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Liability Issues with Autonomous Vehicles: Current Uncertainty and Future Solutions

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Introduction

Every year, new vehicles are released with more driving automation features to lighten the driver's workload or provide added safety. Examples of these features include adaptive cruise control, which automatically adjusts the vehicle's speed to maintain a safe following distance; lane centering, which automatically applies steering force to keep the vehicle centered in the lane; and automatic emergency braking systems, which detect an impending collision and apply the brakes or even steer to avoid or lessen the collision.[1] More advanced driving automation features exist as well, including some which allow the driver to take their hands off of the steering wheel and their feet off of the pedals entirely in certain driving situations.[2]

Automated driving technologies have the potential to benefit society in several ways. The National Highway Traffic Safety Administration (NHTSA) found in a 2015 study that 94% of crashes were attributable to human causes, including a driver's deficient hazard recognition, decision, or performance.[3] As automated driving systems progressively take over more of the driving task, human drivers and their inherent shortcomings will have less opportunities to cause crashes. Automated vehicles may also provide wider access to affordable transportation to those who are unable to operate traditional vehicles, increasing productivity and social involvement.[4] Widespread adoption of automated vehicles may also bring efficiencies in vehicle construction and usage that result in emissions-related environmental benefits.[5]

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[1] SAE INTERNATIONAL, STANDARD J3016: TAXONOMY AND DEFINITIONS FOR TERMS RELATED TO DRIVING AUTOMATION SYSTEMS FOR ON-ROAD MOTOR VEHICLES 8 (2021) [hereinafter J3016]

[2] *See*, *e.g.*, AUTOPILOT AND FULL SELF-DRIVING CAPABILITY, https://www.tesla.com/support/autopilot (last visited Mar. 22, 2022).

[3] SANTOKH SINGH, NHTSA, DOT HS 812 115, CRITICAL REASONS FOR CRASHES INVESTIGATED IN THE NATIONAL MOTOR VEHICLE CRASH CAUSATION SURVEY 1 (2015), https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812115.

[4] JEREMY A. CARP, AUTONOMOUS VEHICLES: PROBLEMS AND PRINCIPLES FOR FUTURE REGULATION, 4 U. Pa. J.L. & Pub. Aff. 81, 89 (2018).

[5] *Id*. at 91.

While all these systems currently on the US market as of the spring of 2022 certainly make the driver's job easier, safer, or more pleasant, none of them truly automate the driving task and relieve the driver of his or her ultimate responsibility for the safe operation of the vehicle.[6] Thus, in the event of a collision, the driver remains responsible for the operation of his or her vehicle, regardless of whether any of these driver assistive technologies were active.[7] As automated driving technologies advance, however, the question of who or what was in control of the vehicle will become both more difficult and more important to answer. Manufacturers of automated vehicles will benefit from clarity and consistency in the rules for liability and compensation in the event of a collision involving an automated vehicle.

This paper will describe the various levels of driving automation technologies, as defined by the industry group SAE International, formerly called the Society of Automotive Engineers.[8] These levels, which range from Level 0 (no driving automation) to Level 5 (full driving automation), dictate the allocation of responsibility for the driving task between the driver, the automated driving system, and other vehicle systems, and have a direct impact on the allocation of responsibility for adverse events.[9] This paper will then examine the potential liability implications for owners, operators, and manufacturers of automated vehicles, with an exploration of the applicable statutes of three US states who have begun to address this issue. Finally, automated vehicle liability schemes from foreign jurisdictions will be considered, along with several options for federal regulation.

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[6] *See* discussion and explanation of levels of automated driving systems, *infra*.
[7] J3016, *supra* note 1, at 25.
[8] *Id*. at 2.
[9] J3016, *supra* note 1, at 4.

Taxonomy of Automated Vehicle Technology

Background and Definitions

SAE J3016 is a comprehensive and broadly accepted industry standard which defines the taxonomy of driving automation systems and automated vehicles.[10] It is published by SAE International, a major automotive industry group formerly known as the Society of Automotive Engineers, and is intended to serve as a set of voluntary standards to provide a common framework and common terminology for automated driving systems worldwide.[11] The framework of the J3016 standard has been adopted explicitly and implicitly by several state governments and by the federal government.[12]

Though vehicle manufacturers may use a variety of terms in their marketing materials to describe driving automation technologies, the SAE J3016 standard prescribes standardized terminology for clarity and consistency. The preferred terms are *automated vehicle*, *driving automation*, and *automated driving system*.[13] These terms are preferred over the deprecated terms "autonomous vehicle" or "self-driving vehicle," as the latter terms are imprecise, potentially misleading, and frequently misused.[14] J3016 specifically disavows the use of the term "autonomous" to describe driving automation because "autonomous" implies a capacity for self-governance that automated vehicles lack – even the most advanced automated vehicle is governed by algorithms and user commands and is not truly self-governing.[15]

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[10] *Id*. at 1.
[11] *Id*. at 2.
[12] *See, e.g.*, NEV. REV. STAT. ANN. § 482A.036 (West) (defining a "fully autonomous vehicle" as one "designed to function at a level of driving automation of level 4 or 5 pursuant to SAE J3016"); NHTSA, DOT HS 812 442, AUTOMATED DRIVING SYSTEMS: A VISION FOR SAFETY (AV 2.0) 1 (2016) (adopting SAE International's terminology "to ensure consistency in taxonomy usage").
[13] J3016, *supra* note 1, at 6-7.
[14] *Id*. at 34.
[15] *Id*.

Several definitions from the SAE J3016 standard will help the reader understand the taxonomy of automated driving systems. The entire set of "real-time operational and tactical functions required to operate a vehicle in on-road traffic" is referred to as the *dynamic driving task*.[16] The dynamic driving task is further broken down into an extensive list of subtasks, the most relevant of which include *lateral vehicle motion*, referring to steering control of the vehicle; *longitudinal vehicle motion*, referring to control of acceleration and deceleration; and *object and event detection and recognition*.[17] Object and event detection and recognition (OEDR) refers to constant monitoring of the driving environment, recognizing objects and events which impact the driving task, and executing appropriate responses to these objects and events.[18]

The tasks and subtasks defined in the previous paragraph are all, of course, tasks which a human driver must execute when driving a car manually. As the level of driving automation incrementally increases, responsibility for the different subtasks is transferred from the human driver to the automated driving system.

