defines Autonomous Technology. Louisiana State University developed a comprehensive Report on AV technology, policy and law.	
Maine	**No**	ME H 135	Smart City Technology	Pending - Carryover - Joint Committee on Appropriations and Financial Affairs	Provides funds through the Maine Technology Institute to allow municipalities to invest in smart and connected infrastructure, technology, and capacity, including but not limited to, information and communications technology such as broadband connectivity, connected sensors, and data aggregation platforms, light-emitting diode lighting, adaptive traffic control signals, and autonomous vehicle projects.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:ME2019000H135&ciq=ncsl&client_md=b1187845dde87eba0d7bbe30ae08277a&mode=current_text
Maine	**Yes**	ME H 1222	Automated Driving Safety Act	Failed - May 2019	Establishes the Automated Driving Safety Act, which provides standards for the registration of automated vehicles, the licensure of automated vehicle operators and the liability of the operators and providers of automated vehicles, defines a provider for an automated vehicle as an individual, organization, or joint enterprise that controls an automated driving system of an automated vehicle for testing or deployment of the automated vehicle on a public way.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:ME2019000H1222&ciq=ncsl&client_md=765691071b6d2ae73d1a73cfb6b246ac&mode=current_text
Maryland	**No**	MD H 1464	Vehicle Data	Failed - Feb 2020	Establishes that the owners of certain vehicles own certain data collected and stored by the vehicle or a vehicle data recorder, prohibits certain persons from retrieving or distributing data collected and stored by a vehicle or a vehicle data recorder, subject to certain exceptions, authorizes certain persons to retrieve or distribute certain aggregated data collected and stored by a vehicle or vehicle data recorder.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MD2020000H1464&ciq=ncsl&client_md=0726dd6d419a3019d84dd5c29420ca2d&mode=current_text
Maryland	**No**	HB 1013	SAVE Act	Introducted in 2017 - Not passed	Safe Autonomous Vehicles Act was introduced but not passed. The autonomous vehicle lab is located at the University of Maryland.	
Massachusetts	**No**	MA S 2056	Internet Connected Devices and Autonomous Vehicles	Pending - Joint Committee on Transportation - January 2019	Relates to the cybersecurity of the internet connected devices and autonomous vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000S2056&ciq=ncsl&client_md=6b516da760f342f283c28448b6c36857&mode=current_text
Massachusetts	**No**	MA S 2115	Autonomous Vehicles Safe Integration	Pending - Senate Second Reading - January 2019	Promotes the safe integration of autonomous vehicles into the transportation system of the Commonwealth.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000S2115&ciq=ncsl&client_md=b620d6d783e25b38f37b5bb66e112d77&mode=current_text
Massachusetts	**No**	MA H 2291	Autonomous Driving Limitations	Pending - Joint Committee on Transportation - February 2019	Relates to limiting autonomous driving capabilities to zero emission and electric vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000H2991&ciq=ncsl&client_md=5b8d593deba655520194d593d42b40f9&mode=current_text
Massachusetts	No	MA H 3013	Safe Integration of Autonomous Vehicles	Pending - Joint Committee on Transportation - February 2019	Promotes the safe integration of autonomous vehicles into the transportation system of the Commonwealth.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000H3013&ciq=ncsl&client_md=41cf5dede7ef027351c925cd660c6cf6&mode=current_text
Massachusetts	No	MA H 3089	Autonomous Vehicles	Pending - Joint Committee on Transportation - February 2019	Relates to Autonomous Vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000H3089&ciq=ncsl&client_md=5644a8927f40f55377d0d09ee1ca401e&mode=current_text

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
Massachusetts	No	MA H 3143	Autonomous Vehicles	Pending - Joint Committee on Transportation - February 2019	Relates to Autonomous Vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000H3143&ciq=ncsl&client_md=ac37e5fa165abd696c93f81f1e6e9157&mode=current_text
Massachusetts	No	MA H 3672	Autonomous Vehicle Event Data Recorders	Pending - Joint Committee on Transportation - February 2019	Relates to event data recorders in autonomous vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MA2019000H3672&ciq=ncsl&client_md=2329e9531ff5044e77ce0a839ccf027e&mode=current_text
Missouri	No	MO H 2059	Operation of Automate Motor Vehicles	Pending - House - January 2020	Prohibits the operation of automated motor vehicles unless a person who is licensed to operate a motor vehicle is present in the vehicle while it is being operated.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:MO2020000H2059&ciq=ncsl&client_md=e4689495c4f49af28ba0e8b00acfdbbb&mode=current_text
Nebraska	Yes	Legislative Bill 989	Autonomous Vehicles	Approved in 2018	The law allows operation of a AV without a driver subject to conditions. It also specifies that the AV operator must demonstrate satisfactory financial stability and compliance with insurance requirements. It clearly states that no additional liability will be imposed on the manufacturers, developers, or AV owners beyond what the State already allows.	
Nebraska	Yes	NE L 142	Driving Automation Systems and Liability	Pending - Legislature - January 2019	Changes provisions relating to driving automation systems and liability.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NE2019000L142&ciq=ncsl&client_md=18b0421027819e77152e995a016e7e6f&mode=current_text
Nebraska	No	NE L 521	Automated Vehicles	Pending - Transportation and Telecommunications Committee - January 2019	Changes and eliminates provisions relating to automated vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NE2019000L521&ciq=ncsl&client_md=54041e60138e212966083c0c65544b72&mode=current_text
Nevada	No	Assembly Bill 511 (updated in 2017 by Assembly Bill 69)	AV	2011	Authorizes AV testing on public roads.	
Nevada	Yes	SB 313	AV	2013	Provides that manufacturers are not liable for AV accidents if a third party converted the vehicle to an AV. Must have $5,000,000 in coverage.	
New Hampshire	No	NH S 216	Automated Vehicle Testing and Deployment Commission	Enacted: 2019-310	Establishes an Automated Vehicle Testing and Deployment Commission and an automated vehicle testing pilot program, requires the State transportation council to conduct a review of automated vehicle testing and deployment, establishing an automated vehicle testing pilot program, and providing requirements for automated vehicle deployment.	
New Jersey	No	NJ A 2807	Autonomous Vehicles Interaction Training	Pending - Vehicles Interaction Training - February 2020	Requires Department of Law and Public Safety to establish training program to prepare law enforcement to interact with autonomous vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NJ2020000A2807&ciq=ncsl&client_md=7bad6d9805ca83376d26b366f29ab8da&mode=current_text
New Jersey	No	NJ A 1607	Testing and Use of Autonomous Vehicles on State Roadway	Pending - Assembly Transportation and Independent Authorities Committee - January 2020	Permits testing and use of autonomous vehicles on state roadways under certain circumstances.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NJ2020000A1607&ciq=ncsl&client_md=875ff0725257a512d665a23144e2b1bf&mode=current_text
New Jersey	No	NJ A 1189	Fully Autonomous Vehicle Pilot Program	Pending - Assembly Transportation and Independent Authorities Committee - January 2020	Establishes a fully autonomous vehicle pilot program.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NJ2020000A1189&ciq=ncsl&client_md=470c3671f16bdd9c095937bf3d912e63&mode=current_text
New Jersey	No	NJ A 1187	Drivers License Endorsement	Pending - Assembly Transportation and Independent Authorities Committee - January 2020	Directs the Motor Vehicle Commission to establish a driver's license endorsement for autonomous vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NJ2020000A1187&ciq=ncsl&client_md=26b8c25222b83034ee24627bb7b69712&mode=current_text
New Jersey	**No**	NJ AJR 164	Advanced Autonomous Vehicle Task Force	Enacted - Act No. 2019-2Revises provisions relating to the Advanced Autonomous Vehicle Task Force.	Revises provisions relating to the Advanced Autonomous Vehicle Task Force.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NJ2018000AJR164&ciq=ncsl&client_md=cbe0885f1c167f74b0716b4942269e77&mode=current_text
New York	**No**	NY S 65	Driving Automation Systems	Pending - Senate Transportation Committee - January 2019	Relates to permitting a driver to not have a hand on the steering mechanism of a vehicle while a driving automation system is engaged.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000S65&ciq=ncsl&client_md=8da4b61740f22a04f418fc0ca7abf76a&mode=current_text
New York	**No**	NY A 301	Driverless Vehicles Study	Pending - Assembly Labor Committee - January 2019	Requires the Department of Labor to conduct a study on the potential impact of driverless vehicles on occupations and employment.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000A301&ciq=ncsl&client_md=5b8c203f85854c2040a1b90408674e46&mode=current_text

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
New York	**No**	NY S 1159	Testing and Operation of Autonomous Vehicles	Pending - Senate Transportation Committee - January 2019	Directs a study and report on the testing and operation of autonomous vehicles on public highways and directs the commissioner of the Department of Transportation to take action to support such testing and operation.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000S1159&ciq=ncsl&client_md=1ec0acbd8a825167d1b6b19ce261bbda&mode=current_text
New York	**No**	NY A 1554	NY State Autonomous Vehicle Task Force	Pending Assembly Transportation Committee - January 2019	Establishes the New York state autonomous vehicle task force to study autonomous vehicle usage on the roads located within the state of New York.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000A1554&ciq=ncsl&client_md=16b1cf7b0c903548b1ed867d4c6ec781&mode=current_text
New York	**No**	NY S 1779	Autonomous Vehicles	Pending - Senate Transportation Committee - January 2019	Provides for a definition of autonomous vehicles, mandates that drivers with a Class D learner's permit or license may only operate an autonomous vehicle under supervision.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000S1779&ciq=ncsl&client_md=0a7f24c03a8afa11812983e23b01761f&mode=current_text
New York	**No**	NY A 1808	Commissioner of the DOT	Pending Assembly Transportation Committee - January 2019	Amends the transportation law, relates to authorizing the Commissioner of the Department of Transportation to enroll New York state in any federal pilot program or project for the collection and study of state roadway safety, infrastructure sustainability, congestion mitigation, transportation system efficiency, autonomous vehicle technology, or capacity challenges.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000A1808&ciq=ncsl&client_md=7700f1628a86a583e17b7fd9fb29e475&mode=current_text
New York	No	NY A 2643	Motor Vehicles with Autonomous Technology	Pending Assembly Transportation Committee - January 2019	Provides for and regulates the operation and testing of motor vehicles with autonomous technology.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000A2643&ciq=ncsl&client_md=973ac7009f22e5bf7c7e8c11d5d2f3bf&mode=current_text
New York	No	NY A 6014	Task Force on Automated Vehicle Technology	Pending - Senate January 2020	Establishes the Task Force on Automated Vehicle Technology to study, evaluate and develop recommendations relating to specific actionable measures that address how automated vehicle technology will transform the state's roadways, economy, education system, and society.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000S6014&ciq=ncsl&client_md=c4f4d12673376d3ce7891a6d4e57af38&mode=current_text
New York	No	NY S 6052 (same as NY A 8460)	Commissioner of Transportation	Pending - Senate June 2019	Authorizes the Commissioner of Transportation to conduct a comprehensive study on designation of private roads on the University at Buffalo North Campus for the purposes of autonomous vehicle technology testing.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000S6052&ciq=ncsl&client_md=779ff309eaf08a76aadfe424564306dc&mode=current_text
New York	No	NY A 7980	Automated Vehicle Technology Study	Pending - Assembly Transportation Committee	Establishes the New York Task Force on Automated Vehicle Technology to study and assess the future of automated vehicle technology.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:NY2019000A7980&ciq=ncsl&client_md=0327609b2e3a17a23d8a8ea579e9c6ef&mode=current_text
North Carolina	No	HB 469	AV Regulations	Passed in 2017	An act to regulate Automated Motorized Vehicles on the Public Highways of this State; AV are permitted to perate in NC. Owner is liable for any traffic violations.	
North Dakota	No	HB 1065 (2015) & HB 1202 (2017)	AV Studys	Enacted in 2015 & 2017	Study and analyze the technology of Automated Vehicles and report back.	
Ohio	No	OH 26	Statewide Center for Smart Mobility	Executive Order 2019 - 26 D	Reestablishes DriveOhio as the statewide center for smart mobility.	http://custom.statenet.com/public/resources.cgi?id=ID:exec_order:OH201926&ciq=ncsl&client_md=8f068ef63086aa6a6976c427d0eb7a34&mode=current_text
Oklahoma	No	OK S 365	Motor Vehicles	Enacted as Act No. 316 - May 2019	Relates to motor vehicles, creates the State Driving Automation System Uniformity Act, provides definitions, provides preemption authority, provides for codification, provides an effective date.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:OK2019000S365&ciq=ncsl&client_md=714735175cb7cfaa0cfc6101fc869ed1&mode=current_text
Oklahoma	No	OK H 1866	Motor Vehicles	Pending - House Rules Committee - February 2019	Relates to motor vehicles, creates the Self-Driving Vehicle Reform Act, provides for noncodification, provides an effective date.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:OK2019000H1866&ciq=ncsl&client_md=e3338fa541425c7499c8f1efe3f6db5d&mode=current_text
Oregon	No	HB 4063	AV	Enacted in 2018	Established an AV Task Force.	
Pennsylvania	No	PA H 1078	Autonomous Vehicle Provisions	Pending - House Transportation Committee - April 2019	Amends Title 75 Vehicles of the Pennsylvania Consolidated Statutes, in general provisions, provides for definitions, relates to miscellaneous provisions, provides for autonomous vehicles and imposing a penalty.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:PA2019000H1078&ciq=ncsl&client_md=b8a14dbdeea33346fe39aefc0d05d0c8&mode=current_text
South Carolina	No	HB 3289	AV	Passed in 2017	Allows vehicle platooning on roadways and potentially an automated public transportation system.	
Tennessee	No	SB 598	AV	Passed in 2015	Prohibits local municipalitiies from banning AV technology.	

