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THE ROAD AHEAD: HOW PRODUCTS LIABILITY WILL APPLY TO AUTONOMOUS VEHICLES

AMELIA G. SRETER

AMELIA G. SRETER
Donahue, Tucker & Ciandella, PLLC
Windham, NH
asreter@dtclawyers.com

Amelia Sreter is an Associate Attorney at the New Hampshire law firm Donahue, Tucker & Ciandella, PLLC. She graduated magna cum laude from the University of New Hampshire School of Law in May 2017. While at UNH Law, Amelia participated in the Daniel Webster Scholar Honors program, earning admission to the New Hampshire Bar upon graduation. She was also an executive editor of the UNH Law Review and a Warren B. Rudman Fellow. Amelia received her bachelor's degree from Cornell University in 2014.

I. Introduction

The advent of autonomous vehicles creates many new legal questions. A growing area of concern for both consumers and manufacturers of autonomous vehicles is the issue of liability. When an autonomous vehicle causes an accident, who is ultimately responsible? Is it the person who was sitting in the car, but not paying attention because he or she believed the car could navigate safely? Or is it the manufacturer who claimed that the car was safe? This question is not easily answered. Additionally, it is likely that the question will be highly debated as new legislation and regulations are formulated over the coming years, and insurers, consumers, and manufacturers find their place in this new paradigm. This article focuses on new issues in products liability in the context of autonomous vehicles.

II. Autonomous Vehicles Overview

To understand liability in autonomous vehicles, one needs a basic understanding of the vehicles and the different levels of autonomy being slowly developed and introduced for consumer as well as commercial use. The National Highway Traffic Safety Administration ("NHTSA") released a policy statement on autonomous vehicles that adopts the SAE International definitions for levels of automation:

- At SAE Level 0, the human driver does everything;
- At SAE Level 1, an automated system on the vehicle can *sometimes assist* the human driver conduct *some parts* of the driving task;
- At SAE Level 2, 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 performs the rest of the driving task;
- At SAE Level 3, 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 automated system requests;
- At SAE Level 4, 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; and
- At SAE Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

See U.S. Dept. of Transp., National Hwy. Traffic Safety Admin., *Federal Automated Vehicles Policy*, at 9 (September 2016), available at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/federal_automated_vehicles_policy.pdf ("NHTSA Policy")(Prior to adopting the SAE levels, NHTSA used a system with five levels (Levels 0-4) instead of six levels (Levels 0-5), and any publications prior to September, 2016 reference the prior level system. *See* U.S. Dept. of Transp., National Hwy. Traffic Safety Admin., *Preliminary Statement of Policy Concerning Automated Vehicles* (May 2013), available at https://www.nhtsa.gov/staticfiles/rulemaking/pdf/Automated_Vehicles_Policy.pdf, for a list and description of the prior automation level classifications.)

The different levels of automation and human contribution to driving, which is clear from the variety of vehicles in use and development, complicate the liability landscape in interesting ways.

SAE Levels 0 and 1 denote the typical vehicle on the road today: cars that must be operated entirely by the human driver or that have some features to help the driver occasionally, such as cruise control, blind spot protection, or even lane assist. SAE Level 2 vehicles combine autonomous functions that may be present one at a time in SAE Level 1 vehicles, such as by both steering to stay in lane and using adaptive cruise control to keep with the flow of traffic at the same time while on the highway. The Department of Transportation considers vehicles of SAE Levels 3-5 to be "highly automated vehicles," or "HAVs," because the vehicles are responsible for monitoring the road and do not require constant vigilance from the driver. *See NHTSA Policy,* at 10.

As of early 2017, many companies are in the process of developing autonomous vehicles for both consumer and commercial uses, and a few are already on the roadways. Tesla's Level 2 vehicle, which is available to consumers, comes equipped with all hardware necessary for eventual full autonomy. Tesla will send software updates wirelessly to the vehicles to increase their functionality as Tesla and its partners develop better autonomous technology. Hirsch, Jerry, *Tesla Motors Will Ship Self Driving Vehicles, Plans Ride Service,* Trucks.com (Oct. 19, 2016), available at https://www.trucks.com/2016/10/19/tesla-motors-shipping-self-driving-vehicles/ and Hirsch, Jerry, *Analysts: Musk's Tesla Electric Truck Plans Takes Billions of Investment,* Trucks.com (July 21, 2016), available at https://www.trucks.com/2016/07/21/tesla-electric-trucks-buses/. Tesla also plans to expand into electric autonomous trucks (semi-trucks and pick-up) and buses. *Id.* Mercedes-Benz, GM, and Nissan are introducing autonomous technology into their vehicles. Davies, Alex, *Ford Says It'll Have a Fleet of Fully Autonomous Cars in Just 5 Years*, Wired (Aug. 16, 2016), available at https://wired.com/2016/08/ford-autonomous-vehicles-2021/. Google and Ford are taking a different approach by skipping straight to Level 4 autonomy, although the vehicles are still a few years away from the consumer market. Davies, Alex, *Google's Self Driving Car Company is Finally Here,* Wired (Dec. 13, 2016), available at https://www.wired.com/2016/12/google-self-driving-car-waymo/. Uber is currently testing a fleet of autonomous rideshare vehicles in Pittsburg, with human drivers who take over occasionally. Davies, Alex, *We Take a Ride in the Self Driving Uber Now Roaming Pittsburgh*, Wired (Sept. 14, 2016), available at https://wired.com/2016/09/self-driving-autonomous-uber-pittsburgh/. Uber also acquired Otto, a start-up that successfully used an autonomous big-rig to ship a delivery of Budweiser beer one hundred twenty (120) miles while the human driver monitored the trip from the sleeper berth. O'Brien, Chris, *Otto Hails Budweiser in First Commercial Use of Self-Driving Truck*, Trucks.com (Oct. 25, 2016) available at https://www.trucks.com/2016/10/25/ubers-otto-hauls-budweiser-beer-across-colorado-first-commercial-use-self-driving-truck/. The German company Daimler's Freightliner Inspiration Truck is licensed to make shipments in the state of Nevada, the first autonomous truck licensed to travel on US roads. Newcomb, Doug, *Daimler Autonomous Truck Has Huge Commercial Implications,* Forbes (May 8, 2015), available at https://www.forbes.com/sites/dougnewcomb/2015/05/08/daimler-autonomous-truck-has-huge-commercial-implications/#4f55434165bd. Ford is also in the process of developing smaller autonomous delivery trucks to be available within five years, and FedEx is working towards introducing more autonomous technology into its fleet. Eisenstein, Paul A., *Ford Is Looking at Developing Driverless Delivery Trucks,* Trucks.com (Aug. 23, 2016), available at https://www.trucks.com/2016/08/23/ford-developing-driverless-trucks/; Woyke, Elizabeth, *FedEx Bets on Automation as It Prepares to Fend Off Uber and Amazon,* MIT Technology Review (Feb. 3, 2017), available at https://www.technologyreview.com/s/602896/fedex-bets-on-automation-as-it-prepares-to-fend-off-uber-and-amazon/.