A final helpful definition is the *operational design domain* (ODD). An automated driving system's ODD refers to the "operating conditions under which a given driving automation system or feature thereof is specifically designed to function."[19] This may be defined as a geographic restriction (within a certain neighborhood or campus), an environmental restriction (only operational in dry sunny weather), a time-of-day restriction, or a restriction based on roadway characteristics (only on limited-access highways, for example).[20] If any of its ODD parameters are not met, the automated driving system will *fall back* to either a human driver (termed a *fallback-*

[16] *Id.* at 9.
[17] *Id.*
[18] *Id.* at 17.
[19] *Id.*
[20] *Id.*

ready user) or to another automated driving system, depending on the level of driving automation involved.[21]

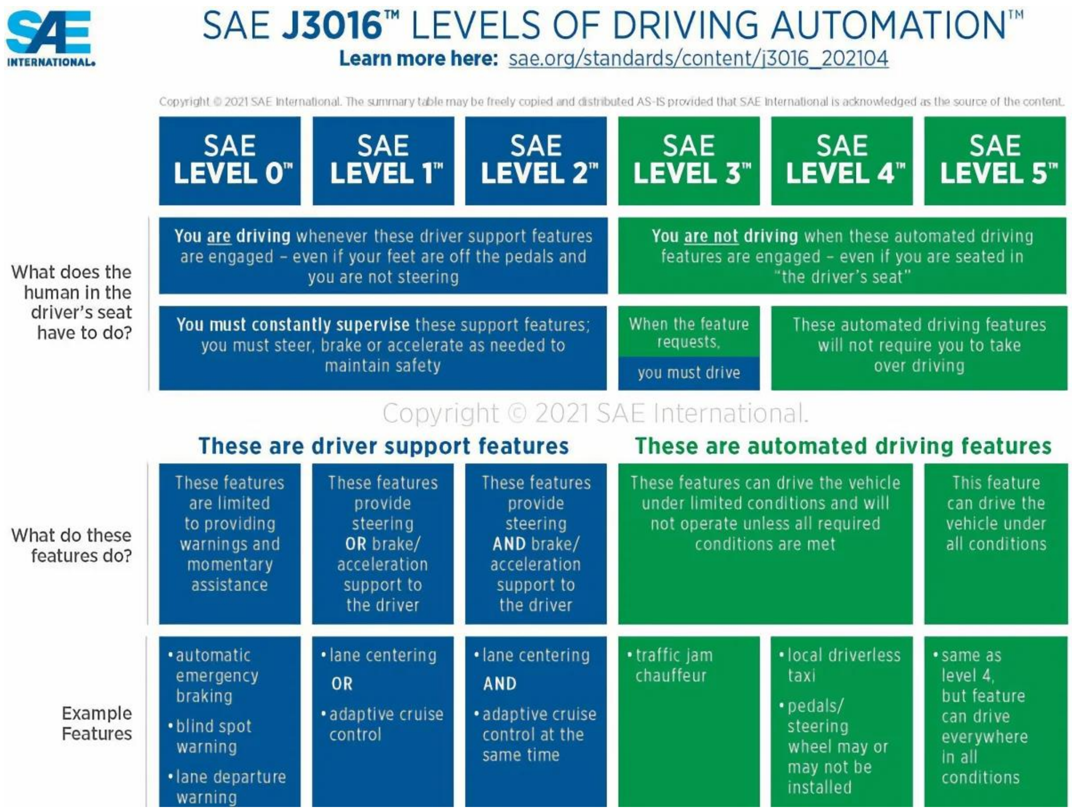

Figure 1: SAE J3016, Summary of Levels of Driving Automation

Level 0: No Driving Automation

A designation of Level 0 indicates that there is no driving automation whatsoever and the human driver is responsible for all parts of the dynamic driving task.[22] The presence of active safety systems in a vehicle does not by itself elevate the vehicle out of Level 0. Active safety systems are those systems which monitor for and intervene during a high-risk event and include

[21] *Id*.
[22] *Id*. at 30.

automatic collision avoidance systems (which automatically apply the brakes), lane keeping systems (which automatically apply steering input to avoid roadway departure), backup collision avoidance systems (which automatically brake for cross-traffic or obstacles when reversing), anti-lock brake systems and traction control systems (which automatically modulate brake inputs to help the driver maintain positive control).[23]

These active safety systems do not elevate the vehicle's automation level because the sustained performance of the driving task remains the driver's responsibility, though these systems may provide momentary assistance to avoid hazards.[24]

Level 0 is logically the default driving automation level, and any vehicle which does not qualify for a higher level is categorized in Level 0. Most vehicles on US roads are Level 0. The driver retains all responsibility for object and event detection and recognition and all responsibility for control of vehicle motion at Level 0.[25]

Level 1: Driver Assistance

At Level 1, driving automation systems begin to have sustained control of a portion of the dynamic driving task.[26] The driving automation system may have sustained control of either lateral (steering) or longitudinal (acceleration and deceleration) vehicle motion, but not both simultaneously.[27] Further, the driving automation system's control over lateral or longitudinal

[23] *Id*. at 6.
[24] *Id*. at 4.
[25] *Id*. at 25.
[26] *Id*.
[27] *Id*.

motion is constrained within a specific operational design domain (ODD).[28] This constraint can be based on speed, geography, environmental conditions, or other factors.

A concrete example of Level 1 driving automation is a vehicle driven on the highway with adaptive cruise control engaged. Adaptive cruise control systems automatically control longitudinal vehicle motion by applying the accelerator or brakes to maintain a minimum following distance from a lead vehicle.[29] In this scenario, the driving automation system has control of longitudinal vehicle motion, but the driver remains responsible for lateral vehicle motion by steering. Further, the adaptive cruise control system, at Level 1, is constrained in its ODD. For example, the adaptive cruise control may be designed to operate only in a certain speed range or with sufficiently clear environmental conditions to allow safe operation.

While an adaptive cruise control enhances safety and reduces the driver's workload, the driver remains fully responsible for object and event detection and recognition at this level of driving automation.[30] The driver of a vehicle with Level 1 driving automation must constantly supervise the driving automation system and be immediately ready to assume full control of the vehicle. For example, an adaptive cruise control system is not designed to adjust the vehicle's speed automatically and sufficiently in the event of a 'cut-in' or 'cut-out' scenario. In a both scenarios, a sudden and drastic speed difference is developed between the vehicle and a vehicle in front of it which the driving automation system cannot accommodate, leading to a potential collision.[31] Examples of 'cut-in' and 'cut-out' scenarios are shown below in Figures 2 and 3, as warnings from vehicle owners' manuals.

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[28] *Id*.
[29] *Id*. at 8.
[30] *Id*. at 25.
[31] NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., ODI RESUME: INVESTIGATION PE 16-007 8 (2017).

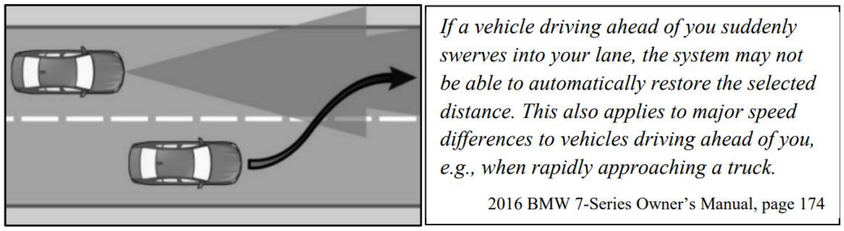

Figure 2: ACC Cut-In Scenario Warning. 2016 BMW 7-Series Owner's Manual

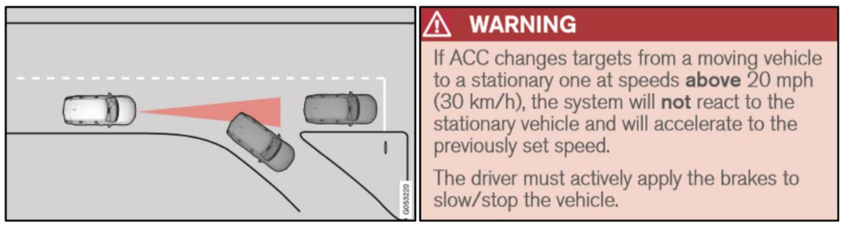

Figure 3: ACC Cut-Out Scenario Warning, 2016 Volvo XC-90 Owner's Manual[32]

