Self Driving Vehicles

THE THREAT TO CONSUMERS

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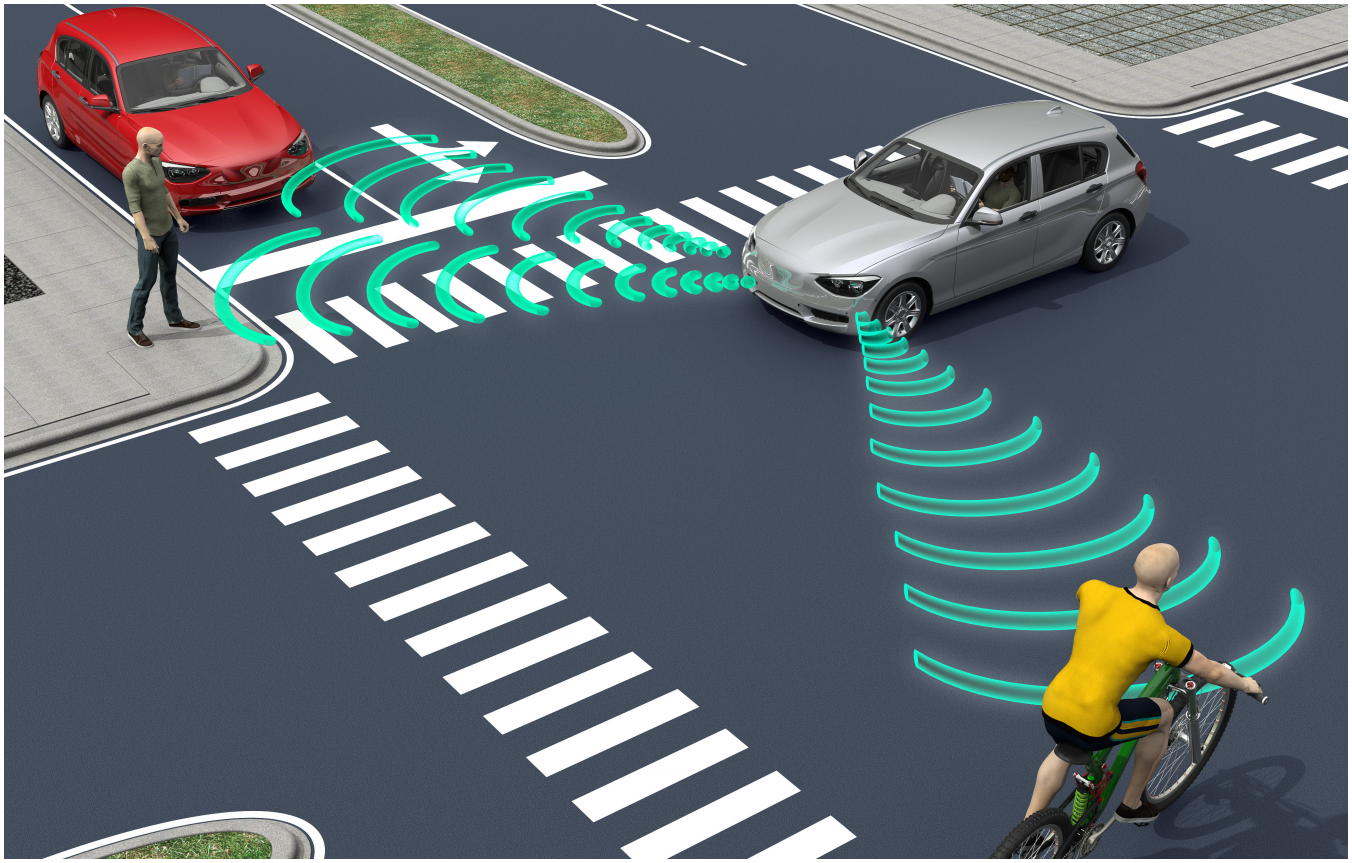

Consumer Watchdog

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1.0 Introduction

Self-driving vehicles have become a cultural and political phenomenon. To peruse the breathless headlines is, like a ride in Marty McFly's DeLorean, to experience the sensation of visiting a wondrous future. Millions of hours previously wasted in traffic, searching for a parking spot or waiting in line at the DMV, will be restored to us, while we sit back in our passenger seats, dine, work or watch movies as robots whisk us around. It's a world in which there are virtually no car accidents, because infallible computers will replace impatient, emotional, tired, distracted, all too error-prone human beings.