State	Apportionment of Liability/ Insurance Requirements	House Bill/ Executive Order	Title or Topic	Status	Description	Website for more information
Tennessee	Yes	SB 151	AV	Passed in 2017	Automated Vehicles Act: defines Automated Driving System; Liability for accidents involving an AV is determined in accordance with product liability law, common law or other applicable state/federal laws.	
Texas	No	SB 2205	AV	Passed in 2017	Allows for AV operation in the State with conditions.	
Vermont	No	VT S 149	Vehicles	Enacted as Act No. 60 - June 2019	Makes miscellaneous changes to laws related to vehicles, establishes an automated vehicle testing program, requires the Department of Motor Vehicles to provide written forms, applications, and tests translated into certain languages and to allow an applicant to have an individual of his or her choosing at the oral examination or road test required for licensing to serve as an interpreter, requires the Commissioner of Motor Vehicles to provide training on cultural differences to employees.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:VT2019000S149&ciq=ncsl&client_md=c163bd797e8603d8a054ebc1017109a9&mode=current_text
Washington	No	WA H 2676	Autonomous Vehicles Testing	Enacted as Act No. 182 - March 2020	Establishes minimum requirements for the testing of autonomous vehicles.	http://custom.statenet.com/public/resources.cgi?id=ID:bill:WA2019000H2676&ciq=ncsl&client_md=525cfad57507cc152c166fbcd32213a6&mode=current_text

The National Highway and Transportation Safety Administration (NHTSA) released new federal guidelines for Automated Driving Systems (ADS). A Vision for Safety 2.0, the latest guidance for automated driving systems to industry and the states.

The guidance builds on NHTSA's 2016 guidance. For more information on the 2016 guidance please see NCSL's Info Alert.

Separated into two sections – voluntary guidance and technical assistance to states – the new guidance focuses on SAE international levels of automation 3-5, clarifies that entities do not need to wait to test or deploy their ADS, revises design elements from the safety self-assessment, aligns federal guidance with the latest developments and terminology, and clarifies the role of federal and state governments. The guidance reinforces the voluntary nature of the guidelines and does not come with a compliance requirement or enforcement mechanism. The guidance attempts to provide best practices for legislatures, incorporating common safety-related components and elements regarding ADSs that states should consider incorporating into legislation. Additionally, it includes DOTs view of federal and state roles and provides best practices for state legislatures and best practices for highway safety officials.

NHTSA's updated guidance comes on the heels of the Sept. 6, passage of the SELF Drive Act (H.R. 3388) that aims to make several changes to federal law impacting autonomous vehicles. NCSL, along with several state groups, issued letters as the bill made its way through the House. The bill includes four main sections: expansion of federal preemption; updates to federal motor vehicle safety standards (FMVSS); exemptions from FMVSS and a federal automated vehicles advisory council. For more information on the House bill, see NCSL's Info Alert.

On Sep. 28, the Senate Commerce Committee Chairman John Thune (R-S.D.) and Senators Gary Peters (D-Mich.), Roy Blunt (R-Mo.), and Debbie Stabenow (D-Mich.) unveiled legislation regarding autonomous vehicles—the American Vision for Safer Transportation Through Advancement of Revolutionary Technologies (AV START) Act. The Commerce Committee will consider the legislation at a markup scheduled for Oct. 4. The AV START Act is similar to the House passed SELF DRIVE Act but does contain some significant differences. For more on the Senate bill, see NCSL's info alert.

In January 2016, U.S. Transportation Secretary Anthony Foxx unveiled new policy that updates the National Highway Traffic Safety Administration's (NHTSA) 2013 preliminary policy statement on autonomous vehicles. This announcement was made at the North American International Auto Show in Detroit in conjunction with a commitment of nearly $4 billion over the next 10 years to accelerate the development and adoption of safe vehicle automation. The new policy is designed to facilitate and encourage the development and deployment of technologies with the potential to save lives. Within six months, NHTSA will propose guidance to industry on establishing principles of safe operation for fully autonomous vehicles.

States w/o Enacted Legislation

Alaska
Montana
Wyoming
Missouri
Kansas New
Mexico
Maryland
New Jersey
Rhode
Island West
Virginia
South
Dakota
Virginia

Chapter II

The Prevailing Legal Views On Apportionment Of Liability

EXECUTIVE SUMMARY

The current and prevailing legal views on how liability should be assessed and apportioned in vehicular accidents involving autonomous vehicles narrow down to three different analytical frameworks: 1) the driver-focused liability framework; 2) the product liability framework; and 3) the manufacturers enterprise responsibility framework. This chapter will discuss the contours and ramifications of each such liability framework.

1. THE DRIVER-FOCUSED LIABILITY FRAMEWORK

I. INTRODUCTION

The National Highway Traffic Safety Administration ("NHTSA") has adopted the five-level classification of automation developed by the Society of Automotive Engineers.[1] At Level 0, the driver does everything. At Level 1, an automated system on the vehicle can assist the driver with part of the driving task under certain circumstances. At Level 2, the automated system can conduct some part of the driving task while the human driver monitors the environment and completes the task. At Level 3, an automated driving system can conduct part of the driving task *and* monitor the driving environment in some instances, with the human driver ready to take control if necessary. At Level 4, the automated system conducts the driving task and monitors the environment under certain conditions, and the human operator need not take back control. At Level 5, the automated driving system performs all driving tasks that a human could perform, and under all conditions.[2]

Currently, most established auto manufacturers are pursuing development of automated vehicles ("AVs"). Some manufacturers, like Google and Volvo, are planning to move directly to Level 4 and 5 vehicles, electing to bypass Level 3 entirely.[3] Others are working toward a gradual evolution from our current automobiles with limited semi-autonomous features, to Level 2 and 3 vehicles, and then eventually to fully autonomous functionality at Levels 4 and 5.[4]

Historically, technological improvements in vehicles have increased safety in terms of avoiding accidents, and mitigating the seriousness of accidents when they occur.[5] For example, seatbelts were introduced in the early 1960s, and are now used by roughly nine out of ten drivers in the United States. In 2014, unrestrained auto occupants accounted for only 13% of travelers but 50% of fatalities. A KPMG-convened group of insurance experts estimated a roughly 80% decrease in auto accidents by 2040 with full deployment of AVs.[6]

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[1] Antonio Davola, *A Model for Tort Liability in a World of Driverless Cars: Establishing a Framework for the Upcoming Technology*, 54 IDAHO L. REV. at 595 (October 2018).
[2] Kenneth S. Abraham and Robert L. Rabin, *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Leal Regime for a New Era*, 105 VA. L. REV. at 130 - 131 (March 2019).
[3] Gary Marchant and Rida Bazzi, *Autonomous Vehicles and Liability: What Will Juries Do?*, 26 BU. J. SCI & TECH. L. at 73 (Winter 2020).
[4] *Id.*
[5] Bryant Walker Smith, *Automated Driving and Product Liability*, 2017 MICH. ST. L. REV. at 11 (2017).
[6] Marchant and Bazzi.

However, these changes in automation will not happen overnight. At this time, there are no Level 3 vehicles even available for public sale.[7] In the coming years, there will be incremental movement toward Levels 4 and 5 AVs, where no operator is required, also referred to as highly automated vehicles ("HAVs").[8] Some experts predict that roadways will carry Level 4 and 5 AVs by the mid-2020s.[9] Of course, this will not completely remove conventional vehicles ("CVs") from the road. The average age of automobile is eleven years old.[10]

A study conducted by Google predicted that AVs will perform better when there are no CVs on the road, where they can communicate with each other absent human driver interference or error.[11] In the meantime, this transition will require AVs, at various levels of automation, to co-exist with CVs for many years. These AVs will be expected to safely interact with CVs, bicyclists, and pedestrians. As the mix of traffic evolves, so will the mix of accidents involving AVs. During this transition period, our current driver-focused tort system may face challenges addressing the types of accidents that occur.

II. THE CURRENT SYSTEM OF DRIVER-FOCUSED LIABILITY

Traditionally, tort claims involving automobile accidents revolve largely around driver-focused liability.[12] Negligence is typically the relevant legal doctrine for determining such liability.[13] The NHTSA reports that roughly 94% of crashes are directly attributed to driver error, while only 2% are the result of failure by a vehicle.[14] These driver errors include speeding, inattention, distraction, illegal maneuvers, poor control, falling asleep, and alcohol or drug impairment.

Over the last 20 years, anywhere from 5,000 to 12,000 automobile negligence claims are resolved each year.[15] Conversely, fewer than 200 vehicle product liability cases per year were resolved against automakers over this same period.[16] As AVs are integrated into our daily lives, we will observe a significant reduction in the amount of road accidents, overall.[17] However, the accidents that do occur may be caused by an alleged failure of the vehicle itself. With AVs of increasing level of automation, a larger share of the accidents will implicate product liability law

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[7] Abraham and Rabin at 131.
[8] *Id.*
[9] *Id.*
[10] Smith at 11.
[11] Madeline Roe, *Who's Driving That Car?: An Analysis of Regulatory and Potential Liability Frameworks for Driverless Cars*, 60 B.C. L. REV. at 325 – 326 (January, 2019).
[12] Currently, twelve states have adopted a "no-fault" approach, limiting an accident victim's recovery to his or her own first-party insurance, unless the loss surpasses a serious injury or monetary threshold.
[13] Marchant and Bazzi at 85.
[14] *Critical Reasons for Crashes Investigation in the National Motor Vehicle Crash Causation Survey*, National Highway Traffic Safety Administration, U.S. Dept. of Transportation (February 2015).
[15] Marchant and Bazzi at 86.
[16] Marchant and Bazzi at 86.
[17] Antonio Davola, *A Model for Tort Liability in a World of Driverless Cars: Establishing a Framework for the Upcoming Technology*, 54 IDAHO L. REV. 594 (October 2018).

and auto manufacturers are more likely targets for lawsuits.[18] In other words, the auto manufacturer industry "will likely bear a bigger slice of a smaller pie of total crash costs."[19]

While HAVs are not yet available to the general public, these vehicles have been tested on public roads in multiple cities in recent years.[20] A handful of accidents involving these AVs foreshadow a potential paradigm shift in the apportionment of liability in automobile accidents as more AVs are introduced.

III. NOTABLE AV ACCIDENTS

On February 14, 2016, an autonomous Google Lexus SUV caused a low speed accident with a bus in Mountain View, California. The Google AV detected sandbags in the road and moved to get around them as a public transit bus approached. The AV operator observed the bus, but believed it would stop to let the Google AV continue into its lane. The automated driving system made this same assumption. The bus did not stop, and the AV contacted the side of the bus at very low speed.[21] Google admitted responsibility for the accident, but the California DMV did not address the issue of fault.

On December 7, 2017, a self-driving Chevy Volt allegedly ran into a motorcyclist in San Francisco, California. The plaintiff-motorcyclist claimed that he was riding behind the autonomous car when it veered into his lane and knocked him to the ground. General Motors, which settled the civil lawsuit, acknowledged the aborted lane change in its report filed with the California DMV, but did not admit fault.[22]

On March 18, 2018, a pedestrian was struck and killed by self-driving Uber car while crossing the street illegally in Tempe, Arizona. An operator was in the driver's seat, but video showed she was distracted. According to the National Transportation Safety Board ("NTSB") report, the automated driving system ("ADS") detected the pedestrian 5.6 seconds before impact.[23] However, by the time the ADS determined that a collision was imminent, the situation exceeded the response specifications of the system. The system precluded activation of an emergency braking system to mitigate a collision, instead relying on the operator to intervene. The operator did not see the pedestrian until 1 second before impact.

The NTSB found that unsafe behavior by the pedestrian contributed to the accident, but its probable cause assessment focused primarily on the failure of the AV operator to monitor the driving environment and the operation of the automated driving system. Further, it stated that Uber's inadequate safety risk assessment procedures, ineffective oversight of vehicle operators, and lack of adequate mechanisms for addressing operators' automation complacency contributed to the crash. The NTSB found that Uber needed to develop effective countermeasures to control the risk of vehicle operator disengagement, which contributed to the crash. The NTSB was also

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[18] Smith at 2.
[19] Smith at 2.
[20] Marchant and Bazzi at 73.
[21] *Alex Davies, Google's Self-Driving Car Caused its First Crash, Wired* (February 27, 2016).
[22] Ryan Felton, *GM Settles Lawsuit With Motorcyclist Over Crash With Self-Driving Chevy Volt*, Jalopnik (June 1, 2018).
[23] National Transportation Safety Board, Public Meeting of November 19, 2019, Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian.

critical of the State of Arizona's lack of safety-focused application approval process, the lack of federal safety standards and assessment protocols for automated driving systems, as well as the NHTSA's inadequate safety self-assessment process.

IV. APPORTIONMENT DURING THE TRANSITION

The prevailing legal commentary predicts that as the percent of AVs increase, the apportionment of blame will shift away from drivers and toward auto manufacturers.[24] However, during this transition period, while more AVs are being introduced, the driver will still usually be responsible for any accidents that occur while he or she is operating the automobile. Google's driverless car project reported that most of the accidents it logged appeared to be the fault of humans. In some instances, it was the human operating the AV and in others it was a human driver in another vehicle. This is consistent with driverless vehicle tests in California, according to accident reports filed with the state.[25] Therefore, during this transition period, it will be necessary to rely on our current system of driver-focused tort liability.