Level 2: Partial Driving Automation

Level 2, 'Partial Driving Automation,' is similar to Level 1 with the additional capability for the vehicle to control both longitudinal and lateral vehicle motion control simultaneously.[33] Thus, a vehicle equipped with Level 2 driving automation systems can control steering and braking/acceleration at the same time. A Level 2 vehicle, like Level 1, has a limited operational design domain. Outside of the designated ODD parameters, the driving automation systems will disengage, and full vehicle control will revert to the human driver. Further, like Level 1, the driver of a Level 2 vehicle remains fully responsible for supervising the driving automation systems and for object and event detection and recognition.[34]

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32 *Id.*
33 J3016, *supra* note 1, at 25.
34 *Id.*

A vehicle driving on the highway with both lane centering and adaptive cruise control activated at the same time is an example of Level 2 driving automation. As noted above, the driver is responsible for constant supervision of the vehicle's systems and is responsible to immediately take over the driving task if the system disengages or if required for safety.

Level 2 driving automation is currently available from several automakers in the US market. Hyundai, Kia and Genesis offer 'Highway Driving Assist,' which combines adaptive cruise control (longitudinal control) and lane centering (lateral control) and is available only on limited-access highways.[35] With this system engaged, drivers may momentarily remove their hands from the steering wheel; however, the system provides escalating audio and visual warnings to prompt the driver to place their hands on the wheel, before eventually disengaging if the driver fails to do so.[36] Similar systems include Ford's 'Blue Cruise' and General Motors' 'Super Cruise' systems.[37]

Tesla's current (as of April 2022) 'Autopilot' and 'Full Self-Driving' technology, despite its name, is also a Level 2 system as it requires constant driver supervision and readiness to take over the driving task.[38]

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[35] WHAT IS HIGHWAY DRIVING ASSIST AND HOW DOES IT WORK?, https://www.jdpower.com/cars/shopping-guides/what-is-highway-driving-assist-and-how-does-it-work (last visited Mar. 20, 2022).
[36] *Id*.
[37] *See* FORD BLUECRUISE HANDS FREE DRIVING, https://www.ford.com/support/how-tos/ford-technology/driver-assist-features/what-is-ford-bluecruise-hands-free-driving/ (last visited Mar. 20, 2022); SUPER CRUISE: HANDS-FREE DRIVING, CUTTING EDGE TECHNOLOGY, https://www.cadillac.com/ownership/vehicle-technology/super-cruise (last visited Mar. 20, 2022).
[38] *See supra* note 2.

Level 3: Conditional Driving Automation

A major shift occurs when an automated driving system achieves Level 3 driving automation. At Level 3, the automated driving system performs the entire dynamic driving task while it is engaged.[39] It may only be engaged by the driver within a defined operational design domain, as with lower-level driving automation systems.[40] While the Level 3 automation system is engaged, the human sitting in the driver's seat is relieved of all driving duties. The human in the driver's seat, now termed a *user* rather than a driver, is not required to supervise the automated driving system, and is not required to keep alert and perform the OEDR (object and event detection and recognition) task.[41]

The user must, however, be ready to assume control if the automated driving system issues a timely request for user intervention. For example, if the Level 3 system senses that it is about to exceed its operational design domain limits (by approaching the programmed destination or a highway off-ramp, or perhaps because of worsening visibility), or if it experiences a system failure (of a sensor or camera, for example), the user will be prompted to intervene and retake control.[42] Thus, the user of a Level 3 automated vehicle cannot be intoxicated, asleep, underage, or otherwise unable to assume control of the vehicle.

An example of a Level 3 automated driving system is Mercedes Benz's 'Drive Pilot' technology, which was recently approved by German authorities for a limited roll-out on designated portions of the Autobahn.[43] The 'Drive Pilot' system is designed to fully operate the

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[39] J3016, *supra* note 1, at 28.
[40] *Id*.
[41] *Id*.
[42] *Id*.
[43] ANGUS MACKENZIE, *Mercedes-Benz Drive Pilot First Drive: It Actually Drives Itself**, MOTORTREND (Jan. 21, 2022), https://www.motortrend.com/reviews/mercedes-benz-drive-pilot-autonomous-first-drive-review/

vehicle under certain conditions on limited-access highways, freeing the user to take their hands off the wheel and eyes off the road until they are prompted by the system to retake control.[44] As currently configured, the 'Drive Pilot' Level 3 system has relatively restrictive parameters defining its operational design domain. It is currently intended to automatically handle slowdowns or traffic jams rather than freely cruise the Autobahn, being limited to speeds below about 37MPH, sufficient daylight, road moisture conditions, and road design (limited-access highways).[45]

Level 3 automated vehicles are a significant step toward full automation from the driver's perspective, as Level 3 is the first level which truly allows the driver to occupy themselves with other tasks while the automated driving system is engaged. Drivers are free to use electronic devices and extend work hours to include their commute, for example, or they can watch movies or television.

Level 4: High Driving Automation

Level 4 driving automation is defined by the automated driving system performing the entire driving task and being capable of performing 'fallback' action without any expectation that the user will intervene at any point.[46] In Level 3 driving automation, the user is responsible for fallback action – assuming control in the event the system departs from its designed operational design domain or suffers from a failure. In contrast, Level 4 systems are capable of handling fallback without user intervention by automatically transitioning into a *minimal risk condition*.[47]

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[44] MERCEDES-BENZ DRIVE PILOT 2, https://group.mercedes-benz.com/innovation/case/autonomous/drive-pilot-2.html (last visited Mar. 22, 2022).
[45] J3016, *supra* note 1, at 28.
[46] *Id*.
[47] *Id*.

A minimal risk condition is defined as a "stable, stopped condition" achieved "in order to reduce the risk of a crash when a given trip cannot be continued."[48] Depending on the event or failure triggering the fallback and the driving environment the automated vehicle finds itself in, a minimal risk condition may simply be coming to a stop along the travel path, or may entail pulling onto the shoulder or returning to a dispatch facility.[49]

Level 4 automated vehicles are limited in their operational design domain.[50] The defined operational design domain for a Level 4 automated vehicle may be limited in terms of geography, speed, road conditions, weather, or any combination of these and other factors. For example, an automated people mover shuttle which automatically runs a defined route on a college or corporate campus would likely qualify as a Level 4 automated vehicle. Another example is a small, automated delivery vehicle which navigates public roads without human supervision. Domino's Pizza has partnered with Nuro to test automated delivery vehicles without human drivers or occupants in the Woodland Heights neighborhood of Houston, Texas.[51] These vehicles are limited in their operational design domain by geographical boundaries, time of day, and likely also by weather and road conditions.[52]

<u>Level 5: Full Driving Automation</u>

Level 5, or Full Driving Automation, builds on Level 4 systems by removing any limitations on the operational design domain.[53] Level 5 automated driving systems perform the

[48] *Id*. at 15.
[49] *Id*.
[50] *Id.* at 26.
[51] DOMINO'S SELF-DRIVING DELIVERY, https://selfdrivingdelivery.dominos.com/en (last visited Apr. 11, 2022).
[52] *Id*.
[53] J3016, *supra* note 1, at 26.

entire driving task and are responsible for handling fallback to a minimal risk condition, without any expectation of human intervention and without any limitation on the operational design domain.[54] There are currently no publicly available Level 4 or Level 5 automated vehicles.