And, wondrously, there will be no need to write another check to the auto insurance company. In the highly unlikely event that anything goes wrong, the robot car manufacturers will stand behind their products and pick up the tab, no questions asked.

Not so fast.

America is decades away from a completely "self-driving" transportation system. But the insurance and auto industries are already preparing to exploit the prospect of self-driving robot cars and trucks so they can force Americans to pay *more* for insurance on the cars they own or lease, and roll back state consumer protection laws so that when their self-driving vehicle gets in a crash, it will *always* be the consumer's fault.

The sparkly chimera of robots replacing human drivers – freeing people to spend their drive time more enjoyably and productively – has captivated the public and media, driven by self-interested auto manufacturers and software developers. But there has been very little public discussion of whether self-driving vehicles will coexist or collide with long-standing principles of accountability, transparency, and consumer protection that collectively constitute the Personal Responsibility System.

The Personal Responsibility System is a set of state-based liability and insurance laws that dispenses justice: First, by regulating insurance companies to mandate fair auto insurance premiums and rate setting practices that emphasize a motorist's safety record rather than surrogates for wealth, race or creed. Second, by encouraging the safe manufacture, marketing and operation of cars and trucks. Third, by determining fault and compensation for, deaths, injuries and property damage caused by defective cars or the negligent operation of vehicles. Fourth, by making sure that auto insurance companies handle crash claims fairly by paying promptly and fully.

At the intersection of the Personal Responsibility System, insurance laws and robot cars, California is of particular interest. Sweeping reforms passed by the voters in November 1988, known as Proposition 103, have protected motorists (along with homeowners, renters, businesses and medical providers) against excessive rates, and discriminatory practices by insurance companies that have historically targeted individuals they deem "undesirable" based on their race, religion, or income. Thanks to Prop 103, California is the only state in the nation where the average auto insurance premium went down between 1989 and 2010, according to a report by the Consumer Federation of America, saving motorists

alone over $100 *billion* in premiums since 1989;[1] CFA's report concluded that "California stands out from all other states in having the best regulatory system for protecting consumers."

Dating back to the American Revolution and enshrined in the Bill of Rights, the Personal Responsibility System has made the American marketplace a paragon of safety, fairness and prosperity.

But insurance companies and automakers now say that it's outdated and incompatible with self-driving vehicles.

They argue that America can dispense with the civil justice system – open courts, impartial judges and citizen juries – because these core consumer protections will "chill this promising technology [autonomous vehicles] and the huge advances in overall public safety it promises," as the leading lobbying group for corporate defendants recently put it.[2] That the manufacturing and insurance industries are exploring ways in which they can limit or shift their responsibility is not particularly surprising, given that safety-related costs and claims are likely to increase as the result of the new, riskier and so-far unregulated technologies. However, these strategies – historically employed by industries seeking a government bailout of risks – undermine competition and distort incentives in the marketplace.

The insurance industry is also opportunistically targeting consumer protections against insurance company abuses like overcharging consumers and discrimination, claiming they will be unnecessary once self-driving vehicles arrive. In California, insurance companies are using robot cars as the excuse to challenge Proposition 103. As a recent report explained, "Over three decades, insurance companies have spent millions of dollars trying to chip away at Prop 103's regulations both through litigation and at the ballot box—with little success. Now, however, the industry has found a new source of optimism in a different phrase: driverless cars."[3]

And if history repeats itself, the insurance and auto lobbies may ask the Trump Administration to impose federal rules that would override the Personal Responsibility Laws of the fifty states.

Even a cursory analysis of the risks that robot cars and trucks will pose over the coming years shows that the industries' argument is wrong. Issues of corporate responsibility, liability and insurance will become far *more important* as self-driving vehicles are rolled out.

To understand the crucial role that the Personal Responsibility System will play in the coming decades, two points are critical.

<u>First, a fully autonomous transportation system is decades away at best</u>. No completely self-driving vehicle is offered for sale today, and notwithstanding a great deal of marketing hype, no manufacturer

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[1] "What Works? A Review of Auto Insurance Rate Regulation in America," Consumer Federation of America, November 12, 2013.