The different levels of automation and human contribution to driving, which is clear from the variety of vehicles in use and development, complicate the liability landscape in interesting ways. As demonstrated throughout this article, a certain claim or defense may not apply equally to all vehicles with autonomous features, or even to all HAVs, because of the different levels of intervention and attention required.

III. Products Liability Overview

Products liability holds a manufacturer or distributor who sells or distributes a defective product liable for any harm caused by the defect. Restmt. (3d) of Torts: Prod. Liab. § 1 (1998); Funkhouser, Kevin, *Paving the Road Ahead: Autonomous Vehicles, Products Liability, and the Need for A New Approach,* 2013 Utah L. Rev. 437 (2013). The main theories of products liability include negligence, strict liability, tortious misrepresentation, and breach of warranty. Villasenor, John, *Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation*, Brookings Inst. at 7-8 (April 24, 2014), available at https://www.brookings.edu/research/products-liability-and-driverless-cars-issues-and-guiding-principles-for-legislation/; Funkhouser, *supra* at 444-45.

Strict liability allows a plaintiff to hold a manufacturer liable even when the manufacturer exercised reasonable care. There are three actionable categories of product defects in strict liability: manufacturing defects, design defects, and defective warnings. Restmt. (3d) of Torts: Prod. Liab. § 2 (1998); Gurney, Jeffrey K., *Sue My Car Not Me: Products Liability and Accidents Involving Autonomous Vehicles,* 13 U. Ill. J.L. Tech. & Pol'y 247, 257 (Fall 2013). While automobile accident plaintiffs often bring claims for crashworthiness, these crashworthiness claims will remain largely unchanged in autonomous vehicles because these claims involve the structure of the vehicle rather than any autonomous features.

> Products liability has long existed and has adapted to many new technologies over the years. Even so, the application of products liability to autonomous vehicles likely will present new challenges.

Gurney, *supra* at 257; Funkhouser, *supra* at 445. A manufacturing defect occurs when the product was not produced according to its specifications, or, under the malfunction doctrine, when there is an inexplicable accident. Restatement (3d) of Torts: Prod. Liab. § 2 (1998); Gurney, *supra* at 258 (citing Owen, David G., *Manufacturing Defects*, 53 S.C.L.Rev. 851, 871-72 (2002)). A design is defective when there was a foreseeable risk of harm posed by the product that could have been reduced or avoided by a reasonable alternative design, and failure to implement the alternative design rendered the product "not reasonably safe." Restmt. (3d) of Torts: Prod. Liab. § 2 (1998). There are two tests for design defect: the consumer expectations test and the risk-utility test. Gurney, *supra* at 258, 260-64. The risk-utility test is more widely accepted, but both of these tests are discussed in more detail in the following section. A failure to warn claim implicates the manufacturer's dual duty to provide instruction on how to safely use the product and to warn the buyer of hidden dangers. *Id.* at 262 and 264. In most jurisdictions, this duty is limited to risks reasonably foreseeable at the time of sale. Marchant, Gary E. & Lindor, Rachel A., *The Coming Collision Between Autonomous Vehicles and the Liability System*, 52 Santa Clara L. Rev. 1321 (2012). Possible defenses the manufacturer may assert in any strict liability case include assumption of the risk, waiver, misuse, state of the art, and comparative negligence.

IV. Products Liability In The Context Of Autonomous Vehicles

Products liability has long existed and has adapted to many new technologies over the years. Even so, the application of products liability to autonomous vehicles likely will present new challenges. Villasenor, *supra* at 15. In a traditional car accident, two (or more) drivers, with the help of their insurance companies, apportion fault between them. However, in an accident involving an autonomous vehicle, many more parties potentially are implicated. These parties may include the driver of the car, the vehicle manufacturer, the manufacturer of a particular component of the vehicle, the software engineer, the designer or programmer of the navigational system, and/or, in the case of an intelligent road system, the road designer. Marchant & Lindor, *supra* at 1326-29. Any or all of these parties could be sued by a driver or passenger in any or all of the vehicles involved in the accident. *Id.* Although the realm of possibilities is broad, it is most likely that the vehicle manufacturer will be the principal liable party because it will have the deepest pockets and the most control over the final product. *Id.*; Brodsky, Jessica S., *Autonomous Vehicle Regulation: How an Uncertain Legal Landscape May Hit the Brakes on Self-Driving Cars,* 31 Berkeley Tech. L.J. 851, 862 (2016). The question then becomes, what new issues arise when the manufacturer of the autonomous vehicle is the liable party in a car accident?

A. Manufacturing Defects

As mentioned above, a manufacturing defect exists when a product was not produced as intended or, under the malfunction doctrine, when there is an inexplicable accident. In autonomous vehicles, the most likely part to malfunction is the software that tells the car how to maneuver without human input. Any other type of malfunction will have the same liability analysis as a malfunction in non-autonomous vehicles if the malfunction occurs in a discrete vehicle component part. However, courts have not yet applied the manufacturing defect doctrine to software as software is not generally considered a product. Gurney, *supra* at 259; Brodsky, *supra* at 863-864; *See also* 68 Am.Jur.3d Proof of Facts § 8 (Last updated Dec. 2016) ("[N]o cases have been found applying strict liability to software.").

The plaintiff could attempt to argue that the autonomous technology did not meet the manufacturing specifications, but it would be difficult to disentangle the "autonomous technology" as a whole from the software that enables the car to be autonomous. *See* Gurney, *supra* at 259; Marchant & Lindor, *supra* at 1328 ("The various component parts and their respective roles in causing a malfunction may be hard to discern and separate for the purpose of assigning responsibility"). For example, if a car collides with something it should otherwise have avoided, did the sensor fail to detect the object, or did the software fail to properly interpret the signals from the sensor? If there is no obvious issue with the sensor, can courts rely on the vehicle's internal memory and diagnostics, powered by software, to sort this out? Until these issues are resolved, a traditional manufacturing defect claim would likely be unsuccessful in the context of autonomous vehicles where the alleged defect is software error.

The malfunction doctrine allows a plaintiff to recover even if he cannot demonstrate by independent evidence how the product was defective, similar to the tort theory of *res ipsa loquitor. See* Garza, Andrew P., "*Look Ma, No Hands!": Wrinkles and Wrecks in the Age of Autonomous Vehicles,* 46 N.Eng.L.Rev. 581, 591 (Spring 2012). The plaintiff must prove that "(1) the product malfunctioned, (2) the malfunction occurred during proper use, and (3) the product had not been altered or misused in a manner that probably caused the malfunction." Gurney, *supra* at 259. While the first two elements are easily satisfied by the fact of the accident, the third may be harder to prove. *Id.* at 259-60. Some courts may require that the vehicle was relatively new or that the part was never altered or repaired to satisfy the third prong. *Id.* at 260. Additionally, the malfunction doctrine has not been recognized in all jurisdictions. Even courts that recognize the malfunction doctrine may be hesitant to apply it, and often require an expert to show that nothing other than the alleged defect could have caused the accident. *Id.* These limitations impede the usefulness of the malfunction doctrine in the context of autonomous vehicles.