A Level 5 automated driving system, when engaged, does not require any human supervision in any circumstances.[55] The automated driving system is designed to handle any driving tasks or road conditions which "can be reasonably operated by a typically skilled human driver."[56] When the system is engaged, a human in the vehicle, even if they are seated in the traditional 'driver's seat,' becomes nothing more than a passenger with no responsibility to supervise the vehicle's operation or to take control of the vehicle.[57] Users of these vehicles, or dispatchers of remotely controlled fleets of these vehicles, are responsible only for engaging the automated driving system and indicating the destination.[58]

Potential Liability Implications of Automated Driving Technology

Despite the promising technological advancements involved in the development of fully automated vehicles, the automated vehicle industry and our society must still plan for when things go wrong. Though automated driving systems may be more alert than their human counterparts and may have quicker reaction times, it would be naïve to fail to plan for collisions, injuries, and even fatalities.

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[54] *Id*.
[55] *Id*.
[56] *Id*. at 32.
[57] *Id*. at 30.
[58] *Id*. at 29.

The question becomes, then, whether the current automobile liability ecosystem can properly allocate liability when one or more of the vehicles involved in a collision is not driven by a human driver. If a human is in her Level 5 automated vehicle, with the automated driving system activated, she is merely a passenger and not required to supervise or intervene in the vehicle's operation. Should she still be held liable if her vehicle hits someone? If a Level 3, 4, or 5 automated vehicle, where the automated driving system is rated to perform the entire driving task, is deemed to be at fault in a collision, should the *manufacturer* be held liable? If so, under what theory of liability?

The answers to these questions, and whether they are answered *consistently* from one case to the next and from one jurisdiction to the next, will inform decisions that vehicle owners, manufacturers, and insurers will have to make as the technology matures.

Existing Auto Liability and Insurance Framework

Following a motor vehicle accident, economic recovery for an injured party generally follows one of two paths, depending on the jurisdiction: tort-based schemes or no-fault schemes.[59] Because automobile liability insurance systems are governed by state law, they differ significantly between jurisdictions.

In a conventional tort system, governed by common law and statutory law of the jurisdiction, an injured party may recover damages if they show that the other party was negligent and caused the injury – that is, if the other party was 'at fault' for the accident.[60] In an action for

[59] RAND CORPORATION, *The U.S. Experience with No-Fault Automobile Insurance* 7 (2010).
[60] *Id*.

negligence, the plaintiff has the burden of proving that the defendant was held to a particular duty, that he breached that duty, that the breach caused the injury, and that some specific damages resulted.[61] If the defendant driver is insured, their insurer typically takes on the task of defending against the claim because damages are paid out of the liability insurance policy, up to the policy cap. Researchers have noted that some efficiency is gained in the auto tort claim system by the often-repeating circumstances leading insurance adjusters, insurers, and attorneys to develop and accept a 'shorthand' set of rules.[62] A driver who rear-ends another is typically considered to be at fault, for example, without a requiring a full examination of all of the elements of the tort claim.[63]

Motor vehicle codes and regulations can also be used to define and evaluate the duty and breach elements of a negligence claim more efficiently.[64] Depending on the law of the particular jurisdiction and the text of the statute, violation of a traffic law may prove negligence in and of itself ("negligence per se") or may be relevant evidence that a duty existed, and that the duty was breached.[65]

The alternative to the conventional tort-based auto liability system is the no-fault system. In a typical no-fault automobile insurance system, there is no need to prove negligence as a prerequisite to recovering damages. Instead, the injured party's own insurer pays for the insured party's loss, though often limited solely to economic losses.[66] This system seeks efficiency and lower costs by providing quicker and broader compensation to an injured party without the need

[61] Restatement (Second) of Torts § 328A (Am. Law Inst. 1975).
[62] RAND, *supra* note 59, at 8.
[63] *Id.*
[64] *Id.*; *see* Restatement (Second) of Torts § 288B (Am. Law Inst. 1975).
[65] *See* Restatement (Second) of Torts § 288B (Am. Law Inst. 1975).
[66] RAND, *supra* note 59, at 11.

to resort to often costly and lengthy litigation.[67] Inured drivers simply file claims with their own insurance company, without regard to who is at fault in the accident.[68]

In a no-fault insurance system, injured drivers are typically prevented from suing the at-fault driver unless certain additional conditions are present.[69] These conditions, or 'thresholds,' are either monetary or verbal. A monetary threshold refers to the amount of monetary loss – if an injured party suffers damages over the monetary threshold, they may sue the at-fault party despite being in a no-fault state. Verbal thresholds refer to the severity of the injury, allowing the injured party to sue in tort if the injury meets or exceeds some described level of seriousness, defined in statute or case law.[70]

In some no-fault jurisdictions, the insurer may have the right of subrogation against the tortfeasor. In these scenarios, the no-fault insurer pays the economic damages of the insured party, and then steps into the insured party's shoes to pursue a claim against the at-fault driver or his insurance company.[71]

The current automobile insurance system, whether conventional tort-based or no-fault, is built around the presumption that there is a human driver at the wheel, because this has been the only reality since the system's inception. Shifting responsibility for a vehicle's operation away from the human driver and toward an automated driving system designed and programmed by the

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[67] *No-Fault Auto Insurance*, INSURANCE INFORMATION INSTITUTE (Nov. 6 2018) https://www.iii.org/article/background-on-no-fault-auto-insurance.
[68] *Id.*
[69] RAND, *supra* note 59, at 12.
[70] *Id.*
[71] *See* THOMAS J. GOGER, Annotation, *No-Fault: Right Of Insurer To Reimbursement Out Of Recovery Against Tortfeasor*, 69 A.L.R.3d 830 (Originally published in 1976).

vehicle's manufacturer may strain the operation of the existing auto insurance system, requiring a new approach to determining liability.[72]

Potential for Product Liability for Manufacturers of Automated Vehicles

Potential liability for manufacturers of motor vehicles in the event of a crash is not a new concept. The field of products liability law is well developed and has been applied to, and developed by, controversies involving motor vehicles.[73]

The law of products liability provides that manufacturers, sellers, and distributors of defective products are "subject to liability for harm to persons or property caused by the defect."[74] Products maybe found defective under any of several theories. A product may be defective because it contains a manufacturing defect, because its design is defective, or because of inadequate warnings or instructions.[75]

Manufacturing defects occur when a product "departs from its intended design."[76] The approach to manufacturing defects embraced by the Restatement (Third) of Torts imposes strict liability on manufacturers for harm caused by manufacturing defects, regardless of any showing of the level of care or quality control the manufacturer employed.[77] For example, if an automated vehicle is assembled improperly or is loaded with the wrong software and an injury results, this

[72] *But see* BRYANT WALKER SMITH, *Automated Driving And Product Liability*, 2017 Mich. St. L. Rev. 1 (2017) (arguing that the existing product liability regime is sufficient to deal with the new realities of automated vehicles).
[73] *See, e.g.*, Jackson v. Gen. Motors Corp., 60 S.W.3d 800 (Tenn. 2001).
[74] Restatement (Third) of Torts: Prod. Liab. § 1 (Am. Law Inst. 1998).
[75] Restatement (Third) of Torts: Prod. Liab. § 2 (Am. Law Inst. 1998).
[76] *Id.*
[77] *Id.* at cmt. a.

would likely be considered a manufacturing defect and an injured party may attempt to bring a claim against the manufacturer under a theory of strict liability.