[2] U.S. Chamber of Commerce Institute for Legal Reform, "Torts of the Future: Addressing the Liability and Regulatory Implications of Emerging Technologies," March 2017, p.2

[3] C. Miller, "Driverless Cars Give Insurers New Vehicle to Criticize California's Rates Law," The Recorder, May 19, 2017 (http://www.therecorder.com/home/id=1202786779265/Driverless-Cars-Give-Insurers-New-Vehicle-to-Criticize-Californias-Rates-Law?mcode=1202617072607&curindex=0).

has set a firm date when it will market a passenger vehicle that is able to operate in all conditions without human intervention, or, importantly, what it will cost to buy.[4] Indeed, the system of vehicle-to-vehicle, vehicle -to-satellite, and vehicle-to-road sensor communications infrastructure that would enable *tens of millions of vehicles* to simultaneously, securely and autonomously operate in proximity to each other on streets and highways without human intervention is barely in the planning stages. Nor is there any consensus on how local, state and federal governments will pay for it. After all, most municipalities these days are struggling to fill potholes. And it is far from clear that every American consumer is going to be ready to abandon America's love affair with the open highway, or to surrender the steering wheel to a machine that is going to cost many thousands of dollars more than today's vehicles.

Even if we assume that someday fully autonomous vehicles will be safe enough to deploy, *and* that all Americans will be ready and able to surrender the steering wheel,[5] for the *foreseeable future* traditional vehicles driven by humans will share a "hybrid highway" filled with cars and trucks of widely varying degrees of automation and autonomy. Relatively few of them will be truly self-driving.

Second, the argument that robot cars and trucks will virtually eliminate crashes is based on a fallacy: that machines are infallible. It makes sense that carefully tested automation technologies will improve the safety of cars and trucks in the future. However, completely self-driving cars don't exist yet and we don't know how they will change transportation patterns once they arrive. So for the moment, the claim that robot vehicles will dramatically reduce vehicular deaths, injuries and property damage is simply speculation.

But we know this: machines make mistakes – sometimes catastrophic mistakes. Consider the automation-related mass disasters that have befallen the commercial airline industry in recent years, notwithstanding its self-avowed goal of zero tolerance for failure. Google/Waymo boasts that its computer-controlled test vehicles have logged the equivalent of over 300 years of human driving experience.[6] But the duration of testing that would be required in order to match the safety tolerance of commercial airplanes is 114,000 years.[7]

In any case, even if robot cars and trucks someday become 100% safe, we can say with certainty that in the short term, autonomous vehicles will pose new and unprecedented risks as they interact with traditional cars and trucks on the hybrid highway.

The #1 safety threat posed by self-driving vehicles is bugs or biases built into the robots' brains.

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[4] A number of automakers have proclaimed they will sell autonomous vehicles over the next few years, but are short on the specifics. Ford has announced it intends to have a "fully autonomous" vehicle for commercial ride-sharing or ride-hailing applications by 2021, but according to the fine print the vehicle will offer only "high," not "full," automation. (https://media.ford.com/content/fordmedia/fna/us/en/news/2016/08/16/ford-targets-fully-autonomous-vehicle-for-ride-sharing-in-2021.html.)

[5] It is more likely that self-driving vehicles, when they become available, will be initially adopted by commercial enterprises such as ride-sharing operations.

[6] See https://x.company/waymo/ (last visited June 12, 2017).

[7] See B.W. Smith, *Automated Driving & Product Liability*, 2017 Mich. St. L. Rev. 1, at 31 re "at least a billion hoyrs of testing," also citing Philip Koopman & Michael Wagner, *Challenges in Autonomous Vehicle Testing and Validation*, 4 SAE Int'l. J. Transp. Safety 15, 15-16 (2016).

A crucial and controversial component of the self-driving car or truck is the set of algorithms that will determine how the vehicle responds when confronted with an unexpected, life-threatening emergency such as children playing in the street, pedestrians, roadside construction, and weather conditions. Initially these rules will be programmed by corporate engineers; eventually the engineers will teach the cars how to think for themselves using artificial intelligence, so-called "machine learning."

