AUTONOMOUS VEHICLES

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Lawdragon Magazine - 500 Leading Plaintiffs' Lawyers 2007; 500 Leading Plaintiffs' Consumer Lawyers 2019-2022
D Magazine - Best Lawyers in Dallas 2014-Present
Texas Trial Lawyers Association – President 2022
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Dallas Trial Lawyers Association - President 2007-2008
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Publications

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I. INTRODUCTION

On October 14, 2019, *Bloomberg Businessweek*'s cover screamed "Tesla's Autopilot Could Save Millions of Lives. How Many People Will It Kill First?" The headline captured the risk of the calculated decision by Elon Musk, Tesla's founder, to put Tesla's Autopilot feature in the hands of as many drivers as possible, as soon as possible. The headline also captured the broader risk of society's rushed embrace of autonomous vehicles (AVs). Tesla's experience certainly is a cautionary tale. Critics maintain that Tesla markets its Autopilot feature as a system that will automatically drive a Tesla with little or no input from the driver, and that Tesla's marketing lulls drivers into a dangerous sense of complacency. Although Tesla's manual warns Tesla drivers to stay attentive, the warnings have not stopped Tesla drivers from checking text messages, reading books, strumming ukuleles, sleeping, or even having sex while their Teslas traveled along highways in Autopilot mode.

The automation of our vehicles has been occurring for longer than most of us realize. As far back as 1958, brochures for Chrysler Imperials trumpeted "Auto-Pilot," described as "an amazing new device that helps you maintain constant speed and warns you of excessive speed." *See* "Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation," Brookings Institution, fn 6 April 24, 2014. That same year, an article in *Popular Science* opined that Auto-Pilot "certainly promotes safety by reducing fatigue," and observed that, "Like it or not, the robots are slowly taking over a driver's chores." *Id*. at fn 7. Anti-lock brakes (ABS) have been available since the 1970s, and Electronic Stability Control (ESC) has been available since the mid-1990s. ESC uses data from multiple sources to selectively apply the brakes on specific wheels of a vehicle to increase control on turns and slippery roadways. More recently, "driver assists" systems have provided ever more autonomous control of our vehicles. Volvo's "City Safety System" automatically applies the vehicle's brakes to avoid a collision if the vehicle's system determines that there is an imminent risk of collision with a vehicle detected by the vehicle's windshield mounted sensor. Mercedes Benz's Distronic System works in a similar manner. Audi, BMW, Ford, Land Rover, Mercedes-Benz, Nissan, Toyota, and other vehicle manufacturers now sell vehicles with automated parallel parking – a system that essentially takes over the control of a vehicle as it is maneuvered into a parking space.

The advent of AVs has not been limited to passenger vehicles, such as Teslas. Truck driving could be the next new desk job. In the near future, you could have the disquieting experience of seeing nobody sitting in the driver's seat in the tractor-trailer to your right in traffic. Instead, the rig's operator could be operating the rig remotely, and not even continuously, while sitting many miles away behind a desk.

There is an almost overwhelming financial incentive to automate trucks. Trucks carry more than 70% of U.S. domestic freight tonnage, and the U.S. is experiencing a severe shortage of truck drivers. The shortage of drivers may be as large as 175,000 by 2026, according to the American Trucking Association. Trucking is a $700 million-a-year industry, and about a third of those costs are spent on drivers. Automation has the potential to address the shortage of truck drivers, reduce costs, and perhaps increase safety. But are we really ready to trust the operation of loaded 80,000-pound tractor-trailer rigs to automated systems?

Headline-making crashes of autonomous vehicles (AVs) designed for passengers over the last several years have dimmed much of the initial enthusiasm about passenger AVs. But some contend that the trucking business is different. They argue that trucks are ripe for automation because the technology is now sufficiently tested in passenger AVs. They also note that big trucks spend most of their time on repetitive, easily navigated highway routes, and not on the cramped urban intersections where passenger AVs spend most of their time.

If you think that we will be easing into a new era of large AV truck rigs on our highways after an appropriate period of societal and governmental reflection, think again. The era of AV truck rigs is here, and it is here *now*. Over half a dozen companies currently are road-testing AV trucks on our public roads. But the only way to bless this new era of AV trucks is to ignore all of the lessons that we should have learned from the crashes of *passenger* AVs over the past few years.

We are in a transition period, when it comes to AVs and Collision Avoidance Technology (CAT). The technology is still in its infancy, and AV crashes and mishaps are occurring with some frequency as the technology is developed and perfected. As manufacturers and developers race to be at the head of the AV line, they are taking short-cuts and not paying sufficient attention to safety concerns, in the eyes of many.

The consensus is that AVs and CAT will reduce crashes and save lives, but there are numerous unanswered questions about legal liability, insurance coverage for crashes, and governmental regulation. AVs have already failed, and they will continue to fail. When AV trucks and CAT systems on trucks fail, who will get sued, and what causes of action will be alleged?

II. NHTSA'S VEHICLE AUTOMATION LEVELS

In 2013, the National Highway Traffic Safety Administration (NHTSA) defined levels of vehicle automation as follows, in NHTSA's "Preliminary Statement of Policy Concerning Automated Vehicles":

Level 0: No automation

Level 1: Function Specific Automation -
Automation at this level involves one or more specific control functions; if multiple functions are automated, they operate independently from each other. The driver has overall control, and is solely responsible for safe operation, but can choose to cede limited authority over a primary control (as in adaptive cruise control), the vehicle can automatically assume limited authority over a primary control (as in electronic stability control), or the automated system can provide added control to aid the driver in certain normal driving or crash-imminent situations (e.g., dynamic brake support in emergencies). The vehicle may have multiple capabilities combining individual driver support and crash avoidance technologies, but does not replace driver vigilance and does not assume driving responsibility from the driver. The vehicle's automated system may assist or augment the driver in operating one of the primary controls – either steering or braking/throttle controls (but not both). As a result, there is no combination of vehicle control systems working in unison that enables the driver to be disengaged from physically operating the vehicle by having his or her hands off the steering wheel AND feet off the pedals at the same time. Examples of function specific automation systems include: cruise control, automatic braking, and lane keeping.