Strict liability based on manufacturing defects is unlikely to play a significant role in resolving controversies surrounding automated vehicle crashes. Recovery for a manufacturing defect requires a showing that the vehicle was in fact assembled contrary to the plans or specifications. Thus, this theory is not applicable in cases where the automated vehicle was assembled and programmed 'properly' (i.e., according to the design or plan) and nonetheless caused or contributed to an injury.[78]

The next step, then, is to ask whether the design or plan of the automated vehicle was correct, or at least reasonable, and whether the vehicle's manufacturer may face liability because of a faulty design or programming. Design defects claims are evaluated under either a consumer expectations test, or under a risk-utility test.[79]

The consumer expectations test asks whether the design of the product is such that it is dangerous "to an extent beyond that which would be contemplated by the ordinary consumer."[80] This test is limited to those products about which an ordinary consumer would have settled and reasonable expectations. If a technology is complex, or typically hidden from the view of a typical consumer to the extent that they do not have an articulable expectation of its proper function, then the consumer expectation test is inapplicable.[81] In Pruitt v. General Motors Corp., the California Court of Appeals held that the consumer expectations test was inappropriate for evaluating the

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[78] *See* KEVIN FUNKHOUSER, *Paving the Road Ahead: Autonomous Vehicles, Products Liability, and the Need for A New Approach*, 2013 Utah L. Rev. 437, 455 (2013).
[79] *Id.* at 456.
[80] Restatement (Second) of Torts § 402A cmt. i (Am. Law Inst. 1975).
[81] *See* Pruitt v. Gen. Motors Corp., 72 Cal.App.4th 1480, 1484 (Ct. App. 1999) (noting that the consumer expectations test is inappropriate with complex technical items, here air bags).

operation of vehicle airbags, as their activation is "not part of the 'everyday experience' of the consuming public" and their proper operation constitutes a "complex technical issue."[82] If the function of airbags is considered too complex for this test, then the operation of an automated driving system is also likely too complex. It is unlikely that consumers will have well-formed expectations of the proper behavior of automated vehicles under varying road and traffic conditions, at least not until they are on the market for many years.[83]

The risk-utility test is an alternative test for evaluating design defect claims which has been embraced by the Third Restatement.[84] This test considers whether there exists a reasonable alternative design which would have reduced the foreseeable risks of harm, at reasonable cost, and whether failure to use that alternative design rendered the product not reasonably safe.[85] Putting this test into practice in the context of automated vehicles will likely face a similar challenge as the consumer expectations test: the complexity of the technologies at issue. Application of this test would require comparison of the automated vehicle to a reasonable alternative. Though the industry is rapidly developing, there are currently few alternative designs to bring forward and compare.

Plaintiffs seeking to use the risk-utility test to prove a design defect may also encounter an obstacle to their claim if the manufacturer claims that the technology in question is "state of the art" – "the safest and most advanced technology developed and in commercial use."[86] Commentary

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[82] *Id.* at 1483-44.
[83] FUNKHOUSER, *supra* note 78, at 57.
[84] Restatement (Third) of Torts § 2 cmt. d (Am. Law Inst. 1998).
[85] *Id.*
[86] *Id.*

to the Third Restatement recognizes the difficulty of proving the feasibility of a reasonable alternative design when the technology in question is at the cutting edge.[87]

Both existing primary tests for product design defects, then, face significant challenges in their application against the advanced and opaque technology of automated vehicles.

That said, the entry of more automakers into the automated vehicle market and the technological nature of the product may alleviate some of these issues. As more manufacturers are able to place operational automated vehicles into production, automated vehicle manufacturers facing a design defect suit are likely to find their design or programming compared to that of other manufacturers. If the defendant's design is proven to be less safe than a reasonable alternative design from another manufacturer, the plaintiff may prevail. To protect from such losses, it will be incumbent upon automated vehicle manufacturers to keep abreast of market developments and ensure that their designs are demonstrably as safe or safer than competitors' designs.

The high-tech and data-driven nature of automated vehicle technology may also alleviate some of the opacity and evidentiary challenges raised above. Logged data from automated driving systems' multitude of sensors and logs of the algorithms' decisions may prove to be valuable evidence and is likely to be parsed by both sides' expert witnesses in future suits to prove the design's reliability or fallibility, depending on which side is doing the analysis. At least one state, California, has already enacted legislation mandating the preservation of a certain amount of logged data from automated vehicles following an incident.[88]

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[87] *See id*.
[88] CAL. CODE REGS. tit. 13, § 228.02(a) (2022).

Review of Automated Vehicle Regulations in Selected Jurisdictions

This section will discuss the existing automated vehicle regulations in three US states: Nevada, California, and Florida.

Nevada

In Nevada, automated vehicles are governed by Chapter 482A of the Nevada Revised Statutes, which authorizes supplementary administrative rulemaking contained in Chapter 482A of the Nevada Administrative Code.[89] An "autonomous vehicle" is defined by Nevada statute as one which functions at SAE J3016 Level 3, 4, or 5, with the subcategory of "fully autonomous vehicle" encompassing only Levels 4 and 5.[90]

The automated driving systems of automated vehicles of Level 3 or higher perform the entire dynamic driving task, including object and event detection and recognition, without requiring a human driver to keep watch on the road. A Level 3 automated vehicle requires a human user to be present in the vehicle and ready to take control if requested by the system; in Level 4 and 5 vehicles, the automated driving system will not ask a human user to take control.[91]

Nevada Administrative Code provides that "a person shall be deemed the operator of an autonomous vehicle which is operated in autonomous mode when the person causes the autonomous vehicle to engage, regardless of whether the person is physically present in the vehicle while it is engaged."[92]

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[89] NEV. ADMIN. CODE § 482A (2019); NEV. REV. STAT. § 482A (2017).
[90] NEV. REV. STAT. § 482A.030 (2017); NEV. REV. STAT. § 482A.036 (2017).
[91] J3016, *supra* note 1, at 26.
[92] NEV. ADMIN. CODE § 482A.020 (2019).