These algorithms will be responsible for life and death decisions that will place their financial interests in conflict with their customers' lives. But Google and other software developers have refused to disclose to the public or regulators the robot values that they are programming into their computers to replace human values and judgment. When Google's self-driving vehicle sideswiped a bus in Mountain View, California, the company called it a "misunderstanding" between the bus driver and the robot.[8] A software "misunderstanding," even at 2 m.p.h., cannot be dismissed. Just as occurs every day on our roadways, the robot will confront situations in which the choice is not whether to smash into someone, but rather who to hit – an oncoming vehicle, a pedestrian in a crosswalk, a mom pushing her infant in a stroller on the sidewalk?

Other risks include failures in the extremely complex hardware (Google and other companies' robot test vehicles have been involved in multiple accidents and hundreds of near-misses[9]); privacy breaches (now endemic in the United States[10]); criminal hacking or even terrorist cyber attacks involving hundreds or thousands of vehicles, as the FBI has warned.[11]

When one or more of these serious risks inevitably results in a crash on the "hybrid highway," the inquiry into what caused the crash and who is responsible will include the manufacturers of the automated vehicle's hardware and software. There is no reason to believe that they or their vendors will respond any differently than they do today: deny their liability and attempt to shift the blame to the human driver. Indeed, in the limited experience so far, the companies that have deployed robot technologies have not readily accepted responsibility for their crashes and near-misses. This is particularly true of Tesla, which has denied responsibility for two fatalities involving its "Auto Pilot" software.[12] While some car companies have stated that they will assume liability for the failure of their robot technologies, nothing's in writing, and their pledge appears to be conditioned on a determination that their technology was *at fault.*[13]

Crashes aside, consumers who own or lease self-driving vehicles will face far greater responsibility for vehicle maintenance than they bear today. Self-driving vehicles will be extraordinarily reliant on external sensors – the eyes and ears of the robot car's brain. An accidental driveway ding in a sensor could have deadly consequences when the vehicle is on the road. What happens if the consumer fails to

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[8] M. McFarland, "For The First Time, Google's Self-Driving Car Takes Some Blame For A Crash," Washington Post, February 29, 2016 (https://www.washingtonpost.com/news/innovations/wp/2016/02/29/for-the-first-time-googles-self-driving-car-takes-some-blame-for-a-crash/?utm_term=.f19f6bdc6f4d).

[9] See Section 2.4.

[10] See Section 2.2.

[11] See Section 2.2.

[12] See Section 2.4.

[13] See Section 3.1.4.

download a software update? No one has suggested that manufacturers will be prepared to assume liability for a crash caused by the consumer's failure to maintain the vehicle's operational status.

That leads us right back to the Personal Responsibility System of insurance and liability laws.

With the heightened risks that the new automated technologies will pose over the coming years, the legal requirement that manufacturers be held strictly liable for defective products, a mainstay of America's consumer protection regime, will remain essential. Disputes over fault will require the full power of the civil justice system, with its procedural safeguards of an impartial judge, full public transparency, and trial by citizen juries, to investigate and publicly expose the cause of crashes, compensate the victims for deaths, injuries and property damage, punish the wrongdoer, and force manufacturers to make changes in their products to prevent future harm.

For the same reasons, protections against abusive practices by insurance companies will be critical. So long as motorists face legal responsibility for the proper maintenance and safe operation of vehicles they own, lease, rent or control, they will require the same liability insurance coverage that they purchase today. Pointing to the new risks of the Hybrid Highway, and the greater costs of repairing the automation technology, insurance companies will no doubt ask their customers to pay more for it. Preventing insurance companies from overcharging motorists, and from high-tech forms of redlining that rely on manipulation of data about each customer, will necessitate forceful consumer protections such as those contained in Proposition 103.

The proponents of autonomous vehicles like to describe themselves as "disruptors," and take pride in refusing to accept the norms of what they deride as the decrepit status quo. But behind the scenes, industry players are employing decidedly Old World lobbying and political strategies to avoid public and regulatory scrutiny and oversight, while at the same time urging lawmakers to pass legislation that would limit or even eliminate their legal accountability to injured consumers.