Level 2: Combined Function Automation –
This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions. Vehicles at this level of automation can utilize shared authority when the driver cedes active primary control in certain limited driving situations. The driver is still responsible for monitoring the roadway and safe operation and is expected to be available for control at all times and on short notice. The system can relinquish control with no advance warning and the driver must be ready to control the vehicle safely. An example of combined functions enabling a Level two system is adaptive cruise control in combination with lane centering. The major distinction between level one and level two is that, at level two in the specific operating conditions for which the system is designed, an automated operating mode is enabled such that the driver is disengaged from physically operating the vehicle by having his or her hands off the steering wheel AND foot off pedal at the same time.

Level 3: Limited Self-Driving Automation –
Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver control. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time. The vehicle is designed to ensure safe operation during the automated driving mode. An example would be an automated or self-driving car that can determine when the system is no longer able to support automation, such as from an oncoming construction area, and then signals to the driver to reengage in the driving task, providing the driver with an appropriate amount of transition time to safely regain manual control. The major distinction between level two and level three is that at level 3, the vehicle is designed so that the driver is not expected to constantly monitor the roadway while driving.

Level 4: Full Self-Driving Automation –
The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip. This includes both occupied and unoccupied vehicles. By design, safe operation rests solely on the automated vehicle system.

III. AVS DO NOT SEE WELL, AND THEY DO NOT ALWAYS "DECIDE" WELL

AVs navigate with a sophisticated array of systems and sensors, including on-board computers and software, Global Positioning Systems (GPS), Radar sensors that use radio waves, and LIDAR sensors that use light beams, among others. But AV systems do not always "see" well, and they do not always "think" well. There can be problems with the ability of AVs to track the center of the road well on roads that are poorly-maintained or under construction, for example. Rain, snow, and other bad weather can create problems for AVs because LIDAR beams may reflect off of particles in the air, instead of reflecting off of obstacles, such as pedestrians and bicyclists. AV systems are programmed to "think" using certain assumptions about their surroundings and the probable actions of other drivers. When those assumptions are incorrect, crashes can occur. AV systems also do not react well to stationary objects that suddenly become moving objects. The AV system may disregard those objects, and instead "concentrate" on already-moving objects and on calculating their future trajectories and paths.

Yet another issue is the AV's software's pre-programmed decision-making preferences. Is the AV's software pre-programmed to place a priority on saving the lives of the AV's occupants, or is it pre-programmed to place a priority on saving the lives of the occupants of other vehicles and bystanders?

Predictably, AV crashes are now happening with some frequency. These crashes demonstrate that AVs are most dangerous when they are *partially* autonomous. Partially autonomous AVs can lull a driver or an attendant into a false sense that human vigilance is no longer required. Today, as we transition from partially autonomous vehicles to fully autonomous vehicles, drivers will continue to have obligations to stay alert and to assume control of the partially-autonomous vehicle if necessary. It is an open question whether designers of AVs are up to the challenge of keeping these drivers vigilant and engaged.

IV. AV CRASHES

As AV crashes have started occurring, the press cannot seem to get enough of them. For the past several years, AV crashes have dominated our news headlines.

A. Google Crash – California - February 2016

In February of 2016, Google's self-driving Lexus attempted to make a right turn at an intersection, but sandbags placed around a storm drain blocked the right-hand turn lane. The Google car stopped to let cars pass it after the traffic light turned green because it needed to re-enter the center lane to make a right turn. When the Google car started to move into the center lane, it struck a bus that was approaching behind it.

The human test driver did not take control of the vehicle before the collision because he thought that the bus would yield to the Google car. The Google software likewise wrongly predicted that the bus would yield. After the crash, Google stated that it would adjust its programming to compensate for the fact that buses and other large vehicles were not as likely to yield in such circumstances as other vehicles. No injuries were reported in the collision.

B. Tesla Fatality Crash – Florida – May 2016

In May of 2016, a Tesla S sports car being operated in autopilot mode by its driver crashed into a tractor-trailer rig in Florida. The driver of the Tesla was killed. The crash occurred when the rig made a left turn in front of the Tesla at an intersection in a divided highway where there was no traffic control light. It appears that neither the Tesla driver nor the Tesla autopilot system noticed the white side of the trailer in the Tesla's path, perpendicular to the Tesla, against the brightly light sky. The Tesla rode up under the trailer of the rig. The wreckage of the Tesla, with its roof sheared off, ended up hundreds of feet from the crash site. The Tesla driver was a 40 year old former Navy Seal who owned a technology company.

NHTSA then opened an investigation. Tesla said that the Tesla's radar sensors may have spotted the rig, but nevertheless "tuned it out" because the system is designed to tune out overhead structures, such as bridges and highway signs. Mobileye, the manufacturer of the camera and the computer system for the Tesla said that they had warned Tesla not to allow Tesla drivers to use the Autopilot system without their hands on the steering wheel. NHTSA ultimately determined that the Tesla had no safety defect, and that manufacturers and drivers of semi-autonomous vehicles should not treat them as if they were fully self-driving. But NHTSA's Robert Sumwalt stated that "system safeguards were lacking," and that "Tesla allowed the driver to use the system outside of the environment for which it was designed and the system gave far too much leeway to the driver to divert his attention."

C. GM Bolt - Motorcycle Collision – California – December 2017

In December of 2017, an autonomous GM Bolt in California allegedly suddenly veered into the lane of a motorcyclist and knocked him to the ground. GM claimed that the motorcyclist had been riding between two lanes, and had moved into the center lane and "glanced the side of the [car] … wobbled, and fell over." Nevertheless, GM settled the motorcyclist's damages claim.