However, NRS 484A.080 further defines driver in the autonomous vehicle context. For an "autonomous vehicle" (Level 3, 4, or 5) with the automated driving system engaged, the "driver" is the person who caused the automated driving system to engage.[93] For a "fully autonomous vehicle" (only Levels 4 or 5), "driver" *does not* include the natural person who engaged the automated driving system, unless that person is also the owner of the vehicle.[94]

Thus, Nevada statutes make a distinction between Level 3 automated vehicles (where a human operator is still required to be sitting in the driver's seat, though he can amuse himself with other tasks while the vehicle is driving) and Level 4 or 5 automated vehicles, where the technology will at no point ask a human to take over the driving task. In the former case, the human who activates the automated driving system is still considered the "driver;" in the latter, the human who activates the automated driving system is only considered the driver if she is also the owner of the vehicle.

Presumably, this distinction exists to prevent a passenger in a Level 4 or 5 automated ride-sharing service (such as Uber without a human driver) from being deemed the 'driver' of the vehicle they have hired. Unfortunately, no statements of legislative intent are apparent, and there has yet to be published litigation addressing the issue or importance of who is considered the 'driver' or 'operator' of an automated vehicle in Nevada.

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[93] NEV. REV. STAT. § 484A.080 (2017).
[94] *Id*.

Nevada is a mandatory insurance state. Autonomous vehicles are required to carry the same minimum level of insurance as other motor vehicles in the state.[95] Nevada is not a no-fault state, and conventional tort remedies are available as recourse for motor vehicle accidents.[96]

California

The State of California regulates manufacturers' on-road testing of automated vehicles in addition to the deployment (consumer use) of automated vehicles.[97] Like Nevada, California defines an "autonomous vehicle" as a vehicle with capabilities listed in SAE J3016 Levels 3, 4, or 5.[98]

To test autonomous vehicles on public roads, manufacturers are required to get a permit, have a test driver in the vehicle who is certified by the manufacturer, and prove their financial ability to respond to a judgment for damages for personal injury, death, or property damage. California's regulations require minimum liability coverage of $5 million, which can be satisfied by insurance, surety bond, or a certificate of self-insurance.[99]

'Deployment' refers to the actual operation of autonomous vehicle on public roads by a member of public who is not associated with the manufacturer – making the vehicle commercially available outside of a testing program.[100] The same financial responsibility requirements are imposed on manufacturers for deployment, namely $5 million in liability coverage by insurance,

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[95] NEV. ADMIN. CODE § 482A.050 (2017); NEV. REV. STAT. § 485.185 (2017).
[96] NEVADA CAR INSURANCE REQUIREMENTS, https://www.nolo.com/legal-encyclopedia/nevada-car-insurance-requirements.html (last visited Apr. 20, 2022).
[97] *See* CAL. CODE REGS. tit. 13, § 227.00 et seq. (2022); CAL. CODE REGS. tit. 13, § 228.00 et seq. (2022).
[98] CAL. CODE REGS. tit. 13, § 228.02 (2022).
[99] CAL. CODE REGS. tit. 13, § 227.04 (2022).
[100] CAL. CODE REGS. tit. 13, § 228.02 (2022).

surety bond, or proof of self-insurance to the $5 million figure above.[101] Existing California regulations do not explicitly indicate when the manufacturer's insurance will be the source of a crash victim's recovery, though the fact that the legislature implemented these requirements for manufacturers testing or deploying automated vehicles is evidence of the expectation that manufacturers may provide at least some of the recovery for injured parties in the event of an automated vehicle accident.

This financial responsibility requirement imposed on the manufacturer is in addition to the insurance requirement each individual vehicle owner must meet.[102] Vehicle owners may satisfy their insurance requirement in California with a liability insurance policy, a cash deposit of $35,000 with the DMV, a self-insurance certificate, or a surety bond for $35,000.[103] The minimum liability coverage required for private passenger vehicles is $15,000 for injury or death to one person; $30,000 for injury or death to more than one person; $5000 for damage to property.[104]

California law defines the "operator" of an autonomous vehicle as "the person who is seated in the driver's seat, or, if there is no person in the driver's seat, causes the autonomous technology to engage."[105]

Unlike the other states surveyed for this report, California mandates that autonomous vehicles be capable of recording "technical information about the status and operation of the vehicle's autonomous technology sensors for 30 seconds prior to a collision."[106] California's regulations do not indicate what will be done with this information in the event of a collision, nor

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[101] CAL. CODE REGS. tit. 13, § 228.04 (2022).
[102] CAL. VEH. CODE § 34687 (West 2022).
[103] *Id*.; CAL. VEH. CODE § 16056 (West 2022).
[104] CAL. INS. CODE § 11580.1b (West 2022).
[105] CAL. VEH. CODE § 38750(a)(4) (West 2022).
[106] CAL. CODE REGS. tit. 13, § 228.02(a) (2022).

do the regulations mandate the sharing of this information with other drivers, insurers, the state, or the manufacturer. However, the mandate to collect this information will likely make it available via discovery in the event of litigation, if it is properly preserved.

California is not a no-fault state. Injured motorists retain their right to sue other parties for negligence. [107]

Florida

Florida defines an "autonomous vehicle" as any vehicle equipped with an automated driving system, which is further defined as a system capable of performing the entire dynamic driving task, regardless of whether it is limited to a specific operational design domain.[108] In the standardized parlance of the SAE J3016 standard, then, Florida considers Level 3, 4, and 5 vehicles to be "autonomous vehicles."[109]

Florida provides for minimum insurance requirement for all vehicles used upon a highway.[110] The general minimum liability coverage is $10,000 for bodily injury or death to one person in any one crash; $20,000 for bodily injury or death to two or more persons in any one crash; and $10,000 for property damage in any one crash.[111]

Florida imposes an additional minimum insurance requirement for fully autonomous vehicles which are "logged on to an on-demand autonomous vehicle network or engaged in a prearranged ride" of $1 million in primary liability coverage for death, bodily injury, or property

[107] RAND, *supra* note 59, at 55.
[108] FLA. STAT. §316.003(3) (2021); FLA. STAT. §316.003(3)(a) (2021).
[109] *See supra* text accompanying notes 39-58.
[110] FLA. STAT. §324.021 (2021).
[111] FLA. STAT. §324.021(7) (2021).

damage.[112] This regulation is likely targeted at rideshare companies or common carriers who would come to use automated vehicles in their networks.

When it is engaged, the automated driving system is deemed to be the operator of the vehicle for the purposes of traffic laws, regardless of whether a natural person is physically present in the vehicle at the time.[113]

It is unclear whether Florida's legislative declaration that the automated driving system is the 'operator' will have any effect on tort liability determinations. There are no published court opinions addressing this issue, as the deployment of truly autonomous vehicles is limited in Florida as of March 2022. As stated above, the commercially available "self-driving" systems from Tesla ("Full Self-Driving"), General Motors ("Super Cruise"), and Ford ("Blue Cruise") require the driver to always remain alert for roadway hazards and ready to resume control, making them Level 2 systems at most (and so not "autonomous vehicles" under Florida law).[114]

The importance of who is deemed the "driver" or "operator"

All three states surveyed above have enacted laws or regulations defining who is the "driver" or "operator" of an autonomous vehicle. However, for the purposes of this paper, such definitions or distinctions are inconsequential if they do not reflect a legislative intent to allocate liability along those lines following a crash of an automated vehicle.