In the context of autonomous vehicles, manufacturers will likely argue that the vehicles and systems are too complex for the average consumer to form appropriate and realistic expectations about the vehicles' capabilities and/or safety.

B. Design Defects

Design defect will likely be the most common product liability claim in cases of autonomous vehicle accidents because of the challenges with other claims and the new and evolving nature of autonomous vehicle design. There are two tests for design defects: the consumer expectations test and the risk-utility test. Garza, *supra* at 599.

1. <u>Consumer Expectations Test</u>

The consumer expectations test examines whether the design is unreasonably dangerous beyond the expectation of the average consumer. Restmt. (2d) of Torts § 402A, Cmt. g (1965). This test was rejected by the Restatement (Third) of Torts: Products Liability, but many states still use it. Restmt. (3d) of Torts: Prod. Liab. § 2, Cmt. g (1998) ("[C]onsumer expectations do not constitute an independent standard for judging the defectiveness of product designs."); Gurney, *supra* at 261, n. 36 and 37. In the context of autonomous vehicles, manufacturers will likely argue that the vehicles and systems are too complex for the average consumer to form appropriate and realistic expectations about the vehicles' capabilities and/or safety. Garza, *supra* at 600.

Some courts already hesitate to apply the consumer expectations test to novel technology in traditional automobiles because automobiles are highly complex even without autonomous driving. Garza, *supra* at 601-02; Gurney, *supra* at 261. *See, e.g., Soule v. General Motors Corp.*, 882 P.2d 298, 310 (1994)(requiring use of risk-utility test to determine crashworthiness involving technical and mechanical details, and discussing appropriate circumstances for application of the consumer expectations test); *Bresnahan v. Chrysler Corp.*, 32 Cal. App. 4th 1559, 1567, 38 Cal. Rptr. 2d 446, 451 (1995) ("In relation to automobiles, the court observed that although ordinary consumers may legitimately form many safety expectations of their cars, providing standards for defectiveness, '…the ordinary consumer of an automobile [also] simply has "no idea" how it should perform in all foreseeable situations, or how safe it should be made against all foreseeable hazards.'") (quoting *Soule,* 882 P.2d at 308 (internal citations omitted)); *Branham v. Ford Motor Co.*, 701 S.E.2d 5, 15 (S.C. 2010) (In the context of a design defect claim regarding a vehicle's handling and stability system, the court found "the consumer expectations test and its focus on the consumer ill-suited to determine whether a product's design is unreasonably dangerous."). However, other courts take the position that consumers can form reasonable expectations about a complex product with which they are familiar, or a product where the mechanics may be complex but the concept is not. *See, e.g., Jackson v. GMC*, 60 S.W.3d 800, 806 (Tenn. 2001) (quoting *Cunningham v. Mitsubishi Motors Corp.*, No. C-3-88-582, 1993 WL 1367436 at *6 (S.D.Ohio 1993) (In case involving allegedly defective seat belts, "…this Court is simply not willing to … preclude the use of the consumer expectation test in a situation involving a familiar consumer product which is technically complex or uses a new process to accomplish a familiar function. Many familiar consumer products involve complex technology.")). Often, the determination relies on the circumstances of the case: the consumer expectations test will apply where an airbag deploys when there is no crash, a vehicle bursts into flames in a 5-mile-per-hour collision, or a gas tank explodes at a stoplight. *Pruitt v. GM*, 72 Cal.App.4th 1480, 1484, 86 Cal.Rptr.2d 4, 6 (1999), as modified (June 23, 1999)(referencing *Soule v. General Motors Corp.,* 882 P.2d at 308, n.3).

Applying the risk-utility test to autonomous vehicles may present some challenges. When determining whether benefits outweigh risks, do juries and courts compare autonomous vehicles with the alternative of non-autonomous vehicles?

Similarly, a consumer could expect an autonomous vehicle to stop at a red light or stay within its lane. *See* Garza, *supra* at 601. However, there will likely be accidents that go beyond a consumer's experience or understanding and require a more complex analysis, in which case the risk-utility test would apply. *See Soule,* 882 P.2d at 308 ("…a complex product, even when it is being used as intended, may often cause injury in a way that does not engage its ordinary consumers' reasonable minimum assumptions about safe performance. For example, the ordinary consumer of an automobile simply has "no idea" how it should perform in all foreseeable situations, or how safe it should be made against all foreseeable hazards.") (citing *Barker v. Lull Engineering Co.*, 573 P.2d 443, 454 (1978)).

2. Risk-Utility Test

The risk-utility test is the majority test to prove design defects in products liability and was put forth as the sole design defects test by the Restatement (Third) of Torts*:* Products Liability. Restmt. (3d) of Torts: Prod. Liab. § 2(b)(1998). Under the Restatement, a design defect exists "when the 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 … and the omission of the alternative design renders the product not reasonably safe." *Id.* The risk-utility test therefore weighs the foreseeable risks of the current design with the safety benefits of an alternative design and the costs of implementing such alternative design. *See* Gurney, *supra* at 263. A plaintiff must present a reasonable alternative design that would have prevented the harm caused by the current design to prevail.

Applying the risk-utility test to autonomous vehicles may present some challenges. When determining whether benefits outweigh risks, do juries and courts compare autonomous vehicles with the alternative of non-autonomous vehicles? Autonomous vehicles have already been shown to be safer than their traditional counterparts, with Google claiming traffic fatalities will be reduced by fifty percent (50%) with the implementation of autonomous vehicles. Garza, *supra* at 603-04. Additionally, NHTSA declared that crash rates per million miles decreased forty percent (40%) with Tesla's Autopilot installed on Tesla's Level 2 semi-autonomous vehicles. Randall, Tom, *Tesla* 's *Autopilot Vindicated with 40% Drop in Crashes,* Bloomberg Tech. (Jan. 19, 2017), available at https://www.bloomberg.com/news/articles/2017-01-19/tesla-s-autopilot-vindicated-with-40-percent-drop-in-crashes. Another study predicts accidents will be reduced by ninety percent (90%) upon full adoption of fully-autonomous vehicles. Bertoncello, Michele & Wee, Dominik, *Ten Ways Autonomous Driving Could Redefine the Automotive World,* Auto & Assembly, McKinsey&Co. (June 2015), available at http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-waysautonomous-driving-could-redefine-the-automotive-world. Tesla has declared a goal to decrease accidents by ninety percent (90%). Randall, *supra* 48; *but see* Naughton, Keith, *Humans Are Slamming Into Driverless Cars and Exposing a Key Flaw,* The Sydney Morning Herald (Jan. 2, 2016), available at http://www.smh.com.au/technology/technology-news/humans-are-slamming-into-driverless-cars-and-exposing-a-key-flaw-20151222-gltebr.html (explaining that accident rates for driverless cars surrounded by human drivers are twice as high because the automated cars obey traffic laws rather than following human distracted or aggressive driving habits). In that case, even if an autonomous vehicle causes an accident, it would be difficult to show that a Level 0 or Level 1 vehicle is the safer alternative. By way of example, Google's self-driving cars have caused only one accident; however, Google did not address the question of fault and the U.S. Department of Transportation found no indication of any safety problem with Tesla's Autopilot. Davies, Alex, *Google's Self-Driving Car Caused Its First Crash*, Wired (Feb. 29, 2016), available at https://www.wired.com/2016/02/googles-self-driving-car-may-caused-first-crash/; Randall, *supra.*