D. Uber Fatality Crash – Arizona – March 2018

In March or 2018, an Uber autonomous vehicle struck and killed a pedestrian in Tempe, Arizona. The victim was in a cross-walk at around 10 p.m. when she was struck and killed. Video taken from inside the Uber Volvo XC90 sport utility vehicle shows the Uber vehicle driving along a dark road when a woman walking a bicycle across the road in front of the Uber vehicle suddenly appears in the video.

Dash-cam video showed the back-up driver looking down repeatedly -- 204 times during the 11.8 miles leading up to the crash. She was streaming the television show, *The Voice* on her cell phone during the 43 minutes leading up to the crash, and looking down near her right knee for four or five seconds before the crash. A report released by the Arizona police concluded that the crash would have been avoided if the Uber back-up driver had not been distracted.

The NTSB released a preliminary report, finding that the sensors in the Uber vehicle worked as expected, spotting the pedestrian about six seconds before the impact. Nevertheless, the software became confused, according to the NTSB report. The software first classified the pedestrian as an unknown object, then as a vehicle, and then as a bicycle, all with varying and conflicting expectations of future travel paths.

At 1.3 seconds before impact, the system determined that an emergency braking maneuver was required to avoid the collision. The Volvo's built-in collision avoidance system perhaps could have avoided the collision, but Uber had disabled that system when the car was under computer control in order to avoid possible conflicts between Uber's AV system and the Volvo system, and to avoid erratic vehicle behavior. Instead, Uber's system relied upon the human back-up driver to intervene and take action. But, Uber's system was not designed to alert the back-up driver to take action in such a situation.

Uber manager, Robbie Miller had sent an internal company email days before the incident, lamenting that the Uber AVs "shouldn't be hitting things every 15,000 miles," and that "dangerous behavior" incidents were happening with some frequency. He specifically noted an incident in which an Uber AV had driven on a sidewalk for several meters, and observed that Waymo, his previous employer, would have grounded the entire fleet in response to such an incident. To enhance safety, he recommended Uber's use of two human backup drivers, instead of just one, and an 85 percent reduction in the Uber test fleet. Uber adopted none of these recommendations before the death of the pedestrian.

In response to the incident, Missy Cummings, a robotics expert at Duke University who has been critical of the rapid rollout of AVs, said that the computer-vision systems for self-driving cars are "deeply flawed," and can be "incredibly brittle," particularly in unfamiliar circumstances. *See* "Death Halts Testing," *Dallas Morning News*, March 20, 2018.

E. Tesla Crash – California – March 2018

Walter Huang, an Apple engineer, was driving his Tesla in Autopilot mode when it approached an exit lane that diverged to the left of the main roadway. At seven seconds before the crash, the Tesla began a left steering movement that carried the Tesla into the widening gap between the travel lanes, which the Tesla apparently mistook for a travel lane. Then the Tesla determined that there was no car ahead of it, and accelerated to 70 miles per hour.

Tesla blamed the driver for being inattentive: "The only way for this accident to have occurred is if [the driver] was not paying attention to the road, despite the car providing multiple warnings to do so." The NTSB opened up an investigation into the crash, but Tesla withdrew as a party to the NTSB investigation, an unprecedented step. The NTSB determined that there was no pre-crash braking or evasive action by the Autopilot system, and that the driver had his hands on the steering wheel for 34 of the last 60 seconds before the crash, but not for the last 6 seconds before the crash.

Bryant Walker Smith, a University of South Carolina law professor who studies AVs, called this crash an illustration of the "mushy middle" of automation – partial automation systems "work unless and until they don't."

In May of 2019, Huang's family filed a lawsuit against Tesla and the State of California. The lawsuit alleged that the Autopilot feature is unreasonably dangerous and that the State was negligent for failing to replace a crash attenuator barrier after a previous crash at the accident site one week earlier.

F. Tesla Crash – Florida – April 2018

A Tesla vehicle drove through a wall of a vacant storefront and crashed into the side of an Anytime Fitness gym in Florida in April of 2018. The Tesla driver claimed the vehicle "would not stop accelerating forward" as she pulled into a parking spot.

Tesla's website states that it's autopilot can maneuver itself around a highway "without requiring driver input," as well as "self-park when nearing a parking spot." Tesla vehicles can download real-time data, but Tesla drivers must first register for the Tesla logs feature and pay a monthly fee.

G. Tesla Fatality Crash – Florida – May 2018

A Tesla vehicle in semi-autonomous mode crashed into a concrete highway divider and burst into flames. The Tesla driver and a passenger died as a result of the crash. Vehicle logs showed that the vehicle's AV system had warned the driver to put his hands on the wheel right before the crash, but that the driver had failed to do so.

The Tesla, which had been travelling at 116 miles per hour just seconds before impact, hit the concrete divider while travelling at 86 miles per hour. The parents of the teenaged driver had installed a speed governor on the Tesla that limited its speed to 85 miles per hour in response to a previous ticket for speeding at 112 miles per hour, but the driver had secretly removed it before the crash.

The battery of the Tesla reignited twice after the crash – one while the Tesla was on the tow truck, and once while the Tesla was in the storage yard. In January of 2019, the parents of the passenger filed a lawsuit, claiming, among other things that the Tesla's batteries were inadequately protected from fire.

H. Tesla Crash – California – May 2018

A Tesla sedan in semi-autonomous mode, travelling 60 miles per hour crashed into the back of a fire department truck that had stopped at a red light in California in May of 2018. At the time of the crash, there was a light rain falling, and the Tesla vehicle did not activate its brakes before the crash. The driver, who suffered only a broken foot, was looking at her phone shortly before the crash. The driver had her hands off of the steering wheel for a period of 80 seconds before the crash. She was issued a citation for "failure to keep a proper lookout."

I. Tesla Crash – California – May 2018

A Tesla Model S in semi-autonomous mode crashed into the back of a police car in California in May of 2018. The police car was empty at the time, and the Tesla driver sustained only minor injuries.