For the most part, courts will continue to determine fault and liability on a case-by-case basis as they do now.[26] Courts will address the same fact-specific issues, such as whether one automobile was speeding, whether one violated traffic laws, and whether one of the vehicles failed. The big difference will be that courts will have more information to help determine fault.[27] Vehicles with automated driving systems can provide data for a finder of fact that wouldn't otherwise be available with CVs.

The level of autonomy of an AV may also be critical to determining liability in accidents with CVs.[28] For example, a Level 3 AV can operate autonomously in certain situations, but a human operator will remain in ultimate control of the vehicle with the responsibility to take over control if a situation exceeds the operational design capabilities of the AV.[29] When AVs reach Levels 4 and 5, they will be able to operate entirely autonomously in some (L4) or all (L5) conditions.[30] At this point, the question of liability will have completely shifted to whether the vehicles itself is responsible.[31] "[J]urors will be particularly harsh on AVs that draw on exotic artificial intelligence technology, and which may be involved in accidents that harm people notwithstanding their claims of improving overall vehicle safety."[32]

Since these HAVs have not yet been approved for the general public's use, there is no established legal doctrine addressing the liability framework for fully autonomous vehicle accidents.[33] In the meantime, legislators and courts will be tasked with striking a balance between

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[24] Davola at 600.
[25] Hayley Tsukayama, *A driverless bus got into a crash during its first day on the job,* Washington Post (November 9, 2017).
[26] Yuki Noguchi, *Self-Driving Cards Raise Questions About Who Carries Insurance*, NPR (April 3, 2017).
[27] *Id.*
[28] Marchant and Rida Bazzi at 73.
[29] *Id.*
[30] *Id.*
[31] *Id.*
[32] Marchant and Bazzi Abstract.
[33] Roe at 321.

holding manufacturers responsible for accidents caused by cutting edge technology they develop, and discouraging them from developing AVs to avoid this shift in blame.

While employment of a higher percentage of autonomous vehicles will almost certainly decrease the total number of accidents, autonomous vehicle manufacturers may bear a greater share of the liability. Regulators will need to juggle holding businesses accountable for wrongdoing and concerns about slowing technology expected to take lives. Heightened exposure to product liability claims could potentially lead to an inflated price for automated driving systems, which could mean slower adoption of automated systems. In turn, this could result in preventable injuries and deaths.

V. CONCLUSION

While AVs remain a relatively insignificant proportion of the motor vehicle accident mix, our current rules governing liability should apply to claims involving CVs and AVs for the time being. Claims will still be based largely around driver-focused negligence, and liability will be determined on a case-by-case basis. However, as AVs become more common, and the level of autonomy increases, traditional driver-focused negligence will become a less suitable means for apportioning liability. The compensation regime will begin to shift from negligence to product liability. With the increase in automation, we should observe a significant reduction in the number of auto accidents, but auto manufacturers will be a more likely target for lawsuits when accidents do occur.

2. THE PRODUCT LIABILITY FRAMEWORK

I. INTRODUCTION

Autonomous vehicles make it feel like the future is here, but fully driver-less vehicles are not yet in full operation in the United States. Legislative and regulatory frameworks for autonomous vehicles have largely kept driver-less vehicles at bay. For now. Nevertheless, driver-assisted technology and semi-autonomous vehicles are sharing our roadways today and presenting various liability concerns from vehicle owners to robotaxi, rideshare and delivery businesses to manufacturers, distributors and software designers. Understanding the potential liability exposure and evaluating the unique functions of an autonomous vehicle will be key for manufacturers and software designers that place these vehicles on the road.

On the one hand, autonomous vehicles are seen as a boon to improve safety on the roads and highways. But, on the other hand, the uncertain liability scheme presents a challenge to progress because of the unknown costs once the vehicles are more prevalent on the road. The reality is that potential liability exposure may be an impediment to development of autonomous vehicles.[34] Moreover, as the vehicles are programmed to make more decisions, the potential liability for the manufacturer and designers of these vehicles will be potentially greater than the driver.

"A legal question is deeply unsettled when it could be plausibly resolved in substantially different ways. The more difficult a tort problem, the more likely that it will be initially resolved in an erroneous manner. The potential for legal error is then compounded by the need for courts to resolve this issue for each body of state tort law. As compared to a relatively 'easy' problem, courts across the country are more likely to adopt different rules for solving a difficult tort issue, creating substantial variability within the national market. Courts will presumably correct mistakes over time, but the prospect of initial legal error and widespread disagreement creates an additional source of uncertainty for manufacturers trying to assess their potential liability in the national market."[35] This will, in turn, increase the demand for insurance coverage to protect manufacturers as they enter the autonomous vehicle market. At least one manufacturer has accepted potential liability in the context of accidents in "autopilot" or fully driver-less mode: "Volvo Cars will accept full liability for the actions of its autonomous cars when in Autopilot mode, making it one of the first manufacturers to take this vital step forward in the development of self-driving cars."[36] Certainly this tells of the desire to favor progress over fear of liability. But, it is not without cost.

This section discusses the prevailing legal commentaries with respect to how product liability theories will affect finding, apportioning and accounting for potential liability. Manufacturers need to design the vehicle operating systems taking into account human errors that

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[34] Geistfeld, Mark. *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, 105 Calif. L. Rev. 1611, 1617-1618 (2017).
[35] *Id*.
[36] *Id*. at 1630; see also Volvo Cars Responsible for the Actions of its Self-Driving Cars, Volvo Cars (Oct. 20, 2015), http://www.volvocars.com/intl/About/Our-Innovation-Brands/IntelliSafe/IntelliSafe-Autopilot/News/Volvo-Cars-responsible-for-the-actions-of-its-self-driving-cars

are foreseeable in the context of a vehicle with some automated features, but where full control is not assumed by the operating system.

II. HOW DOES THE LAW HANDLE POTENTIAL LIABILITY FOR ACCIDENTS CAUSED BY AUTONOMOUS VEHICLES?

How the law should handle the development, manufacture and operation of autonomous vehicles when the vehicles are involved in accidents involving injuries and damages is an unsettled issue in the United States. As shown in Chapter I of this White Paper, while several states have proposed legislation relating to the testing and operation of autonomous vehicles on the roadway, no laws have been enacted addressing liability concerns in the event of accidents and resulting damages.[37] The critical question, and of concern to manufacturers and others in the autonomous vehicle distribution chain, is what is the potential liability exposure in the design, manufacture and operation of autonomous vehicles? This is particularly true on a national scale given manufacturers will want to know their potential liability exposure in placing these vehicles in the national market. Furthermore, it is important to consider potential liability exposure in developing, testing and the sale of autonomous vehicles as that exposure will inevitably and directly impact costs and insurance coverage considerations. While the National Highway Traffic and Safety Administration ("NHTSA") has issued statements with recommendations for how the states should handle autonomous vehicles, those recommendations do not implement regulations on the industry. Instead, it is up to the states themselves to develop guidelines and standards for the development, sale and use of autonomous vehicles.[38]

A. Product Liability Is A Predominate Emerging Legal Theory To Address Injuries And Damages Caused By Autonomous Vehicles

Product liability is frequently discussed in the legal community as a reasonable legal theory to hold manufacturers liable for accidents arising from operation and use of autonomous vehicles. Product liability is a logical theory to apply in this context given each autonomous vehicle with the same operating system executes the task of driving in the same manner, shifting liability from human errors of the driver to potential design defects of the manufacturers.

As Jeffrey Zohn opines in his University of Illinois Journal of Law, Technology & Policy article, there are three options for how the law should treat autonomous vehicles.[39] First, the law can apply already existing precedent for application of products liability to traditional automobiles. In that context, "[o]ne engaged in the business of selling or otherwise distributing products who sells or distributes a defective product is subject to liability for harm to persons or property caused by the defect."[40] To find liability, the law typically will evaluate if the cause of the accident was (1) a manufacturing defect, (2) a design defect, or (3) driver negligence. Second, Zohn opines that

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[37] Zohn, Jeffrey. *When Robots Attack: How Should the Law Handle Self-Driving Cars that Cause Damages*, 2015 U.Ill.J.L.Tech & Pol'y 461, 472 (2015); see also, IL Autonomous Vehicle Act, 2019 Text IL H.B. 2575 (not yet enacted) [Liability for accidents involving a fully autonomous vehicle (operates by definition without a driver) shall be determined under existing product liability or common law negligence principles.].
[38] *Id*. at 472-473.
[39] *Id*.
[40] *Id*. at 475, citing Restatement (Third) of Torts: Products Liability §1 (Am. Law Inst. 1998) and citing *Watxon v. Ford Motor Co.*, 699 S.E.2d 169, 174 (S.C. 2010).

the states can ignore the precedential product liability law and treat autonomous vehicles as a totally new product with new laws.[41] In this context, the states will need to enact legislation and create judicial precedent as autonomous vehicles are placed on the road and as accidents happen. Third, Zohn opines that autonomous vehicles should be treated as non-automobile products with similar features.[42] For example, for claims and lawsuits arising out of accidents involving autopilot planes and ships, liability is typically placed on the manufacturer unless the user is found independently negligent.[43] A key liability issue when comparing autonomous vehicles to other automated technology is the amount of training available to and required of the operator of an autonomous vehicle.[44] Liability will shift in this context from the manufacturer to the operator where the operator uses the autonomous vehicle in a negligent or reckless manner.

There is a significant precedent to apply if traditional products liability legal theories are applied to autonomous vehicles involved in accidents. A plaintiff seeking to hold a developer, manufacturer or distributor liable under a product liability theory can pursue a claim based on theories of ordinary negligence or strict products liability. A product liability claim based on alleged negligence focuses on the *behavior* of the developer, manufacturer or distributor. The key question in an ordinary negligence action will be whether the defendant(s) acted reasonably under the circumstances. However, a strict products liability claim focuses on the *product* itself. In other words, in a strict liability claim, the defendant(s) is liable if the product itself is defective. The latter claims require proof of a manufacturing, design or warning defect. "Autonomous vehicles will alter the mix and number of tort cases, causing a massive shift from ordinary negligence claims to those based on products liability."[45]

B. <u>Application Of Strict Liability To Autonomous Vehicles</u>

Strict liability claims are borne out of the idea that responsibility for defects is necessary to protect life and health when defective products are placed in the stream of commerce.[46] The liability risks to the manufacturer can be insured and those costs can be distributed among the public as a cost of doing business.[47] A plaintiff need only prove that he or she used the defective product in the manner intended and was injured "as a result of a defect in design and manufacture of which the plaintiff was not aware that made the product unsafe for its intended use."[48] In the context of autonomous vehicles, a strict liability claim will be favored by the plaintiffs' bar because all those in the distribution chain may be potentially liable as plaintiffs search for "deep pockets"

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[41] *Id.* at 479.
[42] *Id.* at 480-481.
[43] *Id.* at 481. See also *In re Korean Airlines Disaster*, 932 F.2d 1475 (D.C. Cir. 1991) [the court held Korean Airlines vicariously liable for the pilot's misuse of the airplane's autopilot by flying it into dangerous airspace at which time it was shot down by the USSR]; and see *Richardson v. Bombardier, Inc.*, 2005 WL 3087864 (M.D. Fla. 2005) [the airline was held liable, not the manufacturer, because although autopilot was used, the plane was found to be carrying an inappropriate and imbalanced amount of supplies.]
[44] Zohn, Jeffrey. *When Robots Attack: How Should the Law Handle Self-Driving Cars that Cause Damages*, 2015 U.Ill.J.L.Tech & Pol'y at 482.
[45] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1691.
[46] *Greenman v. Yuba Power Products, Inc.* (Cal. 1963) 59 Cal.2d 57.
[47] *Id.*
[48] *Id.* at 64.

to compensate for injuries. Moreover, the owner or operator will also be incentivized to seek to shift liability to the developer, designer or manufacturer for defects.

A manufacturing defect is defined as "'when the product departs from its intended design even though all possible care was exercised in the preparation and marketing of the product. Defects of this type occur for different reasons. Materials or component parts of the product can be contaminated or otherwise manufactured in a flawed manner due to an error in the production process; the product can be improperly assembled or constructed; or the product can be improperly packaged. Because these defects depart from design specifications, they exist only in aberrant products that would not satisfy quality-control standards. A commercial distributor of the defective product would be subject to strict tort liability in most states.'"[49] Liability for manufacturing defects can be reduced or eliminated by implementation of quality control practices. A manufacturer's potential exposure can be reduced by purchasing insurance to cover the risk.