More realistically, a plaintiff would have to show that a certain aspect of the autonomous technology, whether a physical component or the software, was defective and could have been safer. A claim for a defect in the design of a physical component will not be much different from current suits, but just as with manufacturing defects, it may be challenging to determine whether the physical component or the software caused the accident, and therefore to determine which is defective. Calo, M. Ryan, *Open Robotics,* 70 Md.L.Rev. 571, 597 (2011)("It is extremely difficult to discover whether software, as opposed to hardware, is responsible for the glitch that led to an accident. If the software is responsible, it would be hard to determine whether the precise cause was the operating system or the application (and, if the latter, which application). This analysis is all the more difficult where the software is open source (since no single author is responsible) and the hardware can be easily modified."). A truly autonomous vehicle would likely have learning capacity -- is the manufacturer responsible for self-taught behaviors that are inconsistent with original programming and cause an accident? *See* Marchant & Lindor, *supra* at 1329, n. 29. In either case, the technology is cutting-edge, and it may be difficult to find, or cost-prohibitive to retain, an expert or multiple experts with the knowledge and capacity to create a better design. Gurney, *supra* at 265-66.

C. Failure to Warn

The final category of defect in strict liability is defective warnings. Restmt. (3d) of Torts: Prod. Liab. § 2(c) (1998). Manufacturers have a dual duty to inform buyers of the hidden dangers of a product and to instruct buyers how to safely use the product. This duty is limited to foreseeable risks of harm that could have been reduced or avoided by provision of reasonable warnings or instructions. *Id.* Failure to warn claims are most likely to come up in the context of semi-autonomous vehicles because they are not designed to handle all situations independently. For example, a manufacturer would have a duty to inform a driver that the vehicle's GPS system does not work as well in remote locations, or that it has trouble with certain road conditions, such as dirt roads or bad weather. *See* Gurney, *supra* at 265-65. In these circumstances, a driver needs to be aware or be alerted by the vehicle that the driver needs to take over to ensure safe operation. The manufacturer, therefore, must take into consideration all foreseeable circumstances and fully inform the driver or passenger on safe operation of the vehicle, or design the vehicle to warn the driver when such circumstances arise.

Tesla's Autopilot feature provides a demonstration of the necessity of warnings. This Level 2 automated feature requires a driver's attention at all times, but the driver can turn on the Autopilot feature on highways and the car will stay in the lane, maintain speed appropriate to traffic conditions, and change lanes. *See* Tesla Press Information, Autopilot, available at https://www.tesla.com/presskit/autopilot/?redirect=no#autopilot (last visited December 6, 2017). The car will also park itself, and can be summoned from a parking spot without a driver inside. *Id.* The Autopilot feature comes disabled and requires an explicit acknowledgement of risks before it can be enabled. Woolf, Nicky, *Tesla fatal autopilot crash: family may have grounds to sue, legal experts say,* The Guardian (July 6, 2016), available at https://www.theguardian.com/technology/2016/jul/06/tesla-autopilot-crash-joshua-brown-family-potential-lawsuit. Autopilot also has frequent alerts to remind drivers to keep their hands on the wheel at all times when Autopilot is engaged. *Id.* A Tesla car with Autopilot enabled was involved in a fatal crash on May 7, 2016, when the driver failed to take control in a situation the vehicle was not equipped to handle independently. Despite the warnings, some believe that Tesla could be held responsible for making the feature sound more advanced and safer than it was. *Id*. The NHTSA ultimately absolved Tesla and the Autopilot feature from any liability in the crash based on NHTSA's determination that the driver ignored the manufacturer's warnings to maintain control while using the driver assist function. Randall, *supra.* However, Tesla has since updated the software to require drivers to touch the steering wheel more frequently. *Id.* While Tesla was not liable in this instance, this accident and subsequent turmoil highlight the difficulty of providing adequate instructions and warnings, especially when the human driver retains some degree of responsibility.

A truly autonomous vehicle would likely have learning capacity -- is the manufacturer responsible for self-taught behaviors that are inconsistent with original programming and cause an accident?

Adequacy of warnings may become a more prominent issue as Level 3 and Level 4 vehicles are developed. Level 3 vehicles can alert the driver when the driver needs to reassert control. While Level 4 vehicles do not require the driver to maintain vigilance or reassert control quickly, they only operate fully in certain driving conditions. The liability analysis may hinge on how much warning the vehicle provided to the driver, whether the warning was clear, and/or whether the warning was sufficiently loud. For example, a driver may be watching a movie with headphones on his smartphone when the vehicle warning sounds or flashes on a screen in the dashboard. If the driver does not see or hear the signal, is the driver negligent even though he was not required to remain alert or was this a foreseeable circumstance that the manufacturer should have anticipated in designing an adequate warning system? *See, e.g.,* ALM GL Ch. 90, § 13 (Massachusetts statutory law expressly prohibits wearing headphones while driving).

D. Warranties

All products involve warranties created through marketing and sales that assure the consumer that the product is of good quality. Villasenor, *supra* at 12. Warranties may be express -- created explicitly in advertising, a product description, a contract, or even a sample of the product. *Id.*; U.C.C. § 2-313(1)(a-c). Warranties may also be implied or imposed by the Uniform Commercial Code ("UCC"). Villasenor, *supra* at 12. Implied warranties include the implied warranty of merchantability and the implied warranty of fitness for a particular purpose. U.C.C. §§ 2-314 and 2-315. In the case of autonomous vehicles, the vehicle must be capable of performing the functions advertised, such as self-parking, and be fit for the uses reasonably anticipated by the consumer, such as allowing the driver to read while commuting. However, the manufacturer can disclaim warranties and limit remedies for breach of warranty. U.C.C. § 2-316. For example, Tesla has limited warranties on its Autopilot feature by asserting that the driver must have his or her hands on the wheel at all times. *See Potential Liability Ramifications of Self-Driving Cars,* Potential Liability Ramifications of Self-Driving Cars Legal Solutions Blog (Aug. 31, 2016), available at http://blog.legalsolutions.thomsonreuters.com/current-awareness-2/potential-liability-ramifications-of-self-driving-cars/. All told, the application of warranties to autonomous vehicles is likely not very different from traditional vehicles.