J. Waymo Crash- Arizona - May 2018

In May of 2018, a Waymo self-driving SUV was in the "wrong place at the wrong time," according to Arizona police. A Honda sedan swerved to avoid hitting another vehicle and ended up colliding with the Waymo vehicle. The Waymo vehicle was in autonomous mode, and a human back-up driver in the Waymo suffered minor injuries.

K. Tesla Fire – California – June 2018

A Tesla vehicle caught fire on a street in West Hollywood, and actress Mary McCormack shared video of her husband's Tesla shooting flames near the front wheels on social media.

L. Tesla Crash – Florida – October 2018

Shawn Hudson bought a Tesla with the idea that Hudson could use Autopilot and check emails and do other work during his 250 mile round-trip commute. The Tesla salesman had told Hudson that he could use Autopilot in that manner, and that Tesla's Autopilot system would alert him if he needed to put his hands back on the steering wheel. While his Tesla was travelling at 80 miles per hour in Auto-Pilot mode, it crashed into a disabled, empty Ford Fiesta on the Florida Turnpike. Incredibly, Hudson survived the crash. He filed suit in Florida, claiming that "Tesla has duped customers … into believing that the autopilot system it offers…can safely transport passengers at highway speeds with minimal input and oversight from those customers." His suit alleged negligence, breaches of warranty, and violations of the Florida DTPA.

Tesla, of course, blamed the operator: "When using Autopilot, it is the driver's responsibility to remain attentive to their surroundings and in control of the vehicle at all times."

M. Tesla Crash – New Jersey – February 2019

A Tesla vehicle on Autopilot in New Jersey "got confused due to lane markings" being in flux. Instead of taking an exit, it split the difference and went off of the road, striking a number of objects. The Tesla driver claimed that his attempts to override Autopilot during the crash were unsuccessful.

N. Tesla Crash – Florida – February 2019

Dr. Omar Awan, a physician and father of five, was killed when his Tesla swerved through three lanes of traffic, hit a median, and caught fire. It is not clear whether Autopilot was engaged at the time of the crash. The Tesla's batteries reignited three times after the crash. Tesla states that, "Battery fires can take up to 24 hours to extinguish." The National Highway Traffic Safety Administration is investigating the crash.

O. Tesla Crash – Florida – March 2019

Jeremy Banner's Tesla drove up under the bottom of a trailer that was part of a tractor-trailer rig making a left turn in front of Banner. Banner was killed when the roof of his Tesla was sheared off. It is not clear whether Banner had activated Autopilot, but the circumstances of the crash are suspiciously similar to the Florida fatality crash in May of 2016, in which the Tesla's sensors "tuned out" a trailer that was turning across the path of the Tesla. The NTSB and NHTSA are investigating the crash.

P. Bottom Line on Tesla Crashes

The bottom line on Tesla and its crashes is that there are allegations that Tesla undercounted injuries caused by its vehicles and ignored the warnings of its own safety experts. Tesla's semi-autonomous mode arguably endangers Tesla drivers because it can lull them into believing that they can cede *complete* control of the vehicle to the self-driving system. Furthermore, Tesla's vehicles do not appear to be sufficiently protected from battery fires.

Tesla has lagged behind GM and other manufacturers in embracing driver-facing camera systems to monitor head and eye movement and to disengage partially autonomous systems when the driver is not paying attention. Tesla also is facing economic pressures arising out of chronic production delays for its newest mass-market car—the Model 3. The question arises: Are market forces and pressures prompting Tesla to skimp on safety?

In May of 2018, Tesla settled a class action lawsuit involving Tesla buyers who claimed that Tesla's auto-pilot system was "essentially unusable and demonstrably dangerous."

Beginning in January of 2021 with the inauguration of President Joe Biden, there was new cop on the block. The Biden Administration quickly signaled that the Trump Administration's laissez faire attitude towards the regulation of AVs was a thing of the past.

In August of 2021, NHTSA opened an extensive investigation into Tesla's Autopilot feature. In September of 2021, the NTSB pumped the brakes on

Tela's rollout of its Full Self Driving (FSD) feature. That same month, NHTSA ordered Tesla to hand over detailed Autopilot data or face $1125 million in fines.

In February of 2022, Senators Ed Markey and Richard Blumenthal raised concerns about Teslas' Autopilot and FSD systems in a letter to Tesla. The next month, Tesla admitted in a written response to the senators that both systems require "constant monitoring and attention of the driver."

In May of 2022, NHTSA opened a probe into a fatal Tesla crash that occurred that month in Newport Beach, California.

In June of 2022, NHTSA released its first summary report of accidents involving AVs. Although the report lacked real detail, the report showed there almost 400 crashes involving partially or fully autonomous vehicles between June 1, 2021 and May 15, 2022.

In July of 2022, a Florida jury awarded $10.5 million for the death of two teens – Barrett Riley and Edgar Martinez in a Tesla crash that occurred in 2018 in Florida. The jury placed 90 percent of the fault for the crash on the driver, Barrett Riley, and 9 percent of the fault on Barrett Riley's father. The jury nevertheless found Tesla negligent for disabling a speed governor at Barrett Riley's request without Barrett's father's knowledge. In 2019, the NTSB found the crash was caused by "the driver's loss of control as a result of excessive speed."

In November of 2022, there was a serious eight car crash involving a Tesla on the San Francisco-Oakland Bay Bridge. Although nobody was injured, the Tesla driver told police he was using his Tesla's FSD mode when FSD malfunctioned, causing the Tesla to change lanes and brake suddenly in front of a line of cars.

In December of 2022, Tesla filed a motion to dismiss a class action alleging that Tesla misrepresented the capabilities of Autopilot and FSD. Tesla claimed that "mere failure to realize a long-term aspirational goal is not fraud." Tesla also moved to require the plaintiffs to arbitrate their claims, as required by their Tesla purchase agreements.

In January of 2023, NHTSA reported that the extensive investigation of Tesla's Autopilot that it opened in August of 2021 was proceeding "really fast." That same month, the Justice Department requested self-driving software documents from Tesla.