A design defect exists "when foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product not reasonably safe."[50] In the context of autonomous vehicles, failure of product performance is a source of potential liability. Plaintiffs will not be required to prove exactly what in an autonomous vehicle's operating system caused the accident. "'[P]roduct performance is a sufficient substitute for direct proof of defect when it 'was of a kind that ordinarily occurs as a result of product defect; and … was not, in the particular case, solely the result of causes other than a product defect existing at the time of sale or distribution.' Because the defect in these cases is inferred from the product misperformance, the Restatement (Third) calls such performance a 'malfunction,' a usage adopted by some courts and commentators. Regardless of the label, this widely adopted doctrine subjects manufacturers to liability for product malfunctions."[51] Courts consider factors including the "'magnitude and probability of the foreseeable risks of harm, the instructions and warnings accompanying the product, and the nature and strength of consumer expectations regarding the product . . . .' Additionally, courts may consider production costs, product longevity, maintenance, and others factors. It should be evaluated on a case-by-case basis."[52]

It is expected that design defects in the context of autonomous vehicles will be evaluated like traditional strict product liability claims by application of a risk-utility test or a consumer expectation test. However, among the various jurisdictions in the United States, there are differing views as to which test is applied, with some jurisdictions utilizing a hybrid of the two. This difference in views will make it difficult for manufacturers to gauge their potential liability exposure in deploying autonomous vehicles in the national market. Nevertheless, the key questions to consider in evaluating a potential design defect are, "(1) whether the crash of an

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[49] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1633, citing Restatement (Third) of Torts: Products Liability §2(a) (Am.Law Inst. 1998).
[50] Restatement (Third) of Torts: Products Liability §2(b).
[51] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1634, citing Restatement (Third) of Torts: Product Liability §3 (Am.Law Ins. 1998).
[52] Zohn, Jeffrey. *When Robots Attack: How Should the Law Handle Self-Driving Cars that Cause Damages*, 2015 U.Ill.J.L.Tech & Pol'y at 475, citing Restatement (Third) of Torts: Products Liability §2 (Am. Law Inst. 1998).

[autonomous vehicle] is a malfunction, or (2) whether a vehicle that did not malfunction nevertheless has an unreasonably dangerous or defective design."[53]

Generally, consumers will have a minimum expectation that autonomous vehicles will perform as safely as traditional human-operated vehicles. But, given the fact that development of autonomous vehicles is driven by the concept that these vehicles are expected to be safer and reduce injuries on the roads and highways, it is expected that consumers' expectations may be that the vehicles will perform even to a higher standard. Under the consumer expectation test, "'the product must meet the safety expectations of the general public as represented by the ordinary consumer, not the industry or a government agency.' Under this test, the 'crucial question in each individual case is whether the circumstances of the product's failure permit an inference that the product's design performed below the legitimate, commonly accepted minimum safety assumptions of its ordinary consumers.' At minimum, the ordinary consumer expects that a product will not malfunction. The frustration of that expectation supplies the rationale for subjecting the manufacturer to liability for product malfunctions."[54] If a consumer does not know of the potential risk and knowledge of the risk would have materially affected his or her decision to use an autonomous vehicle, the manufacturer is obligated to warn of the risk. Providing a warning may discharge the manufacturer of liability for a design malfunction. With respect to risks that are only known after an autonomous vehicle is sold, it is likely that courts will recognize a post-sale duty to warn because the costs involved would be minimal. For example, after a risk becomes known post-sale, a manufacturer could broadcast warnings through the vehicle operating systems at minimal cost.[55]

The risk-utility test is used to determine whether a product is unreasonably dangerous under the totality of the circumstances by viewing the safety benefits of a proposed design compared to alternative models for the same product.[56] By deploying more autonomous vehicles on the road, it is anticipated that the operating systems will "learn" how to adapt to certain situations and to respond to conditions presented by driving. This is analogous to the evaluation of liability based on driver error in an ordinary negligence driver-operated motor vehicle accident case. After repeat experience and training, drivers learn to better adapt and respond to conditions on the road. New drivers are particularly susceptible and at higher risk of liability for the cause of an accident given their relative inexperience. The same will be true with regards to the design of autonomous vehicles. The more autonomous vehicles are tested and "experience" different road conditions, there greater the expectation will be that the operating systems are trained to handle and respond to varying conditions. The risk-utility test, though favored in some jurisdictions in evaluating design defects, may be difficult for new products such as autonomous vehicles because there is nothing that may be used in comparison, most especially traditional vehicles.

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[53] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1634.
[54] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1638. See also Zohn, Jeffrey. *When Robots Attack: How Should the Law Handle Self-Driving Cars that Cause Damages*, 2015 U.Ill.J.L.Tech & Pol'y at 476, citing Terrence Kiely & Bruce Ottley, *Understanding Products Liability Law* 135 (2006) at note 186 [Is the danger posed by the design greater than an ordinary consumer would expect when using the product in its intended or reasonably foreseeable manner?]
[55] *Geistfeld, Mark.* 105 Calif. L. Rev. at 1641.
[56] Zohn, Jeffrey. *When Robots Attack: How Should the Law Handle Self-Driving Cars that Cause Damages*, 2015 U.Ill.J.L.Tech & Pol'y at 477.

Potential liability exposure for design defects may be limited or reduced through pre-market testing and adequate warnings. While more extensive testing will increase costs of development and production of autonomous vehicles, manufacturers may be incentivized by decreased potential exposure in the future. Adequate warnings will need to encompass inherent, foreseeable risks of an accident in operating an autonomous vehicle. On a national level, the Department of Transportation ("DOT") and the NHTSA will have incentives to assist manufacturers in limiting their liability for the overall promotion of safer technology on the road.

A design defect will be more difficult and costly for plaintiffs to prove. For example, a plaintiff will need to retain an expert to demonstrate that a reasonable alternative design would have prevented the accident.[57] Specifically, an expert will need to show that the software could have been written or designed in a safer manner to have prevented the accident.[58] Further, to prove a reasonable alternative design, a plaintiff may seek to use a subsequent change in the software or update as evidence of a design defect. However, Federal Rule of Evidence 407 and several state evidence codes prohibiting introduction of subsequent remedial measures to prove liability.[59] As a result, plaintiffs will be forced to retain a skilled and properly qualified expert to demonstrate that an alternative design exited prior to the accident that would have avoided the accident. While that might be a deterrent, the potential scope of defendants in the chain of distribution may incentivize plaintiffs in order to increase their potential damages recovery.

In addition, products liability may be based on an alleged failure to warn. A product may be found "defective because of inadequate instructions or warnings when the foreseeable risks of harm posed by the product could have been reduced or avoided by the provision of reasonable instructions or warnings by the [manufacturer] … and the omission of the instructions or warnings renders the product not reasonably safe." As mentioned herein, manufacturers will need to ensure that owners and operators of autonomous vehicles are appropriately trained to use the autonomous technology to avoid liability for a breach of the duty to warn. Owners and operators will also need to be warned that an autonomous vehicle may have more difficulty in certain situations or road conditions, including weather.

C. <u>Potential Defenses To Product Liability Claims</u>

The legal commentary on the application of products liability to autonomous vehicles also takes the vehicles' operators into consideration in evaluating the potential legal liability landscape. As noted by Jeffrey Gurney, the application of products liability to accidents involving autonomous vehicles should be view based on four driver scenarios: (1) the distracted driver; (2) the diminished capabilities driver; (3) the disabled driver; and (4) the attentive driver.[60] Viewing potential liability based attributes of the driver considers the driver's level of reliance on the technology of the autonomous vehicle rather than solely based on the existence of a defect.

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[57] Jeffrey Gurney, *Sue My Car Not Me: Products Liability and Accidents Involving Autonomous Vehicles*, 13 U.Ill.J.L.Tech. & Pol'y 247, 263, citing Restatement (Third) of Torts: Products Liability §2(b) cmt. a and citing David Owen, *Toward a Proper Test for Design Defectiveness: "Micro-Balancing" Costs and Benefits*, 75 Tex. L. Rev. 1661, 1689 (2013).
[58] *Id.*
[59] *Id.* at 265-266.
[60] Jeffrey Gurney, *Sue My Car Not Me: Products Liability and Accidents Involving Autonomous Vehicles*, 13 U.Ill.J.L.Tech. & Pol'y 247 (2013).

The law will need to take the driver's capabilities and attentiveness in account in determining how and where to impose liability. For example, an autonomous vehicle will provide transportation and access for disabled drivers or drivers with diminished capabilities, such as the blind or elderly.

But, the technology will also give way to driver distraction as owners seek to use autonomous vehicles to increase productivity. A driver who remains capable of taking over the autonomous vehicle and is attentive, will potentially be able to foresee and prevent accidents.[61] On the same end, however, being distracted cannot serve as a misuse defense because driver distraction is foreseeable with autonomous vehicles. A misuse defense should be used where the owner made a change to the autonomous vehicle that in turn caused the accident.

A liability scheme will also need to consider the fact that the purpose of autonomous vehicles is to shift operation of the vehicle to the autonomous technology, allowing the driver to increase productivity. If the driver may face comparative negligence due to availing himself or herself of the benefits of the technology, the usefulness of autonomous vehicles may make them less attractive.[62] But, exactly how much comparative negligence may be apportioned to the driver will be factually driven. For example, the factual issue to be resolved will be whether the distracted driver had time to reach and avoid an accident or whether the diminished capabilities driver should have been able to take over and avoid an accident. The courts should not require all operators to be attentive drivers, however, because that would defeat the purpose of an autonomous vehicle in providing transportation to those that cannot drive, have limited ability to drive or that seek to increase their productivity.[63] Tesla has acknowledged that the software in the Tesla Autopilot technology "is imperfect and … drivers should be prepared to take control of the vehicle at any time."[64] Tesla's owner's manual states drivers are to keep their eyes on the road and hands on the wheel, but a recent study found drivers paid less attention and glanced away from the road more often when Autopilot was active.[65]

A further defense to a product liability action is the state of the art defense. For this defense, the manufacturer will need to prove that while it is aware of a potential risk or danger, current technological and scientific limits may make the risk unavoidable or protecting against the risk financially unfeasible to research.[66] Finally, another defense to a product liability claim is assumption of the risk. This requires proof that the plaintiff knew and understood the risk and chose to encounter it freely and voluntarily. To avail themselves of an assumption of the risk defense, manufacturers will need to disclose the potential risks to each consumer.

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[61] *Id.* at pp.255-257.
[62] *Id.* at p. 267.
[63] *Id.* at 268.
[64] McFarland, Matt. *Despite warnings from Tesla, Autopilot drivers still aren't paying enough attention, study finds*, CNN Business, September 24, 2020.
[65] *Id.*
[66] Jeffrey Gurney, 13 U.Ill.J.L.Tech. & Pol'y at 269, citing *Geressy v. Digital Equip. Corp.*, 980 F.Supp. 640, 649 (E.D.N.Y. 1997) and citing Gary C. Robb, *A Practical Approach to Use of State of the Art Evidence in Strict Products Liability Cases*, 77 Nw. U. L. Rev. 1, 22-25 (1982).

III. CONCLUSION

The evidentiary and proof requirements related to potential product liability-based claims are important to consider in moving forward with continued development, manufacture and distribution of autonomous vehicles. Awareness of the potential liability exposure will incentivize manufacturers to thoroughly test autonomous vehicles, inform and train drivers and improve the vehicle operating systems to make them safer. On top of that, manufacturers will want to evaluate the risks and prepare by properly insuring against potential liability.

3. MANUFACTURERS ENTERPRISE RESPONSIBILITY: POTENTIAL VEHICLE-FOCUSED LIABILITY AND INSURANCE FOR HIGHLY AUTONOMOUS VEHICLE ACCIDENTS

I. THE DEACTIVATION OF TORT RESPONSIBILITY AND THE ADOPTION OF MANUFACTURER ENTERPRISE RESPONSIBILITY AS AN EXCLUSIVE REMEDY.

Once highly autonomous vehicles ("HAV") are on the road there will be two new types of accidents: In addition to accidents involving conventional vehicles only, there will be mixed accidents involving conventional vehicles and highly autonomous vehicles and purely HAV vehicle accidents. There have been multiple proposals for accidents involving these mixed vehicle types. The most logical and most likely is the adoption of a manufacturing enterprise responsibility interpretation of liability ("MER"). This would not occur until at least 25% of all vehicles registered in the United States are highly autonomous vehicles. This proposal was put forth by Kenneth Abraham and Robert Ravine in their Virginia Law Review Article, *Automatic Vehicles and Manufacturers Responsibility for Accidents: A New Legal Regime for a New Era*, 2019. They categorized vehicles by their automation. This was an adoption of the National Highway Traffic Safety Administration 6 Tier System.

- Level Zero, The human driver does everything;
- Level One, Some adaptive functions for driver mode specific safety assistance where the driver remains primarily in control such as blind spot monitoring and emergency braking;
- Level Two, An automated system on the vehicle can actually conduct some parts of the driving task while the human continues to monitor the driving environment and perform the remainder of the driving task;
- Level Three, An automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the system requests;
- Level Four, An automated system can conduct the driving task and monitor the driving environment and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions. This might include specific highways and modernized driving grids; and
- Level Five, The automated system can perform all driving tasks, under all conditions that a human driver can perform them. This would likely not require the human driver to sit in a designated driver's seat. [67]

[67] See SAE (Society of Automotive Engineers International), J3016-June2018, Taxonomy in Definitions for terms related to driving automated systems for on-road motor vehicles. (2018)

For purposes of adoption of the MER at the 25% vehicle on-road classification, the assumption is made that all HAVs are Level Four or Level Five, meaning capable of complete autonomy in most or all conditions. The Society of Automotive Engineers defines this as high or full automation, respectively. This for the most part would remove driver attention and responsibility for the operation of the vehicle. It should be noted that SAE levels four and five are not entirely objective as the technology has not yet been incorporated fully into vehicles and would vary from manufacturer-to-manufacturer due to patent considerations. SAE, *Automated driving: levels of driving automation are defined in new SAE international standard*, J30162 (2014). In the mid-2020's, the most promising approach would be to designate certain features of the vehicle as highly or fully autonomous in order to qualify. It is premature to determine and identify which of these features will exist.

The likely approach could be for the U.S. Congress to enact a single, national rule regarding conventional, and highly autonomous vehicle liability interpretation, preempting all inconsistent state legislation and common law rules. Any other approach would likely create a patchwork of potentially inconsistent state regimes. A patchwork adoption of the MER could create havoc among the insurance industry.