E. Misrepresentation

Liability arises from misrepresentation when one person makes a false or misleading representation to another who is harmed as a result of his reasonable reliance on the misrepresentation. Villasenor, *supra* at 11. Misrepresentation may be fraudulent (when the misrepresentation was intentional) or negligent (when the party making the representation knew or should have known it was false). Strict liability for misrepresentation may be imposed regardless of whether the defendant knew the information was false. *Id.* In the context of autonomous vehicles, misrepresentation claims are akin to express warranty claims and may arise where the vehicle does not live up to its advertising. For example, a semi-autonomous vehicle may advertise that it rarely needs human intervention when, in fact, the driver is required to touch the steering wheel every few minutes. *See id.* Again, it is likely that the law concerning misrepresentation is not impacted by the advent of autonomous vehicles; however, novel situations and applications may arise.

Comparative negligence is most likely to arise in the context of vehicles which can be controlled by a human driver regardless of the vehicle's autonomous capabilities.

F. Defenses

Manufacturers of autonomous vehicles may assert various defenses to claims brought against them for harm caused by their vehicles. These include comparative negligence, misuse, state of the art, assumption of the risk, and waiver.

1. <u>Comparative Negligence</u>

Comparative negligence weighs the amount of fault of the two parties and imposes liability accordingly. Comparative negligence is most likely to arise in the context of vehicles which can be controlled by a human driver regardless of the vehicle's autonomous capabilities. Where driver control is possible, a driver may negligently enable autopilot or some other autonomous feature when it is not appropriate. For example, a driver may use the autonomous features for weather and/or road conditions, such as a snowstorm or on dirt roads, which are inconsistent with the manufacturer's recommendation and instructions. Alternatively, a driver may enable the autonomous feature appropriately, but fail to disengage the feature when encountering a condition for which the vehicle is not equipped. This analysis would come into play in situations similar to the Tesla accident discussed above in which NHTSA absolved the manufacturer and the autonomous technology from any liability and determined that the driver ignored the manufacturer's warnings to maintain control while using the driver assist function. Woolf, *supra.*

In the case of fully-autonomous, Level 5 vehicles, a situation may arise where the vehicle could not prevent the accident, but a human driver could have. In this situation, the manufacturer likely cannot, or should not be able to, assert comparative negligence. A fully autonomous vehicle should be able to handle all conditions, excepting any conditions that manufacturers warned against. If a situation arises for which the vehicle is not equipped, the manufacturer may be responsible for any failure to adapt. The purpose of autonomous vehicles is to allow people to be more efficient and productive and to give freedom to those who are not able to drive themselves. *See* Gurney, *supra* at 267-68 (Discussion of comparative fault across different types of drivers, including attentive drivers, distracted drivers, diminished capabilities drivers). This purpose would be defeated if the passengers in a fully-autonomous vehicle were responsible for paying attention to the road and jumping in to prevent accidents.

However, a manufacturer will need to take into account the likelihood that drivers will be distracted or take advantage of the vehicles' functionality to do other things while behind the wheel and may be responsible even if the driver was performing other activities behind the wheel.

2. Misuse

The misuse defense allows a manufacturer to disclaim liability for harm caused when the product was not used as intended or designed. *See* Gurney, *supra* at 267-68. However, a manufacturer still has a duty to protect against foreseeable misuses. *Id.* at 268. Therefore, a manufacturer arguably is not responsible for an accident that occurred because the consumer modified the vehicle and the modification caused the accident. However, a manufacturer will need to take into account the likelihood that drivers will be distracted or take advantage of the vehicles' functionality to do other things while behind the wheel and may be responsible even if the driver was performing other activities behind the wheel. *Id.*

3. State of the Art

The state-of-the-art defense is a powerful tool for opposing warning defect and design defect claims. This defense takes into account the fact that the technology is new and not every potential consequence or accident can be foreseen. When the defense is asserted in a failure to warn claim, courts examine what the manufacturer could have reasonably foreseen based on the technology and scientific knowledge available at the time of production. *Id.* at 268-69. In a design defect claim, the state-of-the-art defense highlights the feasibility aspect of an alternative design that would reduce or eliminate known risks. Even if a manufacturer is aware of a risk, it may not be feasible or possible to reduce or eliminate the risk because of limits of the scientific and technological knowledge available at the time. *Id.* at 269. This defense can apply to physical aspects of the vehicle or to the software.

4. Assumption of the Risk

The assumption of the risk defense requires that the plaintiff knew and understood the risk, and voluntarily encountered the risk. *Id.* Not all jurisdictions recognize this defense as a separate defense as it is often merged with comparative negligence. Marchant & Linder, *supra* at 1336. The difficulty with this defense as it applies to autonomous vehicles is that the manufacturer has to be aware of and disclose the potential risk that led to the accident. Gurney, *supra* at 269. This defense most likely will apply to discrete conditions or circumstances the manufacturer warned against. For example, if a manufacturer warns the driver that the autopilot feature does not function well in snowy road conditions and the driver failed to disengage the autopilot feature when it started snowing, the driver likely assumed the risk. This analysis becomes more complicated when considering different types of drivers in Level 4 vehicles, such as a disabled or intoxicated driver who is incapable of taking control of the car when it begins to snow. *See id.* at 269-70 (Discussion of comparative fault across different types of drivers, including attentive drivers, distracted drivers, diminished capabilities drivers). Of course, the manufacturer could argue that the driver assumed the risk by even entering a car that may not function independently in all conditions. This defense is also limited to the driver and perhaps passengers of the autonomous vehicle, and does not include anyone in other vehicles involved in the accident. Marchant & Linder, *supra* at 1337.

5. Waiver

Finally, manufacturers may be able to avoid liability by asking consumers to sign waivers in which they accept the risks and take personal responsibility for accidents. However, risks must be fully disclosed for a consumer to appreciate them and absolve the manufacturer of liability. Waiver will not be an applicable defense for manufacturers against claims involving unexpected risks and unforeseeable accidents. Brodsky, *supra* at 865.

G. Additional issues

Clearly, the largest change in the liability scheme is the shift of liability from the driver of the vehicle to the manufacturer. This shift creates additional issues beyond simply the theories of liability that may apply.

1. Increased Litigation

As autonomous vehicles are introduced into the consumer market and/or become available for use by consumers in ride sharing, it is likely that products liability lawsuits against manufacturers will see a sharp increase. In the past, new technologies have invited litigation as the safety of the product and the public's trust in the product are tested. For example, in the 1980s, there was a large increase in products liability litigation against U.S. biotechnology companies which produced vaccines and other pharmaceuticals. There was also a significant increase in the average jury verdicts against these biotechnology companies. *Id.* at 864-65. This type of increased liability can severely impact a company's ability to innovate and produce new products. See Stovsyk, Michael D., *Product Liability Barriers to the Commercialization of Biotechnology: Improving the Competitiveness of the U.S. Biotechnology Industry*, 6 Berkeley Tech. L.J. 363, 373-77 (1991)(explaining the impact of products liability claims and litigation on the biotechnology industry). Some argue that the large decrease in the number of U.S. biotechnology companies between 2000 and 2010 is attributable, in large part, to the costs of insuring against products liability suits. Colonna, Kyle, *Autonomous Cars and Tort Liability,* 4 Case Western Reserve J. of Law, Tech. & the Internet, 81, 110-11 (2012); Boffey, Philip P., *Vaccine Liability Threatens Supplies,* N.Y.Times (June 24, 1984), available at http://www.nytimes.com/1984/06/26/science/vaccine-liability-threatens-supplies.html. The same problem could occur in the autonomous vehicle industry if manufacturers are always held strictly liable.