In February of 2023, NHTSA pushed Tesla to recall over 362,000 vehicles with FSD as crash risks.

V. CAUSES OF ACTION - WHO WILL GET SUED, AND UNDER WHAT THEORIES?

A. Overview

AVs have already failed, and they will continue to fail. When AVs fail, who will get sued, and what causes of action will be alleged?

When an AV crashes, possible defendants in a civil lawsuit include the operator of the AV, the manufacturer of the AV or its component parts, the developer for the AV's software, or all three. Some states, including California have mandated that the AV "operator" is legally responsible for any crash involving the AV. The operator is defined as the person who either manually controls the vehicle or causes the AV system to engage. Other states are silent on liability for crashes of AVs.

Traditionally, lawsuits arising out of garden-variety car crashes – one operator suing another operator for negligence, have been filed in state courts. Products liability lawsuits against automobile manufacturers and manufacturers of component parts of automobiles, on the other hand, often end up being filed in federal court. These lawsuits end up being filed in federal court, more often than not because of "diversity" jurisdiction – the manufacturer being a citizen of a state other than the injured plaintiff requires the suit to be filed in federal court. Automobile products liability lawsuits, in contrast to garden-variety negligence lawsuits arising out of crashes, are very expensive and time-consuming due to the need to employ design engineers and other experts.

As AV's proliferate, the potential exists for almost any garden-variety crash to become an expensive, time-consuming federal court-based products liability lawsuit against the AV manufacturer and designer.

Within the literature, there is a raging debate about whether the existing framework of legal precedents and causes of action is flexible enough to accommodate AVs.

The Brookings Institution's position is representative of those who believe that the existing framework will suffice: "Products liability law has proven to be remarkably adaptive to new technologies," and "the same will hold true for autonomous vehicle technologies." "Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation," Brookings Institution, April 24, 2014. *See also* Garza, "Look Ma, No Hands!: Wrinkles and Wrecks in the Age of Autonomous Vehicles," 46 New England L. Rev. 581, 595 (2012) ("Products liability law is capable of handling the new technology just as it handled the incorporation of seat belts, air bags, and cruise control.").

The RAND Corporation, on the other hand, is representative of those who have raised concerns about regulating and holding AV defendants accountable under the existing regime. Rand believes that Congress should "consider preempting inconsistent state-court remedies" to "minimize the number of inconsistent legal regimes that manufacturers face and simplify and speed the introduction of this technology." "Autonomous Vehicle Technology: A Guide for Policymakers," Rand Corp. 2014. *See also* Gurney, "Sue My Car Not Me," 2013, No. 2 Journal of Law, Tech. & Policy 247, 277 (2013) (when an AV crashes, "current products liability law will not be able to adequately assess responsibility to the party that caused the accident").

Another raging debate is whether the federal government should preempt the application of state law causes of action to AVs. Currently, there is a patchwork of regulation of AVs by the states. In response, some have advocated for federal preemption of regulation of AVs on the grounds that inconsistent laws and regulations among the various states will obstruct and delay the rollout of AVs and their attendant safety benefits. The current state of regulation of AVs is analogous to the 1960s in some ways, before the formation of NHTSA – the National Highway Traffic Safety Administration, and the promulgation of federal safety rules for automobiles. Bills that have been introduced in Congress would immunize AV manufacturers from liability and fail to prohibit forced arbitration of legal disputes between AV manufacturers and consumers.

Again, the Brookings Institution believes that the existing framework will suffice, and Brookings favors the status quo with no federal preemption. According to Brookings, "federal level legislation specifically preempting state authority regarding autonomous vehicle liability would be a mistake," but "the federal government has a clear role in setting safety standards for autonomous vehicles." "Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation," Brookings Institution, April 24, 2014. The Rand Corporation's position in favor of preemption, on the other hand, is representative of those who advocate for federal preemption of the application of state law causes of action to AVs. *See* "Autonomous Vehicle Technology: A Guide for Policymakers," Rand Corp. 2014. Rand believes that Congress should "consider preempting inconsistent state-court remedies" to "minimize the number of inconsistent legal regimes that manufacturers face and simplify and speed the introduction of this [AV] technology." *Id*.

On balance, federal preemption and other major changes to our existing tort regime should not be necessary. Our existing regime has been adaptable enough to evolve to accommodate the horseless carriage and countless other new products and innovations over the years. It makes no sense to scrap such a durable, time-tested regime, just because there may be some inconsistencies in outcomes and some bumps along the road as AV products proliferate.

B. Products Liability Law

Products liability law is a hybrid of contract and tort law. Contract law is implicated by the marketing and sales of products. Sales and marketing of products may create implicit and explicit warranties. Plaintiffs in products suits often assert multiple theories of liability: 1) negligence, 2) strict liability, 3) misrepresentation, and 4) breach of warranty.

1. Manufacturing Defects

The Texas Pattern Jury Charge defines a "manufacturing defect" as follows:

> *A "manufacturing defect" means that the product deviated in its construction or quality from its specifications or planned output in a manner that renders it unreasonably dangerous. An "unreasonably dangerous" product is one that is dangerous to an extent beyond that which would be contemplated by the ordinary user of the product, with the ordinary knowledge common to the community as to the product's characteristics.*

Texas PJC 71.3.

2. Design Defects

The Texas Pattern Jury Charge defines a "design defect" as follows:

> *A "design defect" is a condition of the product that renders it unreasonably dangerous as designed, taking into consideration the utility of the product and the risk involved in its use. For a design defect to exist there must have been a safer alternative design.*
>
> *"Safer alternative design" means a product design other than the one actually used that in reasonable probability—*
>
> 1. *would have prevented or significantly reduced the risk of the [*injury*] [*occurrence*] in question without substantially impairing the product's utility and*
> 2. *was economically and technologically feasible at the time the product left the control of* ABC Company *by the application of existing or reasonably achievable scientific knowledge.*

Texas PJC 71.4.