In order to consider the adoption of a manufacturing enterprise responsibility system, we must consider the accident coverage and accident type. The chart below as proposed by Abraham and Ravine is a likely system. [68]

ACCIDENT TYPE	**CAR 1**	**CAR 2**
Conventional	CV	CV
Mixed	CV	HAV
Pure	HAV	HAV
Pure	HAV	No Car (1 car collision or collision involving pedestrian, bicyclist, etc.)

Pure cases are defined as HAV only accidents under the scope of MER. Under this proposal HAV occupants and specified third-parties involving HAV only accidents would be entitled to MER protection automatically as one of the terms of sale of all HAV vehicles. Bodily injuries arising out of operation of vehicles would be covered potentially with specific benefit limits except for injuries caused by the HAV owner's own negligence. In other words, the driver/owner retains some liability. Examples would include injuries caused by the negligent failure to upload software updates, negligent tweaking of software or negligent maintenance. Under this type of analysis, some tort liability can be retained for instances of customer alterations or maintenance mistakes. Nor would the MER cover negligent drivers for the limited tasks that

[68] Automated Vehicle and Manufacturer Responsibility for Accidents; A New Legal Regime for a New Era, Abraham and Ravine, Virginia Law Review, Page 148, Figure 1 (2019).

they would perform such as a level four vehicle being manually driven a few feet in order to set it in a specific parking place or in order to set it at a particular angle to a wall. However, in this instance of pure HAV related accidents, MER would be a victim's exclusive remedy for the injuries for which it applied. There would be no tort cause of action for injuries caused by alleged defective features of a HAV vehicle. It would include schedules of benefits for pain, suffering and injury.

MER COVERAGE OPTIONS

II. COVERED INDIVIDUALS AND MANUFACTURE RESPONSIBILITY.

A. Covered Individuals

If MER is adopted, it would provide compensation to occupants of highly autonomous vehicles as well as coverage for pedestrians, bicyclists, motorcyclists, and their third-party bystanders for bodily injuries arising from the operation of a HAV. It could be conceivable that in rare occurrences a pedestrian acting entirely outside of their protected scope could be substantially responsible for an accident should they for instance run out into traffic. Therefore, to some extent the MER protections and responsibilities for personal injuries operate somewhat like a worker's compensation policy adopted by most states.

This national adoption would not cover property damage suffered either by a HAV owner occupant or by a third-party. In these instances, this would produce no hardship or unfairness as HAV owners still would likely have to purchase conventional auto insurance, commonly known as collision or comprehensive coverage, covering damage to their vehicles and protecting against fire and theft. Given the availability of property insurance, the Abraham and Ravine proposal favors eliminating strict manufacturer's tort liability for property damage. Even if tort liability for property damage is preserved, liability is likely to be an issue mostly between subrogated auto or property insurers and HAV manufacturers. Such suits will succeed only if the former are able to prove that the property damage was caused by a defect in the HAV. This is an expensive proposition for all that will likely only be pursued in the most substantial of property damage matters. Therefore, the insurers would retain responsibility for property damage and would likely limit the number of automobile subrogation suits.

B. Manufacturer's Responsibility

The second consideration is between third-party and first-party insurance; between manufacturer and auto owner responsibility for the cost of HAV-related compensation.

The owner and occupants of a highly autonomous vehicle have no operational control over the vehicle in a level five type operation. Their only involvement will be the decision to purchase and/or ride in the vehicle. The manufacturer designs or purchases the autonomous driving system incorporated into the vehicle. Because of this, it is more likely that the manufacturer will have ultimate responsibility.

The manufacturer will be in the best position to decide what to invest in the designing of the system by comparing the costs of compensating losses for which it is responsible with the cost of including features that will help to avoid additional accidents. Financial responsibility for HAV

losses will give the manufacturer incentive to research ways of avoiding accidents that are currently unavoidable. Placing responsibility on the manufacturer for the self-driving system, gives the manufacturer the incentive to develop methods of avoiding accidents resulting out of the failure of another vehicle's communication systems. Since the manufacturer will bear the costs of avoiding accidents, those costs will be reflected in the price of the vehicle. HAV manufacturers will internalize the cost of HAV accidents, the purchase price of the HAV's will reflect that cost and an excessive number of vehicles will not be on the road. This will be more effective than negligence liability. *Steven Chavel, Strict Liability v. Negligence*, 9J Legal Study period 1, 2-3 (1980).

HAV technology promises transportation safety advances of such magnitude and profits that will inevitably accompany these advances. The threat of financial responsibility for HAV-related losses is unlikely to deter research and development of the marketing HAVs in a significant way.

If MER is the exclusive remedy, it would provide a swift and in most instances, automatic source of compensation for bodily injuries arising out of the operation of the vehicle. Further, with MER as an exclusive remedy, the plaintiff need not prove the particular causation of the incident among the many component parts that were incorporated in the design by the ultimate manufacturer. It will avoid the complicated, expensive litigation and the uncertainty that would be otherwise associated with the slow development of common law rules about issues such as particular component parts, particular manufacturers, and the evidentiary issues involved with the complicated self-driving applications. The exclusive remedy approach would cleanly and effectively remedy the manufacturer's focal point of the creation of incentives that would otherwise have to address complex rules regarding component part maker responsibilities. Ultimately, making MER the exclusive remedy in virtually all cases will minimize complications of uncertainty of liability and optimize safety incentives by focusing financial responsibility on the manufacturers who will be in the best position to make decisions that influence safety levels.

III. RAMIFICATIONS ON INSURANCE COVERAGE AND UNDERWRITING

If the exclusive MER remedy is adopted for pure HAV accidents, the cost will be to the insurance industry. A factor to weigh will be the likelihood of reduced vehicle accidents due to the estimation there will be an 80% reduction in accidents once the driver is no longer part of the equation. However, testing will be at a premium and responsibility for the MER system will be exclusively on the ultimate manufacturer itself. Liability of component part suppliers will not be considered in actions between the injured party and the manufacturer. Whether the manufacturers may retain a cause of action between themselves and the component part manufacturers, will be an entirely different type of litigation which may be ruled exclusively by warranty considerations and contractual non-insured business transactions. If there is a patchwork of state laws, the continued jurisdiction shopping will occur. With an exclusive remedy solution, the potential for litigation would be less and the factors considered for the cost of premiums will be completely in the hands of the liability carrier. The underwriting will be significantly more simplistic for personal injury litigation involving self-driving cars and the factors could be universal across the entirety of the industry for these types of losses. Another consideration, however, will be instances involving conventional driving cars with highly automated vehicles as we highlighted in Figure 1, a mixed incident between conventional vehicle and a highly automated vehicle.

IV. MIXED ACCIDENTS

Understandably, the auto industry will not evolve fast enough to avoid the likelihood of accidents between conventional vehicles and driverless vehicles. Further, unless completely regulated by the national government, which seems unlikely, conventional vehicles will continue to be produced and current conventional vehicles on the road will not be ultimately eliminated. Therefore, there must be a consideration of instances involving a conventional driver-based vehicle and a self-driving vehicle. That means there are three possibilities: 1) Retention of the current rules governing tort liability; 2) permitting conventional vehicles to access the HAV owner's MER; or 3) enactment of mandatory first party no fault insurance covering losses by conventional vehicle plaintiffs.

A. Retention of Tort

If the current common law tort application were to continue under current negligence to product liability law, there would rarely be any negligence on the part of the owner of the HAV involved in an accident with a conventional vehicle except in the case of negligent maintenance of the HAV. Most suits would have to allege that the conventional vehicle plaintiff's injuries were caused by a manufacturing or design defect in the HAV. Litigation of the defects of the component parts that are not part of the autonomous driving system would replicate what currently occurs. Litigation over the autonomous driving system would be complicated and difficult and desirable for plaintiff's attorneys to avoid.

B. Provide Access to MER

The second approach would eliminate conventional vehicle victims potential causes of action in tort, but it would make H AV manufacturers responsible for losses suffered by conventional vehicle drivers and occupants regardless of fault. The arguments for this are that this would create additional incentive to HAV manufacturers to concentrate on their accident avoidance systems to create and make the even safer in light of the fact that conventional vehicles will still be on the road for some time. It would also allow the manufacturers to avail themselves of the statutory limits for damages that the MER would provide. This in turn allows insurance carriers to estimate the cost of losses as well as the likelihood of losses. Should conventional vehicle drivers be unable to waive the MER statutory liabilities and damages, it may create a public policy wherein conventional vehicles become more expensive and costly to insure. It may also encourage the purchase of HAV in the future and eliminate conventional vehicle production. The ultimate consumer would be more likely to purchase a self-driving vehicle in light of the liability framework within which the purchase would be governed.

C. Third Solution

The final approach for mixed accidents would potentially be the elimination of conventional vehicle plaintiff's tort rights and require owners of conventional vehicles to purchase their own first party insurance covering them against the risk that they would have been injured in an accident rising out of the operation of a self-driving vehicle. This form of coverage could be added to existing auto insurance adopting a benefit structure identical to that available under the MER. This would increase the cost of insuring a conventional vehicle, but likely decrease the cost

to liability carriers for insuring HAV manufacturers. As HAV manufacturing decreases the likelihood of an incident, taking the cost of insuring against the distracted driving of a conventional vehicle would also decrease the cost to the manufacturing insurer.

V. CONSIDERATIONS FOR MER ADOPTION TO INSURER OF MANUFACTURERS

Ultimately, under MER, HAV owners would be relieved of most of the tort liability which will be in turn transmitted to the manufacturers of the vehicles. Some liability exposure might remain. For example, for injuries resulting from negligent failure to maintain the vehicle, for shoddy repairs and to the extent that HAV technology makes limited manual operation available. In addition, the owners will still be purchasing insurance covering property damage to their own vehicles, whether the property damage results from an accident or not. Manufacturers will be responsible for significant safety testing and implementation which will in turn allow the insurers to process and determine the cost of the liability coverage necessary to continue manufacturing these types of vehicles. Like flood insurance, the U.S. government will likely create a MER fund. Like Flood Fund operation, claimants against the fund and the liability insurers will have immediate communication with the HAV owner, transferred to the manufacturer for assessment. The HAV auto insurer would be the agent for receipt of the claims and would submit them to the MER fund with accompanying documentation, not unlike a worker's compensation claim through an employer to an employer's insurer. The fund would then pay in full, pay in part, or deny the claim. The fund would be a small agency within a cabinet department who would manage the process of notice to manufacturers, performing administrative functions and receiving and evaluating claims and disbursing payments. Should a claim be denied, disputes would likely be transferred to an administrative law judge who could make findings of fact and conclusions of law.

VI. CONCLUSION

Over time, highly automated vehicles will largely supplant conventional vehicles and highly automated vehicles accidents will come to dominate. As this occurs, a MER fund could likely become more necessary and current common law and strict liability could begin to evolve and be eliminated. With the acceleration of modernization and changes in technology, this could occur within a matter of decades.

Chapter III

How Courts Have Apportioned Liability Regarding Other Autonomous Devices

HOW COURTS HAVE APPORTIONED LIABILITY
WITH OTHER AUTOMATED/AUTONOMOUS MACHINES AND PRODUCTS

This Chapter addresses how courts may apportion liability for autonomous-vehicle damages between and among manufacturers, software developers, and product users. Since there is no body of autonomous-vehicle jurisprudence yet, this Chapter reviews cases that have adjudicated liability for damages caused by analogous fully or partially autonomous products: drones, medical robotic devices, and smart devices in the ubiquitous "internet of things" or "IoT."

Running throughout these cases are several themes that are pertinent to prospective autonomous-vehicle litigation. First, there are numerous potential claims against autonomous-vehicle manufacturers under various areas of law, including negligence claims and strict product-liability theories, which seek to impose liability on manufacturers for harm caused by defective products. Plaintiffs will assert some variations of all such claims against autonomous-vehicle manufacturers, which then will carry the burden of proving that others are responsible, such as software developers, drivers, and/or injured parties themselves, who are subject to counterclaims and affirmative defenses such as contributory negligence and assumption of risk.

These analogous cases show that allocation issues are more prevalent in cases focused on sophisticated and complex products, such as drones and surgical robots. In those factual settings, manufacturers typically have more room to argue that their products were safe but the embedded technologies and/or the users were not. Users are particularly susceptible to liability if they are supposed to be trained and sophisticated, with physicians being the most glaring example. Although autonomous-vehicle drivers may not have special training on the specifics of their vehicles' technologies, courts and juries likely will expect drivers to be alert and to take control when necessary, just as juries do when deciding the liability of surgeons for failing to take control when robotic surgical products fail to perform. Drivers, therefore, should face substantial risks of civil liability if the facts show that they relied too heavily on autonomy and failed to exercise control over their vehicles.

Another theme running through analogous cases is the importance of expert opinions and evidence. Many courts attribute special importance to the existence or absence of expert testimony in complex cases involving potential defects in partially automated products operated by users. Without such testimony, these courts have held, plaintiffs cannot raise a genuine issue of material fact as to whether these products were defective, and/or whether they caused the damages or harm rather than the users or some other potential causal source. Autonomous-vehicles are even more complicated and sophisticated than these analogous products, and their manufacturers' liability likely will focus and depend on the proverbial battle of the experts.

Given the substantial litigation ahead, autonomous-vehicle manufacturers should focus on multiple risk-reduction fronts. They should comply with myriad applicable federal and state statutes and regulations. They should warn and train users about the many operational risks and the need to be vigilant in the face of unexpected dangers. They should protect themselves

contractually vis-à-vis software suppliers with strong indemnification and warranty provisions. And manufacturers should implement any and all of these protective measures in connection with the many risks raised by their products, including data-security and privacy risks, which may be substantial given the personal and protected information that these vehicles may transmit and store.