> The technology that allows vehicles to be autonomous is incredibly complicated, and therefore, proving liability will require at least one (and likely more than one) highly specialized expert(s).

Predictably, public opinion of autonomous vehicles likely will influence the legal landscape of liability for manufacturers -- not only because the public will be bringing the lawsuits, but also because the public will sit on the jury and decide the outcome of these cases. Jurors may believe that autonomous vehicles are of great benefit to society due to increased traffic safety and commuter efficiency and decreased number of vehicles on the road resulting in decreased vehicle pollution. *See, e.g.*, Fehrenbacher, Katie, *Future Cities Could Run on Shared Fleets of Electric Self-Driving Cars*, Fortune (Oct. 11, 2016), available at http://fortune.com/2016/10/11/shared-electric-self-driving-cars/ (explaining that shared fleets of self-driving cars will allow for increased ride sharing and fewer cars on the roads). Alternatively, jurors may punish manufacturers with unfavorable verdicts because jurors believe that self-driving cars take automation too far and displace people who drive for a living, or jurors may simply fear the new and foreign technology. *See* Marchant & Linder, *supra at* 1335 (explaining that jurors may be suspicious of new and unfamiliar technology regardless of the predicted benefits or actual risk of harm); *see also* McFarland, Matt, *The Backlash Against Self-Driving Cars Officially Begins*, CNN Tech (Jan. 10, 2017), available at http://money.cnn.com/2017/01/10/technology/new-york-self-driving-cars-ridesharing/index.html (describing a push by the Upstate Transportation Association in the state of New York to ban driverless cars).

2. Evidentiary Issues

Lawsuits involving autonomous vehicles may prove challenging because of the evidentiary issues that accompany cutting-edge technology. The technology that allows vehicles to be autonomous is incredibly complicated, and therefore, proving liability will require at least one (and likely more than one) highly specialized expert(s). The need for experts to meet the burden of proof is especially true for allegedly defective software, the very aspect of an autonomous vehicle most likely to cause or contribute to cause an accident. Gurney, *supra* at 263. To provide evidence of a reasonable alternative design, experts in computer science, mathematics, economics, and autonomous vehicles may be needed to demonstrate an alternative algorithm and feasibility. *Id.*at 255-56. In today's typical accident, the cost of experts will easily surpass the possible recovery. However, if the accident is more severe, as some believe autonomous vehicle accidents will be, then the costs may prove immaterial.

Depending on the jurisdiction, plaintiffs may be able to use evidence of a subsequent remedial measure, such as a software update, to prove that a reasonable alternative design exists. *Id.* at 266. Federal Rule of Evidence 407 prohibits the admissibility of subsequent remedial measures; however, not all states' evidentiary rules include the same prohibition. The ability to use a later update to establish a safer alternative would greatly decrease the cost of litigation for the plaintiff. Regardless of jurisdiction, a plaintiff can introduce evidence of a software update that predates the accident but was not installed in plaintiff's car or of a safer algorithm used by a competitor. *Id.*

3. Insight from Analogous Situations

Looking at the way liability has been addressed in analogous situations may shed some light on how autonomous vehicles will be treated in the future. Marchant & Lindor, *supra* at 1324-25. While autonomous vehicles seem new, automation is not a new concept. Liability analysis in the context of existing automated features or machines can pave the path for liability analysis in the context of autonomous vehicles. Clearly, understanding a jury's response to an analysis of current autonomous features in vehicles provides a glimpse into how a jury may treat autonomous vehicles. Plaintiffs have been successful in claiming that failures in a vehicle's cruise control system caused the vehicle to accelerate unexpectedly or fail to respond to braking. *Id.*

Commercial airplanes capable of flying on "autopilot" provide a particularly apt example because the planes are largely automated with the pilot merely monitoring systems during flight. *Id.* However, in at least one case, a judge held the pilot liable for a crash caused by a plane with autopilot enabled because "[t]he obligation of those in charge of a plane under robot control to keep a proper and constant lookout is unavoidable." *Id.* at 325(quoting, with approval, *Brouse v. United States*, 83 F.Supp. 373, 374 (N.D.Ohio 1949)). This "proper and constant lookout" argument is easily applied to Level 1 and Level 2 vehicles. However, what about HAVs where the car is capable of alerting the human driver if it needs assistance? What about Level 5 vehicles that are designed never to require human intervention? An overly broad application of the rationale forwarded in *Brouse* may defeat the very purpose of autonomous vehicles because only people who are licensed to drive and capable of taking over are in a position to assume the obligation to oversee the "autopilot." For example, the first man to ride in an un-monitored, Level 5 autonomous car was blind and, as a result of losing his sight, had lost some of his independence. He reported that riding in a self-driving car gave him "the opportunity to be the man that [he] was before," and let him "be a whole person again." Davies, *supra.*

Variations in state laws may present difficulties for designing and introducing autonomous vehicles across the country. Although the NHSTA promulgates federal safety standards, current vehicle legislation is largely state specific.

Manufacturers of industrial robots used in manufacturing have been subject to litigation when their robots cause or contribute to cause injuries to employees. This indicates that manufacturers of autonomous technology may be subject to liability for injuries caused by the technology. Marchant & Lindor, *supra* at 1325. However, most injuries are attributable to the employees' failure to take safety precautions or removal or disablement of safety features on the equipment that would have prevented the injury. *Id.*

4. Insurance

One issue that consumers may be particularly interested in is the necessity, availability, and/or applicability of insurance. If manufacturers will be the responsible party much more frequently than consumers, will insurance continue to be necessary for owners of autonomous vehicles? As long as vehicles can be controlled by human drivers, there is always the risk of an accident caused by human error. The lower risk associated with autonomous vehicles may lead to decreased insurance premiums. For the same reason, insurance companies may incentivize the use of certain autonomous features by charging higher premiums for vehicles with lower levels of autonomy. Villasenor, *supra* at 13. Insurers also have the best access to the type of data useful in the reconstruction of the actions of the driver and/or the software controlling the vehicle before and during the accident sequence. As a result, insurers may be in a position to steer the market towards safer vehicles or certain types of autonomous technology, thereby incentivizing manufacturers as well.