3. Marketing Defects

The Texas Pattern Jury Charge defines a defect in marketing – a defect in the warnings or instructions as follows:

> *A "defect in the warnings" means the failure to give adequate warnings of the product's dangers that were known or by the application*

of reasonably developed human skill and foresight should have been known and which failure rendered the product unreasonably dangerous as marketed.
[or]

A "defect in the instructions" means the failure to give adequate instructions to avoid the product's dangers that were known or by the application of reasonably developed human skill and foresight should have been known and which failure rendered the product unreasonably dangerous as marketed.

"Adequate" [warnings] [instructions] means [warnings] [instructions] given in a form that could reasonably be expected to catch the attention of a reasonably prudent person in the circumstances of the product's use; and the content of the [warnings] [instructions] must be comprehensible to the average user and must convey a fair indication of the nature and extent of the danger and how to avoid it to the mind of a reasonably prudent person.

An "unreasonably dangerous" product is one that is dangerous to an extent beyond that which would be contemplated by the ordinary user of the product with the ordinary knowledge common to the community as to the product's characteristics.

Texas PJC 71.5.

4. Misrepresentations

The Texas Pattern Jury Charge defines a misrepresentation in the context of products liability as follows:

There was a misrepresentation if—

1. *ABC Company represented to the public that the Panther automobile possessed the most stable suspension system on the market; and*
2. *the automobile in question failed to possess the most stable suspension system on the market; and*
3. *the representation about the stability of the suspension system involved a material fact concerning the character or quality of the automobile in question; and*
4. *Paul Payne relied on the representation made by ABC Company in purchasing the automobile in question.*

A "material fact" is a fact that is important to a normal purchaser by which the purchaser may justifiably be expected to be influenced in making the decision to buy the product.

Texas PJC 71.6.

5. Negligence

The Texas Pattern Jury Charge defines negligence in the context of products liability as follows:

For ABC Company to have been negligent, there must have been a defect in the [manufacturing] [designing] [warnings or instructions].

"Negligence," when used with respect to the conduct of ABC Company, means failure to use ordinary care, that is, failing to do that which a company of ordinary prudence would have done under the same or similar circumstances or doing that which a company of ordinary prudence would not have done under the same or similar circumstances.

"Ordinary care" means that degree of care that a company of ordinary prudence would use under the same or similar circumstances.

"Proximate cause" means a cause that was a substantial factor in bringing about an [injury] [occurrence], and without which cause such [injury] [occurrence] would not have occurred. In order to be a proximate cause, the act or omission complained of must be such that a company using ordinary care would have foreseen that the [injury] [occurrence], or some similar [injury] [occurrence], might reasonably result therefrom. There may be more than one proximate cause of an [injury] [occurrence].

[Insert appropriate defect theory—manufacturing, design, or warnings/instructions.]

A "manufacturing defect" means that the product deviated in its construction or quality from its specifications or planned output in a manner that renders it unreasonably dangerous. An "unreasonably dangerous" product is one that is dangerous to an extent beyond that which would be contemplated by the ordinary user of the product, with the ordinary knowledge common to the community as to the product's characteristics.

[or]

A "design defect" is a condition of the product that renders it unreasonably dangerous as designed, taking into consideration the utility of the product and the risk involved in its use. For a design defect to exist there must have been a safer alternative design.

"Safer alternative design" means a product design other than the one actually used that in reasonable probability—

1. *would have prevented or significantly reduced the risk of the [injury] [occurrence] in question without substantially impairing the product's utility and*
2. *was economically and technologically feasible at the time the product left the control of ABC Company by the application of existing or reasonably achievable scientific knowledge.*

[or]

A "defect in the warnings" means the failure to give adequate warnings of the product's dangers that were known or by the application of reasonably developed human skill and foresight should have been known and which failure rendered the product unreasonably dangerous as marketed.

[or]

A "defect in the instructions" means the failure to give adequate instructions to avoid the product's dangers that were known or by the application of reasonably developed human skill and foresight should have been known and which failure rendered the product unreasonably dangerous as marketed.

"Adequate" [warnings] [instructions] mean [warnings] [instructions] given in a form that could reasonably be expected to catch the attention of a reasonably prudent person in the circumstances of the product's use; and the content of the [warnings] [instructions] must be comprehensible to the average user and must convey a fair indication of the nature and extent of the danger and how to avoid it to the mind of a reasonably prudent person.

An "unreasonably dangerous" product is one that is dangerous to an extent beyond that which would be contemplated by the ordinary user of the product with the ordinary knowledge common to the community as to the product's characteristics.
Texas PJC 71.7.

6. <u>Breaches of Implied Warranty of Merchantability – Design Defect</u>

The Texas Pattern Jury Charge recommends that jurors be asked the following type of question to determine whether there was a design defect that constituted a breach of the implied warranty of merchantability of fitness for a particular purpose in the context of products liability:

*Was the [*good or product*] supplied by* ABC Company *unfit for the ordinary purposes for which such [*goods or products*] are used because of a defect, and, if so, was such unfit condition a proximate cause of the [*injury*] [*occurrence*] in question?*

*A "defect" means a condition of the [*good or product*] that renders it unfit for the ordinary purposes for which such [*goods or products*] are used because of a lack of something necessary for adequacy.*

*For a defect in the design of the [*good or product*] to exist, there must have been a safer alternative design.*

"Safer alternative design" means a design other than the one actually used that in reasonable probability—

1. *would have prevented or significantly reduced the risk of the [*injury*] [*occurrence*] in question without substantially impairing the utility of the [*good or product*] and*
2. *was economically and technologically feasible at the time the [*good or product*] left the control of* ABC Company *by the application of existing or reasonably achievable scientific knowledge.*

Texas PJC 71.9.