I. ALLOCATING LIABILITY IN DRONE CASES

Given the fact that drones are unmanned aircrafts, they are ideal for taking care of projects within the "four D's" – work that is dirty, dull, difficult and dangerous. Real-estate companies are using drones to take photographs and videos of properties for sale. Law-enforcement agencies are using drones to pursue suspects in areas that are difficult to reach by other means. Farmers are using drones to monitor crops, irrigation, livestock and fertilization. First-responders are using drones for reconnaissance and the delivery of food, medicine and water. Insurance companies are using drones to assess property damage, vehicle and construction accidents, fire losses, crop damage and environmental hazards. The uses are endless; however, so are the potential lawsuits.

A. Claims/Defenses in Drone Cases

Increased drone usage has led to a host of new lawsuits alleging damages for alleged bodily injury and property damage, invasion of privacy and trespass claims, product-liability claims, and cyber-liability and hacking claims. Regulatory-enforcement actions also are prevalent.

Plaintiffs have claimed injuries such as severe lacerations, eye loss and soft-tissue injuries relating to drone accidents. Drone use also may result in automobile accidents if drivers were distracted by low-flying drones, and catastrophic accidents if a drone interferes with an aircraft. With respect to property-damage claims, lawsuits are arising regarding the loss of drones themselves that are shot down by those who are unhappy with drones flying over their property.

Drones are often equipped with video cameras that can capture images and videos of their environment. Some even have night vision and infrared lenses. This equipment increases the risk that drone operators may invade the privacy of others. The physical intrusion of drones over a person's personal property also gives rise to trespass claims. Drones are, in essence, flying computers. By collecting information, drones can become targets for malicious software users who want to steal data. Hackers can take over the controls of a drone for wrongful or illegal use.

On June 28, 2016, the FAA finalized the first operation rules for routine commercial use of drones – 81 FR 42063 (known as Part 107). The rules became effective on August 29, 2016. Under Part 107, there are different restrictions depending on the intended use of the drones. Intended commercial use, as opposed to recreational use, comes with more stringent requirements for the pilot, operation, aircraft and location. An operator's or owner's compliance with Part 107 regulations will have a bearing as to whether the operator is held liable for drone accidents. Not only have federal agencies issued drone regulations, but an increasing number of states are enacting their own statutes and regulations regarding drone use. Most of the 50 states have enacted laws prohibiting various uses of drones including hunting, use near first responders, reckless interference with an aircraft, violation of privacy rights, operating a weaponized drone, and unauthorized collection of data.

The ever-changing drone regulatory landscape has also sparked lawsuits. For example, in January 2017, a company named SkyPan International settled a lawsuit with the FAA after it had been facing $1.9M in penalties for 65 unauthorized drone flights in New York and Chicago from 2012 to 2014. Many similar suits are inevitable with allegations of violations of state laws, which eventually will force courts to address the potential preemption thereof by federal laws.

Drone-accident liability could fall within three different areas of tort recovery: 1) absolute liability of drone owners and operators if drone operations are deemed abnormally dangerous activities; 2) negligence arising from unreasonable drone operations; and 3) strict product-liability due to unreasonable design or manufacturing, and/or inadequate warnings or instructions. *See generally* Michael Spanel, *Aviation Law Seminar*, Spring 2015, Chicago-Kent College of Law.

Under an absolute-liability theory, certain activities are deemed as "ultrahazardous" and considered so dangerous that the people engaging in them are responsible for any resulting injuries or property damage. *Id*. Factors considered in determining whether an activity is "ultrahazardous" include: the existence of a high risk of harm to others; likelihood that the harm will be great; inability to eliminate risk by the exercise of reasonable care; extent to which the activity is not a matter of common usage; inappropriateness of the activity to the place where it is carried on; and extent to which its value to the community is outweighed by its dangerous attributes. Restatement Second of Torts § 520 (1965).

To date, courts do not consider drones as "ultrahazardous." Unlike manned aircrafts that were deemed abnormally dangerous when first developed, many drones are small, light and threaten minimal damage as compared with large aircrafts. Furthermore, drones are very popular in use and have many useful applications as discussed above. Just as courts have not considered drones as "ultrahazardous," courts thus far have not considered autonomous vehicles as such. That issue, however, is open, and autonomous vehicles (especially fully autonomous versions) raise substantially greater risks of substantial physical harm as compared with drones. Whether a claimant could prevail on an "ultrahazardous" theory will depend on the Restatement factors discussed above. One important factor will be whether the value to the community of autonomous vehicles is outweighed by the dangerous attributes. This balancing test is difficult to employ for autonomous vehicles at this relatively nascent stage of their development and use.

The more likely claim after drone accidents is negligence. Improper operation of a drone can result in a negligence cause of action if the improper operation caused personal injury or property damage. In the context of commercial drone use, both the operating employee and the employer may be liable for negligent operations. Furthermore, courts may hold owners and operators liable, depending on the jurisdiction. Negligence, moreover, may be common-law or statutory. Common-law negligence claims assert that there was a breach of a legal duty, proximate cause and damages. Failure to operate a drone safely and maintain a drone properly may be negligent under those standards. Statutory negligence relates to whether compliance with statutes or regulations is evidence of negligence on behalf of a drone operator. Some states find that violation of a statute or regulation is *prima facie* evidence of negligence. Conversely, however, compliance with a statute or regulation generally is not a complete defense to a negligence claim.

The third cause of action likely to arise from drone accidents is strict liability. This claim is based upon the concept that a person that sells, designs, and/or manufactures a product that is in some way defective is subject to liability for any harm the product causes. Under a strict-liability theory, drone manufacturers and sellers may be held liable even when they exercise the utmost care in safety, because this theory does not require proof of fault. Product liability claims often require three elements: 1) the injury was caused by a condition of the product, 2) the condition was unreasonably dangerous; and 3) the condition existed at the time it left the manufacturer's control.

Drone lawsuits provide some insight as to the types of cases and the theories of recovery that will be asserted after autonomous-vehicle accidents. Similar to drones, autonomous vehicles will result in accidents and inevitable bodily injury and property damage claims. Autonomous vehicles could also lead to regulatory actions, trespass claims and cyber-liability claims. Plaintiffs will assert bodily injury and product-liability claims against owners, operators, sellers and manufacturers of the autonomous cars. However, unlike drones which can be small and result in minor injuries, injuries resulting from autonomous vehicles are likely to be more catastrophic.

B. Allocating Liability in Drone Cases

In most lawsuits, the drone owner or operator is the only named defendant. In some cases, however, courts have held both the owner and the manufacturer liable for injuries caused by drones. In 2017, plaintiffs filed a product-liability case against Parrot SA, a French-based wireless products manufacturer that designs and manufactures drones. See, *Richard T. Jacky and Tamsin Jacky v. Parrot, S.A., et al*., Denver District Court, 2017CVCV31101. This lawsuit arose from a 2014 Christmas Day accident when the plaintiff's son was allegedly operating a drone in its anticipated manner when the unguarded blade came into contact with his father's eye. The father suffered a corneal laceration, which required emergency surgery and extended recovery. Plaintiff alleged that the manufacturer was strictly liable for the father's injuries due to alleged design defects. The suit listed various design defects including failure to utilize safer blades, adequate software and shut-off features, and adequate blade guards.

To date, however, most bodily-injury lawsuits relating to drones do not involve the manufacturer but rather the operator or the entity that retained the operator. For example, in *Pituch v. Perfect Event Inc*., the fraternity Pi Kappa Phi of the University of Southern California hired an event-planning company to throw a party. A woman sued both the fraternity and the event-planning company, claiming she suffered severe head injuries caused by a drone that was being used to photograph attendees. Plaintiff specifically alleged claims of negligence and premises liability against both defendants, and the operator was not named as a defendant. Similarly, in *Kamboj v. Hollycal Productions, et al*., a wedding guest was blinded when a photographer's drone flew into her eye. The plaintiff named as defendants the photography firm, its owner and the employee that operated the drone. The manufacturer in that case was not named.

In *Nourmand v. Caesar's Palace*, Case No. A-18-777634-C, filed in Clark County, Nevada, a drone crashed into a woman during a show at Caesar's Palace in Las Vegas. The woman claimed permanent damage to her vision. The lawsuit named as defendants Caesars Palace, the Great Lakes Drone Company and the drone operator, alleging negligence for failing to comply with federal rules and regulations that specified that drones cannot be operated after dark or over a crowd of people. The plaintiff also asserted that the operator should not have operated more than

one drone at a time. The drone company and drone operator denied the allegations, asserting that they were in compliance with FAA regulations. Plaintiff also alleged joint venture liability against all of the defendants. Specifically, plaintiff alleged that defendants participated in a joint venture when they operated the subject drones and/or promoted and/or marketed the Caesars fireworks party. Plaintiff claimed that defendants were jointly and severally liable for the wrongful acts committed in furtherance of the joint venture.

In *Ellis v. Billcliff*, filed in Rockingham Superior Court, New Hampshire, two wedding guests filed suit against the groom and the wedding-reception venue after a drone crashed into them, allegedly causing permanent physical and emotional injury. One guest claimed to suffer a concussion and needed twenty stitches while the other guest claimed she suffered fractured orbital bones. The wedding venue defended that it never gave the groom permission to fly the drone at the reception, but the groom responded that no member of the event staff asked him to stop flying the drone.

None of the lawsuits discussed above resulted in a reported decision. These cases were either settled or dismissed, leaving open the question as to whom should be held liable. However, as more case law is decided and decisions are written in this area, the question of allocation between operators, owners and manufacturers will become clearer. What is clear, moreover, is that manufacturers may defend against these lawsuits by alleging that others are responsible for the alleged harm, particularly users who allegedly misused the product. The parallels with prospective autonomous-vehicle cases are palpable, in that both drones and autonomous vehicles rely heavily on the care and control of the operators, who are front-and-center in most factual settings involving accidents or injuries allegedly caused by either product.

II. ALLOCATING LIABILITY IN ROBOTIC-EQUIPMENT CASES

Robotic-equipment cases provide another strong analogy for predicting the allocation of liability in autonomous-vehicle disputes. Robots have revolutionized many industries, including those in manufacturing and health-care arenas where robots have become ubiquitous. Medical and surgical robots, in fact, are strongly analogous to autonomous vehicles, in that they work alongside physician-users, sometimes in fully autonomous mode, and other times assisting physicians who maintain at least partial control.

A. Claims/Defenses in Robotic-Equipment Disputes

Robotic-equipment lawsuits involve the usual litany of claims and defenses typically present in products-liability cases. Plaintiffs assert claims ranging from negligence, to strict liability, to breaches of implied and express warranties, to unfair-competition and consumer-fraud claims. These claims also take a variety of forms, such as alleged design defects focused on the robot and software that allegedly caused harm, and alleged failures to warn the patient or surgeon of potential risks associated with a robot's performance and functionality.

Plaintiffs, moreover, may rely on a variety of standards of care as the benchmarks of conduct that robotic-equipment manufacturers and developers allegedly failed to satisfy. This is particularly true in the medical field, which is replete with state and federal regulatory requirements governing the functionality and performance of medical robots. The FDA, for

example, has enacted detailed requirements for the training and performance of operating physicians and nurses. Any surgeon who uses such a device and does not have the adequate training and/or experience, of course, is at risk of facing claims based on these standards, and others, for resulting injuries. The same is true for product manufacturers, which are required to provide adequate training to those surgeons. If the training is deficient, therefore, plaintiffs may file claims against the manufacturers (as well as the physicians and the hospitals) based on that deficiency alone.

Physicians, in fact, stand in the status of "learned intermediaries" who assume significant duties to advise patients of dangers associated with surgical and medical robots. As a result, plaintiffs may seek redress by asserting claims under the legal frameworks of both products liability and malpractice, and surgical-device cases typically include claims from both arenas. *See generally* O. Miller, "Liability in Robotics: Inside the Legal Debate" (2018).

B. Allocating Liability in Robotic-Equipment Disputes

Given their similarities to autonomous-vehicle issues, robotic-equipment cases provide helpful analogies into how courts may apportion liability between and among manufacturers, software developers, and users. The most telling analogies, moreover, are in cases adjudicating harm allegedly caused by surgical robots, given the similarly critical importance of sound and effective user (*i.e.*, physician and driver) performance.

Consider the case of *Taylor v. Intuitive Surgical, Inc.*, 187 Wash. 2d 743 (2017), in which the Supreme Court of Washington held a manufacturer and physician jointly liable for injuries caused by a robotic surgical device called the "da Vinci System," which assisted in the performance of laparoscopic surgeries. Plaintiff's claims spanned the spectrum of those asserted in product-liability cases, including strict liability, negligence, and breaches of warranty. The court affirmed the liability of both the manufacturer and physician, the latter of which was found liable for superseding negligence and failure to mitigate, since the robot was not supposed to be used in this surgery given the plaintiff's excessive body mass index. The court also found that the manufacturer was liable for failure to warn, despite notices provided to the surgeon, because the manufacturer failed to inform the hospital itself of the products' risks.

Another case, *O'Brien v. Intuitive Surgical, Inc.*, 2011 WL 3040479 (N. D. Ill. July 25, 2011), went the opposite way and found no liability for harm caused by the da Vinci System. The O'Brien case found for defendant because plaintiff failed to satisfy his burden of proving that the manufacturer proximately caused the malfunction that allegedly led to plaintiff's injuries. Although plaintiff offered evidence that the manufacturer was responsible, there was substantive evidence that the physician caused the injuries, and plaintiff failed to satisfy his burdens of proof that the manufacturer or physician, or both, were responsible.