V. Laws And Regulations And Their Impact On Liability

Traditionally, states have been responsible for regulating licensing, vehicle registration, enforcement of traffic laws, motor vehicle insurance, and liability schemes. *See* NHTSA Policy, *supra* at 38. The U.S. Department of Transportation and the NHTSA are in charge of insuring the safety of motor vehicles by creating the Federal Motor Vehicle Safety Standards ("FMVSS"), identifying safety defects, and recalling vehicles or equipment that pose an unreasonable safety risk. This division of responsibilities may make it difficult to establish a uniform approach to autonomous vehicles across the country, which, in turn, could impact the development and implementation of autonomous vehicles.

A. Variations in State Law

Variations in state laws may present difficulties for designing and introducing autonomous vehicles across the country. Although the NHSTA promulgates federal safety standards, current vehicle legislation is largely state specific. *See* Brodsky, *supra* at 867-68 (discussing examples of varying state laws that may hinder or challenge autonomous vehicle development). Many states have laws that are incongruous or even directly contradictory to those of neighboring states. *Id.* For example, Vermont permits passing in the presence of a double yellow line, but in virtually every other state a double yellow line indicates a no-passing zone. States also have different following-distance laws and statewide maximum speed limits that may not be posted on any given road. How do manufacturers design cars that can comply with conflicting laws and regulations? Will manufacturers have to build vehicles designed for a specific state, or perhaps provide different software packages depending on the state in which the vehicle will be used? What if a consumer wants to move or drive cross-country?

Some laws are simply nonsensical when applied to autonomous vehicles. Consider cell phone laws that prohibit texting while driving. Many cars now have interfaces that allow voice text messaging through the vehicle. If the vehicle is the driver, is the vehicle breaking the law by texting for its passengers? The NHTSA has recognized that, in Google's anticipated Level 5 autonomous vehicles, the software is the "driver." *See* National Hwy. Traffic Safety Admin., *Letter to Google Interpreting the Federal Motor Vehicle Safety Standards* (Feb. 4, 2016), available at https://isearch.nhtsa.gov/files/Google%20--%20compiled%20response%20to%2012%20Nov%20%2015%20interp%20request%20--%204%20Feb%2016%20final.htm (The letter refers to the vehicles as Level 4; however, because the letter was written prior to the adoption of SAE levels of automation, the Level 4 reference is equivalent to SAE Level 5). Many states also have laws that require the driver to have at least one hand on the wheel at all times. How does a self-driving car keep a hand on its own steering wheel?

In addition to the existing rules of the road, states have also started introducing and passing legislation regulating autonomous vehicles. In 2017, thirty-three (33) states have introduced legislation related to autonomous vehicles. Twenty-one (21) states plus Washington, D.C. have enacted laws regulating autonomous vehicles, and the governors of five (5) states have signed executive orders. National Conference of State Legs., *Autonomous Vehicles/Self-Driving Vehicles Enacted Legislation* (Oct. 23, 2017), available at http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx. The statutes include varying definitions of driver, control, autonomous, and other salient terms. Some statutes ban cars without a human driver in the driver's seat or without the capability to be manually operated. The varying levels of acceptance toward new autonomous technologies may make it difficult for manufacturers to promulgate their autonomous vehicles or slow down production and progress as manufacturers attempt to build cars that comply with as many states' laws as possible.

The varying state legislation will create inconsistency across states in not only the types of autonomous vehicles and degrees of autonomy allowed, but also in the extent of manufacturer liability. Florida, Michigan, and the District of Columbia recently enacted statutes that include protective language which decreases manufacturer liability for accidents that occur as a result of after-market products that convert non-autonomous vehicles into autonomous vehicles. Villasenor, *supra* at 14. Other states include this language in recently introduced bills, including a bill that was introduced in January in the New Hampshire House of Representatives.

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H.B. 314, 2017 Leg. Sess, (N.H. 2017)(Bill retained in Transportation Committee).

The New Hampshire bill provides a fairly representative example of autonomous vehicle legislation. The definitions section of the bill appears to limit the bill's applicability to HAVs and explicitly excludes vehicles with autonomous systems that merely assist the driver in certain tasks (like parking assistance, lane keep assistance, and adaptive cruise control). *Id.* However, the bill limits the use of HAVs to testing purposes only, and requires a driver with a valid driver's license be behind the wheel at all times unless the testing is conducted on a closed course. *Id.* The company testing the vehicles must also have a five million dollar surety bond or liability insurance coverage, clearly indicating that states expect the manufacturers to bear the liability burden. *Id.* The New Hampshire bill is substantially similar to the autonomous vehicle laws in California and Florida (prior to amendment). *See* National. Conf. of State Legs., *supra* (referencing and summarizing H.B. 314, 2017 Leg. Sess, (N.H. 2017), H.B. 1207, 2012 Leg. Sess. (Fla. 2012), and Cal.Veh.C. § 38750). California's law is more restrictive in that it requires manufacturers to submit an application certifying satisfaction of the statutory requirements before testing vehicles on public roads. *See* Cal.Veh.C. § 38750. In 2016, Florida amended its statute and now has the most permissive state law relating to autonomous vehicles. Florida's amended statute eliminated both the requirement that autonomous vehicles be used only for testing, and the requirement that an operator to be present in the vehicle while it is operating in autonomous mode. *See* National. Conf. of State Legs., *supra* (referencing H.B. 7027, 2016 Leg. Sess. (Fla. 2016)).

One Florida senator used the hashtag "#OpenForBusiness" when referencing the newly passed statute on Twitter. Sherman, Amy, *In Florida, no permit needed for driverless cars, Florida senator says*, Politifact.com (Dec. 28, 2016), available at http://www.politifact.com/florida/statements/2016/dec/28/jeff-bradnes/florida-no-permit-needed-driverless-cars-florida-s. Ironically, the Florida Senator tweeted at Uber, apparently inviting the company to test its autonomous vehicles in Florida as done in Pittsburg. *Id.* However, Florida has not been welcoming to Uber, which only operates in a select few areas of the state. *Id.* An Uber spokesman indicated that Uber was not planning to bring its autonomous vehicles to Florida until the state passes regulations allowing Uber to operate throughout the state. *Id.* This anecdote is a telling example of the myriad of conflicting regulations across states, and even within states, that will influence the development and promulgation of autonomous vehicles.

B. Existing Federal Regulations

The NHTSA issued a policy statement on autonomous vehicles in Fall 2016 that outlines the NHTSA's approach to autonomous vehicles moving forward. NHTSA Policy, *supra*, available at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/federal_automated_vehicles_policy.pdf. The NHTSA policy statement includes a Model State Policy and recommendations for the states to address, and hopefully avoid, variations and inconsistencies in the law regarding autonomous vehicles. *Id.* at 37-47. The policy statement recommends that states review current laws to limit or eliminate unnecessary impediments to autonomous vehicle adoption and update references to human drivers and/or other laws that are nonsensical when applied to autonomous vehicles. *Id.* at 39. The policy also addresses testing and suggests a framework similar to that adopted in California, requiring manufacturers to obtain permits and instituting requirements for test drivers. *Id.* at 41-43; *see also* Cal. Veh. C. § 38750. However, in addressing the liability issue, the policy merely mentions some of the issues that states need to address – for example, which parties are required to carry insurance and how will liability be allocated -- but does not provide any guidance on how to make these determinations or how to insure consistency among states. *See* NHTSA Policy, *supra* at 45-46.