7. <u>Breaches of Implied Warranty of Merchantability – Other Than Design Defect</u>

The Texas Pattern Jury Charge recommends that jurors be asked the following type of question to determine whether there was a breach of the implied warranty of merchantability involving something other than a design defect in the context of products liability:

> *Was there a breach of the implied warranty of merchantability, and, if so, was such breach a proximate cause of the [*injury*] [*occurrence*] in question?*
> *A warranty that the goods shall be merchantable is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind.*
>
> *There is a breach of an implied warranty of merchantability if the goods in question fail to at least—*
>
> 1. *pass without objection in the trade under the contract description; and*
> 2. *in the case of fungible goods, be of a fair average quality within the description; and*
> 3. *run, within the variations permitted by agreement, of even kind, quality, and quantity within each unit and among all units involved; and*
> 4. *conform to the promises or affirmations of fact made on the container or label, if any.*

Texas PJC 71.10.

8. Breaches of Implied Warranty of Fitness for a Particular Purpose

The Texas Pattern Jury Charge recommends that jurors be asked the following type of question to determine whether there was a breach of the implied warranty of fitness for a particular purpose in the context of products liability:

> *Was there a breach of an implied warranty of fitness for a particular purpose, and, if so, was such breach a proximate cause of the [*injury*] [*occurrence*] in question?*
>
> *A warranty that the goods are fit for a particular purpose is implied if at the time of contracting—*
>
> 1. *the seller had reason to know the particular purpose for which the goods are required; and*
> 2. *the seller had reason to know that the buyer was relying on the seller's skill and judgment to select or furnish suitable goods.*
>
> *There is a breach of an implied warranty of fitness for a particular purpose if at the time of sale the goods supplied by the seller are unfit for the particular purpose for which the goods were purchased.*

Texas PJC 71.11.

9. Breaches of Express Warranty

The Texas Pattern Jury Charge recommends that jurors be asked the following type of question to determine whether there was a breach of an express warranty in the context of products liability:

> *Did the power brakes fail to function normally with the engine not running, and, if so, was such failure a proximate cause of the* [*injury*] [*occurrence*] *in question?*
>
> Texas PJC 71.12.

C. Texas AV Statute – SB 2205

In June of 2017, Texas Governor, Greg Abbott signed Senate Bill 2205. SB 2205 requires driverless vehicles on Texas roads: 1) to be capable of complying with all traffic laws, 2) to be equipped with video recording devices, and 3) to be insured to the same extent as cars with human drivers. SB 2205, Section 545.454.

Significantly, SB 2205 provides that: 1) "the owner of the automated driving system is considered the operator of the automated motor vehicle solely for the purpose of assessing compliance with applicable traffic or motor vehicle laws, regardless of whether the person is physically present in the vehicle while the vehicle is operating." 2) "the automated driving system is considered to be licensed to operate the vehicle," and 3) "notwithstanding any other laws, a licensed human operator is not required to operate a motor vehicle if an automated driving system installed on the vehicle is engaged." SB 2205, Section 545.453.

VI. COLLISION AVOIDANCE TECHNOLOGY (CAT)

Crashes involving large trucks are nearly a third higher since hitting an all-time low in 2009. In 2018, large truck crashes killed 4,136 people, and 119 people died in crashes in which large trucks rear-ended passenger vehicles.

Autonomous trucks are now being tested on our roadways, but they are not yet operating within truck fleets. Collision Avoidance Technology (CAT), the technology at the heart of AV systems *is* now being implemented within fleets, however. CAT is a term that encompasses a number of different advanced automated driving systems. These systems may be passive systems or active systems. Passive systems simply warn or advise a driver, while active systems take control of a vehicle to avoid a crash. *Passive* systems include: 1)

Lane Departure Warning (LDW) Systems, 2) Forward Collision Warning (FCW) Systems, and 3) Side View Assistance systems. *Active* systems include: 1) Automatic Emergency Braking (AEB) Systems, 2) Autonomous or Adaptive Cruise Control (ACC), and 3) Electronic Stability Control (ESC) Systems.

Most of these systems are sold as integrated systems within the design of new vehicles, but some of these systems are available as after-market systems. Almost all after-market systems are passive systems because of the difficulties in later integrating active systems into the electronic and mechanical functioning of an existing vehicle.

The European Union required Automatic Emergency Braking (AEB) systems and Forward Collision Warning (FCW) Systems on most new heavy trucks, beginning in 2013. The U.S. has not mandated CAT systems for either trucks or passenger vehicles. The Insurance Institute for Highway Safety (IIHS) and the National Highway Traffic Safety Administration (NHTSA) has brokered a voluntary accord involving U.S. *passenger* vehicles, however. The twenty automakers that account for 99 percent of the U.S. market agreed to make Automatic Emergency Braking (AEB) systems standard on almost all new passenger vehicles by September 1, 2022.

In 2009, the Federal Motor Carrier Safety Administration (FMCSA) studied Forward Collision Warning (FCW) systems and Lane Departure Warning (LDW) Systems for heavy trucks. The FMCSA study found that between 8,597 and 18,013 rear-end crashes involving trucks could have been prevented by Forward Collision Warning (FCW) systems.

In October 2013, the FMCSA published a study, "Onboard Safety Systems Effectiveness Evaluation Final Report." Although the study's findings for Forward Collision Warning (FCW) systems were encouraging, the results were not statistically significant because of the relatively small number of trucks involved in the study. Nevertheless, drivers participating in the study were overwhelmingly supportive of the FCW technology and passed on anecdotal evidence of collisions avoided through use of the technology. The FMCSA study did find that trucks equipped with Lane Departure Warning (LDW) Systems experienced half the number of collisions than trucks not equipped with the technology.

An Insurance Institute for Highway Safety (IIHS) study also found significant benefits from CAT systems for trucks. The IIHS study found: 1) Side View Assistance systems would mitigate 39,000 crashes per year, including 2,000 serious and moderate injury crashes and 79 fatal crashes, 2) Truck Stability Control and Forward Collision Warning systems would each prevent up to 31,000 crashes annually, 3) Truck Stability Control would prevent 7,000 injury-causing crashes a year, including 439 fatalities, 4) Forward Collision Warning systems would prevent 3,000 injury-causing crashes annually, and 115 fatal crashes, 5) Lane Departure Warning Systems would prevent up to 10,000 large truck crashes per year.