Causation, therefore, is an inevitable and complex issue in many medical-robotic cases, as it will be in autonomous-vehicle disputes. Another example is the case of *Mohler v. St. Luke's Med. Ctr.*, 2008 Ariz. App. LEXIS492 (Ariz. Ct. App. Dec. 26, 2008), which reversed the trial court's decision to grant summary judgment for plaintiff. The trial court had decided that plaintiff failed to raise a genuine issue of material fact that the physician and hospital were liable for a

perforated intestine caused during plaintiff's gallbladder-removal operation. The appellate court, however, reversed and held that plaintiff offered sufficient evidence, including expert testimony, on which a jury may have determined that the injury was caused by the robotic instrument as opposed to other factors.

As the *Mohler* case indicates, and other cases corroborate, expert testimony on causation is not just helpful, but perhaps even a critical part of plaintiffs' burdens of proof. In *Brown v. Griffin*, 505 S.W.3d 777 (Ky. Ct. App. 2016), for example, plaintiff sued for alleged harm caused by a botched surgical robot procedure. Plaintiff failed to offer expert testimony on causation, and instead argued that the jury had a sufficient factual basis on which to decide responsibility, including the surgeon's deposition and other relevant evidence. The court, however, disagreed, and held that expert testimony was necessary to establish the standard of care and decide the surgeon's negligence given the unique factual circumstances beyond the ken of ordinary jurors. Plaintiff's failure to offer such expert testimony was a dispositive defect.

Missing expert testimony also was dispositive in the case of *Mracek v. Bryn Mawr Hospital*, 363 Fed. App'x 925, 927 (3rd Cir. 2010). In *Mracek*, the Third Circuit Court of Appeals affirmed judgment for defendants in yet another lawsuit filed as a result of alleged injuries caused by the da Vinci System. The court faulted plaintiff because he "did not offer any evidence to eliminate reasonable, secondary causes for the malfunction of the robot or to demonstrate that the malfunction caused his injury." *Id.* at * 4. Not only did plaintiff fail "to produce any expert reports," but plaintiff also failed to offer record evidence sufficient to raise inferences "that would permit a jury to infer [his] erectile dysfunction and groin pain were caused by the robot's alleged malfunction." *Id.*

It is unclear whether, and to what extent, courts will deem expert testimony to be a critical part of plaintiffs' burdens of proof and persuasion in autonomous-vehicle cases. Arguably juries have a stronger basis, given their experience driving cars, to identify and apply a drivers' (as compared with a physician's) standard of care in operating a vehicle. After all, people generally know how to drive vehicles, much more than they generally know about performing surgery, with or without the help of software. However, like medical-robotic cases, autonomous-vehicle cases raise factually unique issues regarding the interaction between drivers and their vehicles, and it is likely that courts will deem expert testimony important and perhaps critical to allow the case to get the jury for the apportionment of fault.

In any event, medical-robot and autonomous-vehicle cases raise similar issues of user responsibility given the importance of users to safe product operation. Although drivers do not need to be trained and certified like physicians, that may change over time, and autonomous-vehicle drivers clearly need to understand how and when to operate their vehicles and assume control thereof. Drivers, therefore, will be a consistent target for plaintiffs who seek damages caused by autonomous vehicles, and plaintiffs likely will seek supporting facts and expert opinions that accidents occurred because drivers failed to learn and implement necessary safety protocols.

III. ALLOCATING LIABILITY IN THE INTERNET OF THINGS ("IoT")

Autonomous vehicles are part of a much larger and expanding universe of interconnected smart devices and machines commonly called the "internet of things" ("IoT"). These devices have become ubiquitous parts of everyday life at home and work, as manufacturers have incorporated internet-connected technologies into appliances, thermostats, televisions, cameras, refrigerators, entertainment systems, toys, fitness devices, and myriad other products and applications. Indeed, observers predict the global IoT market to reach $1.6 trillion by 2025, with an estimated 55 billion IoT devices pervading our personal and professional lives.

Autonomous vehicles, indeed, are massively complicated IoT products incorporating a multitude of their own smart devices. Accordingly, IoT jurisprudence is a relevant (albeit, as discussed below, limited) touchstone for predicting how courts may apportion liability in autonomous-vehicle cases.

A. Claims/Defenses in IoT Disputes

Courts apply traditional strict-liability principles in adjudicating cases involving damages and harm allegedly caused by defective IoT products. These cases, therefore, examine whether the IoT products were "defective," which typically involves a balancing of the risks raised by the products' designs and the available alternatives thereto. *See e.g.*, *Rapchak v. Haldex Brake Products Corp.*, 2016 U.S. Dist. LEXIS 33148 (W.D. Pa. Mar. 15, 2016) (discussing the consumer-expectation and risk-utility standards, and denying defendant's motion for summary judgment because "reasonable minds" may disagree about "what balance of risk or utility or what consumer expectations are appropriate" and/or "whether an 'ordinary consumer would reasonably anticipate and appreciate the dangerous condition of the product and the attendant risk of injury of which the plaintiff complains") (citations omitted); *Yun Tung Chow v. Reckitt & Colman, Inc.*, 950 N.E.2d 113 (N.Y. 2011) ("A defectively designed product is one which, at the time it leaves the seller's hands, is in a condition not reasonably contemplated by the ultimate consumer and is unreasonably dangerous for its intended use").

Plaintiffs also may assert negligence claims against IoT manufacturers and/or suppliers for harm allegedly caused by IoT devices. Negligence theory imposes the time-honored yet nebulous "reasonableness" standard, which allows plaintiffs to allege that IoT manufacturers and/or software developers were unreasonable, hence liable, because devices failed to function properly. Although negligence claims are easy for plaintiffs to construct, many jurisdictions prohibit such claims under the economic-loss rule, which precludes plaintiffs from asserting tort claims for purely economic harm. However, many jurisdictions have exceptions that allow plaintiffs to end-run around the economic-loss rule. Fraud claims, for example, are permissible for purely economic losses, and plaintiffs routinely restyle their negligence theories as misrepresentation or concealment claims in order to overcome prospective motions to dismiss.

In addition, strict-liability theories incorporate negligence concepts as discussed above, such that many jurisdictions determine whether products are defective by analyzing reasonable consumer expectations and/or by balancing risks and benefits in design-defect cases. Accordingly,

even in strict-liability cases, liability often turns on whether manufacturers or suppliers were reasonable in their product-design decision-making.

Plaintiffs have many sources from which they may construct claims that manufacturers and/or suppliers chose unreasonably defective product designs. Various organizations have issued standards on which plaintiffs may seize in constructing and attempting to sustain their claims, including the Institute of Electrical and Electronics Engineers, the International Organization for Standardization, the National Institute of Standards and Technology, the International Electrotechnical Commission, and the International Telecommunications Unit. *See generally "The Era of the Internet of Things: Can Product Liability Laws Keep Up?,"* 84 Def. Couns. J. 1 (July 2017). There are substantial additional statutes, regulations, and guidelines applicable to alleged IoT defects that involve security and privacy issues, as discussed below.

Plaintiffs also may assert contract-based claims against IoT manufacturers and/or suppliers. For example, Plaintiffs may claim that IoT failures constituted breaches of contractual warranties. Also available to Plaintiffs are implied warranties that inherently cover IoT products under the Uniform Commercial Code, including implied warranties of "merchantability" and "fitness for a particular purpose." The UCC also provides for substantial damages caused by breaches of these implied warranties, such as consequential damages and other reasonably foreseeable losses. Although these damages typically are excluded or limited by contract, Plaintiffs have various tactics for seeking those damages in any event. Fraud claims, for example, are not subject to contractual damages limitations, and the UCC itself authorizes courts to disregard contractual damages limitations if they are "unconscionable." (UCC §§ 2-302(1), 2-719(3).)

IoT manufacturers have their usual arsenal of legal and factual defenses against strict-liability and negligence claims. For example, IoT manufacturers may defend against negligence-based tort claims by invoking the economic-loss doctrine, which in many jurisdictions prohibits (or at least restricts) plaintiffs from asserting such claims for economic losses rather than personal injuries and/or property damages. Even if the economic-loss doctrine is inapplicable (because, for example, plaintiffs suffered harm to personal or property), IoT manufacturers and suppliers may defend that they had no duty to design products that avoid the harm allegedly suffered by plaintiffs. *See e.g.*, *Modisette v. Apple Inc.*, 30 Cal. App. 5th 136, 149-50 (2018) (holding that cellphone manufacturers did not have a duty to design phones to prevent access to applications while driving, given "the burden a contrary conclusion would place upon cell phone manufacturers, and the consequences to the community").

IoT manufacturers also have defenses premised on allegations that others – *e.g.*, software developers and product users – are liable for alleged harm, including affirmative defenses such as contributory negligence and assumption of risk, and defenses on the merits such as the absence of causation or damages. These fact-dependent defenses rely on the varied circumstances of each case, including the nature of the products at issue, the manner in which plaintiffs used those products, and the extent to which plaintiffs suffered physical harm to themselves or their property.

B. Allocating Liability in IoT Cases

Although IoT manufacturers may attempt to allocate responsibility among other potentially blameworthy parties – such as software developers, and users – reported IoT decisions *have not* turned or even focused on those allocation issues. Instead, manufacturers have been held liable, or not, depending on the legal and factual bases for plaintiffs' claims, not on third-party claims or allegations against software developers for allegedly defective component parts and/or deficient software code. *See generally "The Internet of Things: Emerging Legal Issues for Businesses*," 43 N. Ky. L. Rev. 29, 57-58 (2016).

There are several reasons why IoT cases have not focused on allocating liability. Unlike autonomous vehicles, IoT products typically do not require substantial user discretion and judgment. IoT products usually either do or do not work, and their functionality (or lack thereof) is relatively straightforward. In stark contrast, autonomous vehicles require substantial and potentially dispositive judgments by their users, whose actions (and inactions) are at the heart of any analysis of culpability for accidents and harm.

Furthermore, IoT products are substantially less complicated than autonomous vehicles. Assessing whether IoT products are defective, therefore, is a relatively straightforward inquiry focused on whether the products performed their expected functions when used properly. Autonomous vehicles, however, have vastly greater potential sources of failure or misuse, ranging from their technological components to the decisions by users under virtually limitless potential circumstances and conditions. IoT cases, therefore, lack the complex fact patterns and potential sources of user failure that are inevitable in cases assessing liability caused by autonomous-vehicle accidents and incidents.

Similarly, given their relative simplicity, IoT products rarely provide much room for manufacturers to distinguish product problems from issues with the software embedded therein. IoT manufacturers' interests typically align with those of their software developers, and manufacturers have little to gain – and much to lose – by defending that their IoT products were functional but for the software that they used and incorporated. In addition, IoT manufacturers have independent recourse against suppliers of deficient software components, including contract claims premised on breaches of warranties and indemnification duties.

The stakes also are higher in autonomous-vehicle cases, given the substantial risks and costs to persons and property, which will result in substantially greater damages claims that are not present in typical IoT disputes. Plaintiffs' lawyers, therefore, have enhanced incentives to commit the necessary resources – including consulting and testifying experts – to focus on potentially responsible software devices and applications in autonomous vehicles.

The bottom line is that autonomous-vehicle manufacturers will have substantially greater room than typical IoT defendants to defend that others are responsible for harm and damages. This raises significant challenges, as well as opportunities, in that autonomous-vehicle manufacturers need to develop facts and expert testimony that alleged accidents were caused by defectively developed software components or negligent users rather than the vehicle design itself.

C. Special Concerns for Data-Security Risks

IoT devices often raise substantial privacy and data-security risks, given the sensitive and legally protected personal information that many of these devices transmit and/or store. While those specific issues are beyond the scope of this analysis, they are relevant because autonomous vehicles also are susceptible to significant risks of hacking and unlawful data access, which may lead to litigation and/or regulatory actions alleging the failure to implement reasonable and compliant data-security protections. Those actions, in turn, may cause courts and/or regulators to apportion liability between and among manufacturers, software suppliers, and allegedly aggrieved plaintiffs who may have failed to protect their own data.

Data-security risks in IoT devices may be direct or indirect. Not only may data be subject to access and exfiltration directly from an IoT device, but bad actors also may exploit security vulnerabilities in IoT devices to access or control other products to which they are connected, including partially or fully autonomous vehicles. See Andy Greenberg, "*The Jeep Hackers are Back to Prove Car Hacking Can Get Much Worse*," WIRED (Aug. 1, 2016) (discussing an experiment in which white-hat hackers took control of a Chevrolet Jeep by accessing its internet-connected "infotainment" system); Charlie Osborne, "*The Most Interesting Internet-Connected Vehicle Hacks on Record*," ZDNet (Oct. 22, 2018). IoT devices also are subject to hijackings by botnets, which may use the devices for various pernicious purposes, including launching denial-of-service attacks that overwhelm systems and debilitate internet access. *See* "*Examples of Insecurity IoT Devices that Can Cause Nightmares*," DocuBank (June 1, 2018).