> It is not clear how the NHTSA's consideration of software as motor vehicle equipment might influence the products liability defect analysis, which traditionally has not recognized software as a product.

The NHTSA also issued an Enforcement Guidance Bulletin on Safety-Related Defects and Automated Safety Technologies ("NHTSA Guidance Bulletin"). U.S. Dept. of Transp., Nat'l Hwy. Traffic Safety Admin., *NHTSA Enforcement Guidance Bulletin 2016-02: Safety-Related Defects and Automated Safety Technologies*, Dkt. No. 2016-0040 (2016) available at www.regulations.justia.com/regulations/fedreg/2016/09/23/2016-23010.html/. The NHTSA Guidance Bulletin clarified that the NHTSA retains enforcement and recall authority over autonomous vehicles regardless of the innovative nature of the technology. *Id.* It also expressly states that the NHTSA considers software to be motor vehicle equipment within the meaning of the National Traffic and Motor Vehicle Safety Act, as amended ("Safety Act"). 49 U.S.C.A. § 30101, *et seq.* Therefore, a software defect, including vulnerability to hacking, constitutes a defect sufficient to justify a recall if it poses an unreasonable safety risk. NHTSA Guidance Bulletin, *supra*. It is not clear how the NHTSA's consideration of software as motor vehicle equipment might influence the products liability defect analysis, which traditionally has not recognized software as a product. *See* Section IV.A. *supra*. However, the NHTSA Guidance Bulletin makes it clear that software in autonomous vehicles likely will be subject to design defect claims if it malfunctions and causes an accident.

In January 2017, the NHTSA published a Notice of Proposed Rulemaking that suggests a new Federal Motor Vehicle Safety Standard ("FMVSS") to mandate and standardize use of vehicle-to-vehicle ("V2V") communications. *See* Federal Motor Vehicle Safety Standards, V2V Communications, 82 F.R. 3854 (proposed Jan. 12, 2017, and to be codified at 49 C.F.R. 571). The new rule will require new light vehicles to be capable of V2V communication, which enables vehicles to send and receive Basic Safety Messages ("BSM") about speed, heading, brake status, and other vehicle information to surrounding vehicles. "When received in a timely manner, this information would help vehicle systems identify potential crash situations with other vehicles and warn their drivers." *Id.* at 3855. The automotive industry has argued that the V2V systems necessarily rely on information received from other vehicles over which the systems' manufacturers have no control, which inherently confuses responsibility for any malfunction. *Id.* at 3869 and 3966. However, the NHTSA believes the V2V technology is similar enough to existing on-board safety warnings systems and, therefore, the NHTSA does not view V2V warning technologies as creating “new or unbounded liability exposure for the industry.” *Id.* In addition, at this point the technology is merely a warning system, and the driver retains sole responsibility for controlling the vehicle upon receipt of a warning. *Id.* at 3966. Assuming the final V2V communication rule is issued in 2019, the phase-in period will begin in 2021 and compliance will be required by 2023. *Id.*

VI. Potential Solutions

A. Maintain Strict Liability

While strict liability may be seen as harsh or stifling to technological development, some car manufacturers openly support strict liability in the context of autonomous vehicles. Volvo, Google, and Mercedes-Benz have all pledged to accept liability if their autonomous vehicles cause an accident. Gorzelany, Jim, *Volvo Will Accept Liability for Its Self-Driving Cars,* Forbes (Oct. 9, 2015), available at https://www.forbes.com/sites/jimgorzelany/2015/10/09/volvo-will-accept-liability-for-its-self-driving-cars/#748ec86072c5; Whitaker, Bill and Lieberman, Mark, *Hands Off the Wheel,* CBS News, 60 Minutes (Oct. 4, 2015), available at https://www.cbsnews.com/videos/hands-off-the-wheel/. This is likely because the manufacturers are fairly confident that their vehicles will cause few, if any, accidents, especially as the technology continues to improve. Whitaker and Lieberman, *supra*. Google’s cars have been in multiple accidents; however, all but one of these accidents involved Google’s autonomous car being rear-ended. Davies, *supra*. To date, the only accident in which Google “bear[s] some responsibility” is the accident in which the vehicle changed lanes in front of a bus that both the autonomous vehicle and the human driver saw but believed would slow down. *Id*. Strict liability realistically only applies to HAV vehicles because of the high likelihood that humans will intervene, or fail to intervene, and cause an accident if a vehicle is functioning with anything less than full autonomy. However, if HAVs prove less safe than manufacturers predict, then more protections may be necessary to maintain the industry’s momentum.

B. Regulatory Schemes that Support Autonomous Vehicles

Even though some manufacturers support strict liability, the social utility of autonomous vehicles in preventing accidents is such that legislation may be necessary to protect manufacturers and ensure the continued development of autonomous vehicles. *See* Marchant & Lindor, *supra* at 1325. One option is a federal regulatory scheme for liability for autonomous vehicles that pre-empts state tort law. Brodsky, *supra* at 872. This option would be a departure from traditional liability schemes that allow states to develop their own tort laws, but a federal regulatory scheme would spare manufacturers from managing different tort laws in each state. *Id.*; *but see* Villasenor, *supra* at 16 (argument against federal preemption of state tort law). Short of complete preemption, federal liability caps may be another option which could provide a method for limiting liability without infringing on states’ abilities to determine their own tort schemes. Anderson, James, M., et al, *Autonomous Vehicle Technology: A Guide for Policymakers* at pp. 131-32 (2016), available at http://www.rand.org/pubs/research_reports/RR443-2.html. In the past, Congress has limited liability for emerging industries that present unavoidable risk but high utility, including liability caps for commercial airline crashes, oil spills, and problems related to “Y2K,” among others. *Id.* These caps would allow manufacturers to continue to develop autonomous vehicle technology without being crippled by litigation, but still provide some compensation to those who may be injured by the emerging technology. Alternatively, Congress could create an insurance program similar to that created by the 1957 Price-Anderson Act, which was designed to compensate those injured in a nuclear accident. Brodsky, *supra* at 872. A mandated insurance program that requires contributions from all manufacturers is one way to distribute risks among manufacturers and limit costs to any one company. *Id.* A no-fault compensation system, like that used for vaccine-related injuries, could similarly distribute costs and risks among manufacturers. Anderson, *supra* at 131.

VII. Conclusion

As autonomous vehicles become increasingly available and widespread, liability issues will inevitably arise. While strict liability offers one solution, its application to autonomous vehicles may prove unique and provide new challenges to manufacturers, consumers, insurers, and law-makers alike.