[112] FLA. STAT. §627.749(2)(a) (2021).
[113] FLA. STAT. §316.85 (2021).
[114] *See supra* notes 2, 37.

The following table summarizes each state's definition of "driver" or "operator," and indicates the language used to qualify that definition.

Jurisdiction	Nevada	California	Florida
Definition	"Operator" is the person who causes the autonomous vehicle to engage.[115] "Driver" of a Level 3, 4, or 5 AV is the person who caused the ADS to engage. In a Level 4 or 5 AV, that only applies if the person is also the owner of the vehicle.[116]	"Operator" is the person in the driver's seat, or if none, the person who caused the automated driving system to engage.[117]	"Operator" is the automated driving system when it is engaged, regardless of whether a natural person is present in the vehicle.[118]
Qualifying Language	"Operator" is defined "for purposes of this chapter." NAC 484A is titled "Autonomous Vehicles."[119] "Driver" is defined in NRS 484A "as used in Chapters 484A to 484E," which encompasses Nevada's traffic laws. [120]	"Operator" is defined "for the purposes of this division." Division 16.6 is titled "Autonomous Vehicles."[121]	"Operator" is defined "for the purposes of this chapter, unless context otherwise requires." Chapter 316 of Florida Statutes is titled "State Uniform Traffic Control."[122]

[115] NEV. ADMIN. CODE § 482A.020 (2019)
[116] NEV. REV. STAT. § 484A.080 (2017).
[117] CAL. VEH. CODE § 38750(a)(4) (West 2022).
[118] FLA. STAT. §316.85 (2021).
[119] NEV. ADMIN. CODE § 482A.001 (2019)
[120] NEV. REV. STAT. § 484A.010 (2017).
[121] CAL. VEH. CODE § 38750(a) (West 2022).
[122] FLA. STAT. §316.85(3)(a) (2021).

As noted, all the definitions are qualified as being for the purposes of the chapter or division they are found in. Unfortunately, none of these chapters directly address the issue of allocation of liability following a collision.

However, a definition of the autonomous vehicle's driver or operator in the context of traffic control laws, such as Nevada's definition, may form the basis for a legal argument and an extension of that definition to issues of liability. Consider a scenario in which a person enters a Level 4 or 5 automated vehicle in Nevada and activates the automated driving system. That individual is no longer required to monitor the vehicle or the roadway and will not be asked to retake control.[123] Under Nevada law, if that person is not also the vehicle's owner, they are *not* deemed the "driver." If the automated vehicle runs a red light, the person sitting in the vehicle would not be liable for the traffic ticket. It would seem contradictory, then, if the person were nonetheless held liable for a collision if their vehicle struck another vehicle running that same red light. If the legislature saw fit to absolve the occupant of a Level 4 or 5 vehicle of liability for traffic infractions, why shouldn't that extend to liability for traffic collisions?

Unfortunately, due to the nascent state of the automated vehicle industry, no binding or precedential on-point cases have been located in any of the surveyed states or any other jurisdiction. Nor have any of the surveyed states directly addressed the issue of liability in their laws, regulations, or legislative statements.

Though not precedential, one settled 2018 California case can shed light on one automaker's response to an automated vehicle negligence action. In Nilsson v. Gen. Motors LLC, a motorcyclist brought suit against the manufacturer of a Chevy Volt which was alleged to have

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[123] This assumption is drawn from the definition of Level 4 and 5 vehicles. *See supra*, notes 46, 55.

been operating in "self-driving" mode where the driver had his hands off of the wheel.[124] Though the driver allegedly commanded the vehicle to change lanes, the vehicle veered back into its original lane, striking the plaintiff.[125] The plaintiff's cause of action was negligence based on the defendant's vehicle not following the traffic rules and regulations, not product liability.[126]

Surprisingly, in their answer, General Motors admitted that the vehicle was required to use reasonable care in driving.[127] This case was settled by the parties in the pleading phase, and so the case carries no precedential value, nor are we able to see the parties' proposed legal arguments in the record or in their briefs. It would certainly be an overreach to use this single undeveloped case to state that all automakers accept that their *vehicles* bear the burden of liability. However, it is nonetheless interesting to see that an automaker so easily accepted that their vehicle had a duty to follow the rules of the road, even where the vehicle in question could not have been higher than a Level 2 automated vehicle.

Ultimately, until either legislatures or courts directly address the issue of allocation of liability between an automated vehicle's owner, occupant, operator, or manufacturer, there will remain a large amount of uncertainty and risk. The following section will explore approaches used or considered by other jurisdictions, as potential models for US jurisdictions to follow.

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[124] Nilsson v. Gen. Motors LLC, No. 18-471 (N.D. Cal. Jan. 22, 2018), ECF No. 1.
[125] *Id.*
[126] *Id.*
[127] Nilsson, ECF No. 18, paragraph 15.

Alternative Models for Automated Vehicle Liability Regulations

United Kingdom

The United Kingdom's Automated and Electric Vehicles Act of 2018 defines the liability scheme for insurers of automated vehicles.[128] This legislation explicitly addresses a situation where an automated vehicle is involved in an accident while "driving itself," defined in the statute as "operating in a mode in which it is not being controlled, and does not need to be monitored, by an individual." This definition corresponds to Level 3, 4, or 5 automated vehicles by SAE J3016 definitions.[129]

Under this legislation, a person injured by an automated vehicle "driving itself" recovers directly from the insurer covering that vehicle.[130] If that vehicle is not insured (which would be contrary to law), then the owner of the vehicle is liable for the damages.[131] The intent of this policy is to compensate injured parties quickly and fairly and avoid the need for injured parties to sue automated vehicle manufacturers through the courts for compensation.[132]

The insurer or vehicle owner (whoever paid the injured party) is then able to bring a claim against "any other person liable to the injured party in respect of the accident."[133] If the accident was caused by a defect in the vehicle or its programming, for example, the insurer can pursue a claim against the vehicle manufacturer. In this way, this statutory scheme functions like the no-fault insurance schemes described in previous sections, prioritizing compensation of injured

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[128] Automated and Electric Vehicles Act 2018, c. 18 (Eng.), https://www.legislation.gov.uk/ukpga/2018/18/contents.
[129] *See supra* text accompanying notes 39-58.
[130] Automated and Electric Vehicles Act 2018, *supra* note 113, at §2(1).
[131] *Id.* at §2(2).
[132] Automated and Electric Vehicles Act 2018, c.18, Explanatory Notes ¶ 11 (Eng.).
[133] Automated and Electric Vehicles Act 2018, *supra* note 113, at §5.

parties without a finding of fault and contemplating a future claim for reimbursement of the insurer from the liable party.[134]