The IIHS study found that trucks equipped with Forward Collision Warning systems had 22 percent fewer crashes and that trucks with Automatic Emergency Braking (AEB) systems had 12 percent fewer crashes than trucks without either technology. "The potential benefits are great enough that these crash avoidance systems should be standard equipment on all new large trucks," IIHS President David Harkey said. Forward Collision Warning systems reduced rear-end crashes by 44 percent, and Automatic Emergency Braking (AEB) systems reduced rear-end crashes by 41 percent, according to IIHS Director of Statistical Services, Eric Teoh. "This study provides evidence that forward collision warning and AEB greatly reduce crash risk for tractor-trailers and other large trucks," Teoh said. "That's important information for trucking companies and drivers weighing the costs and benefits of these options."

The data supporting the benefits of CAT is overwhelming and unambiguous. Schneider National's experience is just one typical experience in the trucking industry. Schneider reduced rear-end collisions by 69 percent following Schneider's investment in CAT systems, according to the CEO of Schneider, Chris Lofgren in 2017. "Regardless of what happens in court, not having as many crashes means fewer deaths and injuries," said Harry Adler of the nonprofit Institute for Safer Trucking.

VII. LIABILTY THEORIES RELATED TO CAT

We are now relatively early in CAT's timeline. At this juncture, a failure to install CAT claim could be made against both the manufacturer of the truck and the user of the truck. The model would be the early claims that arose out of the failure to install frontal airbags, side airbags, and passenger vehicle Electronic Stability Control (ESC).

Later in the timeline as CAT becomes more proven, claims against the truck manufacturer for making CAT an option versus a standard feature could be made, just as such claims were made in later litigation involving airbags and ESC.

In cases in which CAT *was* installed, but a crash nevertheless occurred, the products liability claim may be that the system was defective, either because it failed to prevent the collision, or because the system actually *caused* the collision. Defects in the CAT system may arise out of defects in the equipment, design, or software in the system. For example, the problem might be that a better sensor could have provided earlier detection of the hazard to enable avoidance of the crash. Or the problem could be that a defect in the system's design or software either thwarted the prevention of the crash, or that such a defect actually caused the crash. CAT essentially is being Beta-tested on our roadways, and the systems are far from perfect. For example, there have been seven recalls for auto-braking problems in passenger automobiles since 2015, affecting nearly 180,000 vehicles. Reported problems in auto-braking systems have included problems that can cause an automobile to automatically apply the brakes as the automobile passes under an overpass, among other serious safety problems.

VIII. INSURANCE

AVs will test automobile insurers. Today, statistics indicate that over ninety percent of crashes are caused by human error. As AVs proliferate, the number of crashes caused by human error will go down, and the number of crashes caused by computerized navigation software and components will increase. The consistent prediction is that there will be fewer total crashes as AVs proliferate. But just how many fewer crashes and what will those crashes cost insurance companies? And how quickly will AVs and their predicated associated safety benefits roll out? Auto insurance companies set insurance rates based upon predictions about the likelihood that crashes will happen and how much the crashes will cost. The problem is that insurance companies do not yet have sufficient data to make meaningful predictions about the frequency of AV crashes, the costs of AV crashes, and future laws and regulations about legal responsibility for AV crashes.

Some, including RAND have called for "no-fault" automobile insurance due to the expense and complexity of lawsuits against manufacturers and designers of AV systems. Others have criticized no fault insurance because of a concern that no-fault regimes fail to punish transgressions and fail to incentivize manufacturers to avoid manufacturing dangerous products.

IX. CONCLUSION

We are in a transition period, when it comes to AVs and CAT. The technology is still in its infancy, and AV and crashes and mishaps are occurring with some frequency in passenger cars as the technology is developed and perfected. As manufacturers and developers race to be at the head of the AV line, they are taking short-cuts and not paying sufficient attention to safety concerns, in the eyes of many.

The consensus is that AVs will reduce crashes and save lives, but there are numerous unanswered questions about legal liability, insurance coverage for crashes, and governmental regulation.

Federal preemption and other major changes to our existing tort regime should not be necessary. Our existing regime has been adaptable enough to evolve to accommodate the horseless carriage and countless other new products and innovations over the years. It makes no sense to scrap such a durable, time-tested regime, just because there may be some inconsistencies in outcomes and some bumps along the road as AV and drone products proliferate.

Now is not the time to ramp up our AV experimentation to include large tractor-trailer rigs. Let us frankly acknowledge what we are doing: we are beta testing AV systems on our public roadways. When we beta-test a smartphone with software that still has bugs within it, the phone may crash. When we beta-test a *passenger* AV with software that is still "learning," it may crash and kill the driver and some others. But when we beta-test a loaded 80,000-pound AV truck rig and it crashes, the potential carnage is ramped up exponentially.

Admittedly, driving is one of the most dangerous things that we do, and human error is the primary cause of automobile crashes. The promise of AVs is that they will never get drunk, never get tired, never get angry, and never feel the need to check text messages while driving down the road. But AV systems are not yet ready for prime time. Any functioning adult driver can tell the difference between a harmless highway overpass and a tractor-trailer rig pulling across the path of a vehicle, but AV systems cannot yet always make that crucial determination. AV systems do not need to be literally flawless before they are allowed to pilot tractor-trailer rigs, but certainly they need to be safer than the average human driver, at a minimum. Until that basic threshold is cleared, we should resist the urge to rush headlong into AV trucks. In the near future, none of us should see an empty driver's seat on a tractor-trailer rig on the road. Trucking should not be the new desk job any time soon.

CAT systems are different because a human operator retains overall control of the vehicle. Although CAT systems are not perfect, they have the proven potential to reduce the number of large truck crashes while keeping the human operators of large trucks in overall control. It is time for CAT systems to be standard equipment on all large trucks today.