Plaintiffs have strong incentives to file class actions based on alleged data-security deficiencies in IoT devices and, eventually, autonomous vehicles. Many jurisdictions are adding to these incentives by reducing or eliminating plaintiffs' burdens of establishing standing to sue, particularly federal courts, in which the trend is to permit claims to proceed even if plaintiffs have suffered no actual harm whatsoever. *See e.g.*, *Flynn v. FCA USA LLC*, 2016 U.S. Dist. LEXIS 130614 (S.D. Ill. Sept. 23, 2016) (holding that plaintiffs may have standing due to alleged overpayment for, and diminution in value of, vehicles with allegedly defective security protections). However, even relatively permissive federal courts are dismissing cases for lack of standing if plaintiffs allege only the risk of hacking or data breaches. *See Cahen v. Toyota Motor Corp.*, 717 Fed. Appx. 720 (9th Cir. 2017) (affirming the district court's holding that plaintiffs lacked standing to assert claims that vehicles were vulnerable to hacking, which is insufficient to constitute actionable harm); 3:15-cv-01104 (N.D. Cal. 2015); *In re VTech Data Breach Litig.*, 2017 U.S. Dist. LEXIS 103298 (N.D. Ill. July 5, 2017) (holding that plaintiffs had standing to allege claims against manufacturer of digital learning toys, since plaintiffs fail to allege how stolen data could be used to steal their identities).

There also is a veritable alphabet-soup of agencies issuing regulations and guidelines governing the security of IoT devices, including the Consumer Product Safety Commission, the Federal Trade Commission, the National Telecommunications and Information Administration, myriad analogous state regulators, and, most relevant for purposes of this analysis, the National Highway Safety Administration. These myriad privacy and security statues and regulations apply to component parts in autonomous vehicles, just as they do for IoT devices. *See generally* "*Autonomous Cars: Navigating the Patchwork of Data Privacy of Laws that Could Impact the*

Industry," 25 Cath. U. J. L. & Tech. 180 (Fall 2016). Several states, most notably California and Oregon, have enacted statutes and issues regulations governing the security and privacy of information stored and transmitted by IoT devices. On the national level, the FTC has been active in IoT privacy regulations in various industries, filings regulatory and civil complaints against manufacturers for allegedly unfair or deceptive practices in connection with the security of IoT devices. *See e.g*., VTech Electronics Ltd., FTC Doc. No. 1623032 (Jan. 1, 2017) (toys); TRENDnet, Inc., No. C-4426 (Feb. 7, 2014) (digital cameras); ASUSTeK Computer, Inc. FTC Doc. No. 1423145 (Feb. 26, 2016) (routers); D-Link, Doc. No. 3:17-cv-00039 (N.D. Cal. Jan. 5, 2017) (wired routers and cameras); Lenovo Inc., FTC Doc. No. C-46356 (Dec. 20, 2017) (laptops with pre-installed ad-injecting software); BLU Products, FTC Doc. No. 1723025 (Apr. 30, 2018) (mobile devices). *See also* FTC Staff Report, "*Internet of Things: Privacy and Security in a Connected World*," (Jan. 2015). Furthermore, many IoT manufacturers and software developers operating in the United States are subject to stringent privacy and data-security requirements set forth in the Europe's General Data Privacy Regulation. *See generally* "*How the EU's General Data Protection Regulation Will Protect Consumers Using Smart Devices*," 52 Suffolk U. L. Rev. 227 (2019).

Again, a detailed review of these regulations and guidelines is beyond the purview of this analysis. However, any assessment of autonomous-vehicle liability, and the allocation of liability, must consider potential costs and fines faced by manufacturers and software developers due to potentially deficient data-security measures and privacy protections. *See generally* "*The Internet of Things and Potential Remedies in Privacy Tort Law*," 50 Colum. J. L. & Soc. Probs. 263 (Winter 2017); "*Rewriting the 'Book of the Machine': Regulatory and Liability Issues for the Internet of Things*," 19 Minn. J. L. Sci. & Tech. 455 (Summer 2018); "*Regulating the Internet of Things: Discrimination, Privacy, and Cybersecurity in the Artificial Intelligence Age*," 96 Denv. L. Rev. 87 (Fall 2018).

Chapter IV

The Clausen Miller View

THE CLAUSEN MILLER VIEW: HOW COURTS MAY ASSESS AND APPORTION LIABILITY IN AUTONOMOUS-VEHICLE CASES

This Chapter discusses our own current thinking on how courts may assess and allocate liability between and among potentially culpable parties – manufacturers, software suppliers, distributors, drivers, and injured yet negligent plaintiffs – in cases seeking damages allegedly caused by autonomous vehicles. There are no federal or state statutes defining these allocations, other than several state laws that simply defer to common-law legal principles. Common law, moreover, has not developed in autonomous-vehicle cases yet, and courts will need to address and decide allocation issues by applying product-liability precedent in multiple novel factual settings.

The judiciary's central role in allocating liability should only intensify over time. It is unlikely that federal or state legislatures will tackle allocation issues in autonomous-vehicle cases, at least not in the foreseeable future. Congress and federal agencies, in fact, have deferred allocation issues to the states, which have deferred to their courts, and those trends are likely to continue. (*See* Chapter I).

History supports the prediction that federal deference will continue as the norm. The federal government has taken a similarly deferential approach in the arena of data security, where states have been filling the void. Over the past several years, there has been a surge of state data-security legislation and regulation, most notably in New York and California, which have enacted comprehensive regimes governing data-security standards of care and liability.

A similar state surge has started in the regulation of autonomous vehicles, and states have been – and will continue to be – active and aggressive in enacting autonomous-vehicle statutes and regulations. (See Chapter I.) Nevertheless, states have shown little interest in legislating or regulating liability allocations for autonomous-vehicle damages, and the absence of state legislative or regulatory clarity on those allocations is likely to continue.

Many observers propose to solve these challenges with new legislative or regulatory paradigms that purport to provide clarity and uniformity in autonomous-vehicle cases, but those proposals are more pie-in-the-sky than legitimate candidates for change. (*See* Chapter II.) One proposal, for example, involves the creation of an entirely new body of legislation governing autonomous vehicles (*see id.*), but that prospect relies on the faint hope that federal and state governments will coordinate and cooperate to pursue uniformity and clarity. The same is true for a proposed national manufacturing enterprise responsibility ("MER") system, which again hinges on the far-fetched prospect of consensus and uniformity among federal and state regulators. Another proposal would expand the role of insurance, which may relieve the courts of at least some of the burdens of assessing and allocating liability. Despite the appeal of some of these potential reforms, they remain conceptual at best, and there is little chance ahead of fundamental reforms that reduce the need for courts to address liability and allocation issues.

Courts, therefore, will need to decide allocation issues on a case-by-case basis, and build that jurisprudence brick-by-brick. The likely result will be a protracted and vague set of liability and allocation standards that will vary between and among, and even within, the states.

In deciding liability allocations in autonomous-vehicle cases, courts may draw on precedent in which they have allocated liability for damages caused by analogous products, including products with some autonomous functionality. (*See* Chapter III.) However, even in those analogous cases, liability apportionments are the exception, and manufacturers have been the principal culpable party held liable for damages caused by their products. (*See id.*) Nevertheless, autonomous-vehicle cases may change that dynamic, since there is much greater room for courts to hold software developers and/or drivers liable for damages caused by autonomous-vehicle accidents, particularly given the central importance of the software's functionality and the driver's involvement in reducing the risks of accidents.

Courts' allocation decisions will depend on the unique aspects of each case, including the alleged facts, the evidence supporting those allegations, the damages and injuries alleged by plaintiffs, the causes of action asserted by plaintiffs, and governing precedent setting the standards of care applicable to various claims. Courts also have a plethora of sources from which to decide allocation and liability issues, including myriad regulatory standards and guidelines governing autonomous-vehicle safety issues, as well as standards developed and issued by private associations and organizations such as the Society of Automotive Engineers and the Insurance Institute for Highway Safety. (*See* Chapters I, II.)

Although these decisions will lead to a complex patchwork of varied precedent, four (4) common-law trends are likely.

First, strict liability will become the centerpiece claim that plaintiffs will assert, and courts will adjudicate, in lawsuits for damages allegedly caused by autonomous vehicles. Much of the jurisprudence will focus on whether accidents were caused by a design defect, which courts typically determine by balancing benefits and risks and assessing the viability of alternative safer designs. These inquiries are necessarily nebulous and depend on specific facts that are relevant to the alleged defect at issue. However, plaintiffs generally have the advantage in seeking to hold manufacturers liable for defective designs that caused injuries, and that advantage should strengthen in autonomous-vehicle cases, given the relative ease with which plaintiffs may allege and highlight risks associated with designs that allow vehicles to operate without driver control.

That is not to say, of course, that plaintiffs and courts will focus on strict liability to the exclusion of other potentially available claims. Plaintiffs invariably will load their lawsuits with claims based on negligence, contractual warranties, and implied warranties, which are easy to invoke given the breadth of warranty rights under the Uniform Commercial Code. Some courts may even hold that autonomous vehicles are "ultra-hazardous," particularly fully autonomous vehicles, such that manufacturers would assume absolute liability for damages caused thereby. All of these potential claims add to the likelihood – if not certainty – that liability allocations will depend on the protracted growth of jurisprudence in which the standards will vary widely depending on the jurisdiction, the claims asserted, and the alleged facts of each case.

Second, autonomous-vehicle manufacturers will rely on the usual defenses of contributory/comparative negligence, but those defenses will be difficult to sustain in most cases, particularly those involving vehicles with greater autonomy. After all, the entire purpose of a

partially or fully autonomous vehicle is to reduce the drivers' control. Manufacturers, therefore, will face substantial challenges in their contributory- or comparative-negligence defenses if drivers' inattentiveness and inaction were foreseeable consequences of reducing or perhaps even eliminating manual control.

Even with fully (or almost fully) autonomous vehicles, however, manufacturers still will defend that the users were supposed to take control under certain circumstances, as dictated by driving conditions and warnings triggered by sensors. The strength of those defenses will depend on many case-specific factors, including the level of vehicle autonomy, the drivers' actions and inactions, and the efficacy of manufacturers' efforts to warn and train drivers. In any event, those defenses generally will be difficult to allege and prove in the autonomous-vehicle realm, and courts and juries will likely accommodate some level of inattentiveness on the part of drivers, depending again on the circumstances of each case.

Contributory/comparative negligence defenses also will be difficult to assert against pedestrians whose injuries were attributable, in whole or part, to their own actions and inactions. Those defenses may have reasonable chances of success in fact patterns like the recent death of an apparently jaywalking pedestrian struck by a self-driving Uber car. (See Section I.) However, even in that example, the National Transportation Safety Board still found driver culpability (*id.*), thereby signaling the difficulty ahead of sustaining contributory-negligence defenses if drivers could have avoided hitting even negligent pedestrians.

Third, autonomous-vehicle cases should spark a wave of claims, including subrogation actions, against developers of embedded software. As discussed in Section III, to date these types of claims have been largely missing in cases against manufacturers of products with autonomous functionality, such as drones or medical devices. Rather than litigate, manufacturers and software developers presumably have been able to resolve their allocation issues under their contracts, particularly warranty and indemnification rights and duties. In autonomous-vehicle cases, however, these disputes should erupt into full-blown third-party and subrogation claims in which manufacturers and software developers aggressively attempt to blame each other for the defects and injuries at issue. Exposure in autonomous-vehicle cases will be high, substantially higher than in cases involving other products with embedded software, and manufacturers will seize any realistic opportunity to redirect responsibility and seek indemnification from developers for allegedly deficient devices and code.

Fourth, autonomous-vehicle cases will be protracted and expensive. Plaintiffs' lawyers will file individual and class-action lawsuits alleging the full panoply of product-liability claims. Manufacturers will face formidable challenges attempting to defeat these cases with dispositive motions, including motions for summary judgment, given the numerous potential claims that will raise multiple factual issues. Discovery will be intensive, and expert testimony will be inevitable, indeed critical, as each side attempts to support its positions with expert opinions on issues ranging from software functionality to driver performance.

These likely trends necessitate action, not consternation. Without waiting for autonomous-vehicle litigation to erupt, insurers and manufacturers should implement measures to reduce their exposure to prospective damages awards and settlements. Although a detailed discussion of these

measures is beyond the purview of this analysis, several substantive steps deserve mention. Insurers need to incorporate autonomous-vehicle regulatory and industry compliance into their underwriting and application processes, just as insurers have done with data-security compliance in underwriting and issuing cyber policies. This is no small task, given the plethora of safety-related regulations and industry guidelines, but it is necessary. Manufacturers should address and certify legal compliance as part of the insurance-procurement process, and insurers should develop questionnaires and underwriting processes to address and reduce exposure before it materializes.

Manufacturers' compliance with laws and regulations is necessary, but nowhere near sufficient in autonomous-vehicle litigation. Common-law principles are vague and ambiguous, and there is plenty of room for courts and juries to decide that manufacturers should have done more than merely comply with statutory or regulatory requirements. Manufacturers, therefore, should go above and beyond the call of duty, so to speak, in designing their products and warning users about potential risks. As for warnings, these need to be written and technological, such that the systems alert drivers, early and often, to dangers and the need to assume manual control. Even effective warnings themselves may be insufficient, and manufacturers will need to train drivers on the specifics of operating autonomous vehicles and taking control well before a problem turns into an accident. Training, moreover, should be ongoing, and manufacturers will need to ensure that drivers receive and avail themselves of training programs on the latest developments and risks.

The bottom line is that an impending wave of autonomous-vehicle litigation will result in piecemeal and invariably inconsistent standards of assessing and allocating liability among potentially responsible parties. That said, there are several likely themes gleaned from litigation waves in analogous contexts, and insurers and manufacturers should understand those themes and respond accordingly, as discussed above and herein, to reduce their anticipated exposure.

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