Canada

Canada has not enacted nationwide legislation addressing liability and automated vehicles, but the non-governmental industry group Insurance Bureau of Canada (IBC) released a report in 2018 with recommendations for legislation.[135] This report recognizes that existing auto liability policies presuppose human error as the cause of motor vehicle crashes, and that this assumption will not hold true as automated vehicles take to the streets unsupervised by human drivers.[136] The report recognizes that a liability claim stemming from an automated vehicle accident would likely involve products liability claims which are more complex than typical motor vehicle collision claims, delaying compensation to injured parties.[137] The report also posits that it would be especially difficult to determine fault in collisions occurring during the transitional period where conventional vehicles and automated vehicles share the roads.[138]

The IBC Report recommends establishing a single insurance policy which would simultaneously cover both driver negligence and the automated driving technology.[139] This policy would compensate injured parties quickly, with the insurer able to recover its costs from the vehicle manufacturer if the manufacturer is later shown to be at fault.[140] The IBC notes that this policy

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134 *See supra* text accompanying notes 66-72.
135 INSURANCE BUREAU OF CANADA, *Auto Insurance for Automated Vehicles: Preparing for the Future of Mobility* (2018). [hereinafter *IBC Report*]
136 *Id.* at 3.
137 *Id.* at 8.
138 *Id.*
139 *Id.* at 3.
140 *Id.* at 9.

solution, compared with a strict no-fault approach, can co-exist with the "mixed no-fault and tort policies that are common in Canada."[141]

The IBC further recommends a data-sharing agreement between vehicle manufacturers, owners, and insurers to help determine the cause of a collision and help efficiently resolve disputes and claims.[142] This data-sharing scheme echoes the data collection mandated by California statute, though the California statute does not mandate the sharing of that information.[143]

<u>Federal Preemption Potential and Examples</u>

Current automobile liability insurance frameworks in the United States are a patchwork system, with each state setting its own regulations. Federal preemption, however, is a distinct possibility and represents an opportunity to harmonize and simplify the autonomous vehicle liability system. A uniform nationwide system would likely be preferable to vehicle manufacturers, who would otherwise be exposed to state-by-state differences in liability schemes and products liability case law.

Federal preemption of vehicle safety issues is not without precedent. The National Highway Traffic Safety Administration (NHTSA) acts under the authority of the National Traffic and Motor Vehicle Safety Act to create and promulgate the mandatory Federal Motor Vehicle Safety Standards (FMVSS).[144] These regulations are focused on vehicle safety features, and NHTSA has already directed significant effort in developing FMVSSs specific to Level 4 and 5

[141] *Id.* at 10.
[142] *Id.* at 12.
[143] *See supra* note 104.
[144] National Traffic and Motor Vehicle Safety Act, 49 U.S.C. § 30101 et seq. (West 1994).

autonomous vehicles.[145] FMVSSs typically address vehicle safety issues and design, and not the liability insurance surrounding motor vehicles.

However, there is precedent for federal vehicle regulations being used by vehicle manufacturers as a defense against products liability claims, by the federal standard preempting a conflicting state regulation.[146] In Geier v. American Honda Motor Co., the Supreme Court held that a state vehicle safety standard was federally preempted by a conflicting FMVSS, and thus the products liability suit based on strict liability for failure to adhere to the state standard failed.[147] The Court held that even if the legislation enabling the publication of FMVSSs did not expressly preempt state regulations, conflict preemption principles still applied.[148] It seems plausible for Congress to enable the Department of Transportation to enact similar regulations that could provide structure and guidance for the allocation of liability in autonomous vehicle crashes. This federal solution, preempting disparate state solutions, would be beneficial to manufacturers and insurers by providing uniformity, certainty, and stability.

Other federal legislation can provide examples for preemption in the liability arena. One extreme approach would be to flatly limit the liability of automated vehicle manufacturers, to protect the nascent industry. This liability-limiting approach was employed to protect the civilian nuclear industry in the 1950s with the Price-Anderson Nuclear Industries Indemnity Act.[149] Under this scheme, still in existence in a modified form, licensed nuclear operators are required to obtain primary commercial insurance coverage which is pooled as an industry to reimburse

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[145] *See* NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, *FMVSS Considerations for Vehicles With Automated Driving Systems: Volume 1*, Report No. DOT HS 812 796 (Apr. 2020).
[146] Geier v. American Honda Motor Co., 529 U.S. 861 (2000).
[147] *Id.* at 874-77.
[148] *Id.* at 882.
[149] Price-Anderson Nuclear Industries Indemnity Act, 42 U.S.C. § 2110 et seq. (1957).

injured parties in the event of a nuclear incident.[150] The total liability of the licensees is capped by statute, and any damages above that statutory cap would be covered by the federal government.[151]

Hypothetical federal legislation could establish a similar system for automated vehicle manufacturers, whereby each manufacturer would be responsible for maintaining insurance coverage proportional to their share of automated vehicles on the road, and where claims for damages caused by automated vehicles would be paid from the industry insurance pool. This system would set up incentives for the industry to self-police and maximize safety but could equally incentivize manufacturers to be free riders knowing that liability for their faulty designs is spread over the industry as a whole.

The National Childhood Vaccine Injury Act is another potential model for federal preemption of the liability ecosystem.[152] This law limits the financial liability of vaccine manufacturers from claims of injury, with the goal of encouraging manufacturers to remain in the market and provide a steady supply of vaccines.[153] Like vaccines, automated vehicles have the potential to have an overall positive effect on public health.[154] Federal legislation protecting the automated vehicle manufacturers from liability and providing for efficient arbitration procedures would remove uncertainty regarding manufacturer liability and encourage manufacturer participation in the marketplace.

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150 *Id.*
151 *Id.*
152 National Childhood Vaccine Injury Act, 42 U.S.C. §§ 300aa-1 to 300aa-34 (1986).
153 *See id.*
154 *See supra* note 3.

Conclusion

Automated vehicles are rapidly being developed by several companies competing for future market share. The regulation of vehicle safety and auto liability in the United States is a patchwork system of state laws and federal vehicle safety regulations. Several states have enacted legislation specifically addressing automated vehicles, though no state laws have been identified which directly address the apportionment of liability in the event of a collision involving an automated vehicle operating without human input. The federal government has begun to develop and institute safety regulations for the design and operation of automated vehicles, but likewise has not regulated the topic of liability.

The absence of clear guidance regarding liability may cause manufacturers to be reluctant to be the first to enter the Level 3, 4 or 5 automated vehicle market. In the absence of legislation indicating otherwise, it is likely that products liability law will be applied to tort claims resulting from automated vehicle accidents. Existing products liability law is likely to be problematic and inconsistent when applied to the complex technology of automated vehicles.

Alternatives exist, including the UK's Automated and Electric Vehicles Act 2018, which makes clear that the automated vehicle's insurer will pay any injured party and may later pursue a claim against the manufacturer or any other responsible party. The Insurance Board of Canada recommends mandating a single insurance policy for automated vehicles which equally covers driver negligence and the automated vehicle technology. The federal government may also preempt state law regarding automated vehicle liability, as it has done in the past for liability issues for other industries.

The widespread adoption and use of automated vehicles is likely to have a significant positive impact on society. Automated vehicles hold the promise for lower emissions, more efficient land use, and lower traffic injuries and fatalities. Clear and consistent regulations on the issue of liability will likely encourage the development of the industry and hasten these positive societal impacts.