Consumer Watchdog, a non-profit founded in 1985, has deep roots working for the public interest on the issues that will be of tremendous concern to consumers as automated vehicles evolve: civil justice and corporate accountability; public safety; the premiums and underwriting practices of the insurance industry; the diminishing privacy of consumers in the digital age; and the importance of government oversight, public scrutiny and participation in decision-making.

This report will discuss the safety, security and other risks posed by robot cars; why the consumer protections of the Personal Responsibility System will be critical in the coming decades as self-driving vehicles come "on line"; and the campaign by insurance companies, automakers and possibly even the federal government, already underway, to undermine those essential consumer protections.

2.0 Robot Cars Will Pose Unprecedented Safety, Security, and Privacy Risks.

The safety of driverless vehicles should be the paramount concern of the auto and insurance industries, if for no other reason than flaws and failures in automated vehicle systems will impose potentially enormous, even catastrophic liability upon hardware and software manufacturers in the event their products cause harm, and lead to more, and more costly, insurance claims.

In this context, it's worthwhile to consider the current state of American vehicle safety. Car crashes in the United States killed 35,092 and injured over 2.44 million people in 2015;[14] including property damage, the total estimated economic cost of car crashes was estimated at $242 billion in 2010.[15] There were a record 801 separate recalls involving 63.7 million vehicles in 2014, and 613 recalls of 40 million vehicles as of mid-2015.[16] Three of the largest recalls in recent years concern vehicle safety failures – defective GM ignition switches,[17] exploding Takata airbags,[18] and unintended acceleration in Toyota vehicles[19] – that have taken hundreds of American lives.

The unprecedented number of recalls in recent years suggests a dangerously cavalier attitude toward public safety on the part of vehicle manufacturers. It raises serious concerns as to whether manufacturers are presently, or will be, capable of building safe robot cars and trucks, which will far exceed the complexity and sophistication of today's vehicles.

When assessing whether autonomous vehicles will ever be 100% safe, consider the transportation sector in which automation is by far the most advanced and the concern for safety is arguably greater than in any other: commercial air travel. Recent airline disasters cast doubt on whether one hundred percent reliance on "fly-by-wire" technology will ever be safe.[20]

To our knowledge, no one has suggested that the manufacturers of robot cars can or will aim for that level of safety; the former head of NHTSA suggested in 2016 that autonomous vehicles will merely be twice as safe as human-driven cars.[21] By definition, that leaves a lot of carnage on America's streets.

No one disputes that the evolution of motor vehicle technology has the potential to prevent deaths, injuries and property damage. New technologies such as automatic emergency braking, lane keeping,

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[14] NHTSA, 2015 Motor Vehicle Crashes: Overview (August 2016).

[15] NHTSA, The Economic and Societal Impact Of Motor Vehicle Crashes, 2010 (Revised May 2015).

[16] NHTSA, 2014 Vehicle Recalls by Manufacturer (available at http://www.safercar.gov/Vehicle+Owners/vehicle-recalls-historic-recap); 2015 data: Statement Of Joan Claybrook Consumer Co-Chair Advocates For Highway And Auto Safety, on "Examining Ways To Improve Vehicle And Roadway Safety" before the
Committee On Energy And Commerce Subcommittee On Commerce, Manufacturing And Trade, October 15, 2015, p. 2.

[17] "NHTSA Admits Faults In GM Investigation," Detroit News, June 5, 2015 (http://www.detroitnews.com/story/business/autos/general-motors/2015/06/05/gm-nhtsa-report/28540239/); "Why General Motors' $900 Million Fine For A Deadly Defect Is Just A Slap On The Wrist," Washington Post, September 17, 2015 (https://www.washingtonpost.com/news/business/wp/2015/09/17/why-general-motors-900-million-fine-for-a-deadly-defect-is-just-a-slap-on-the-wrist/).

[18] "Everything You Need to Know about the Takata Airbag Recall," Consumer Reports, December 23, 2015 (http://www.consumerreports.org/cro/news/2014/10/everything-you-need-to-know-about-the-takata-air-bag-recall/index.htm?loginMethod=auto).

[19] "Toyota Says It's Settled 338 Cases So Far In Acceleration MDL," Law360, July 22, 2015 (http://www.law360.com/articles/681915/toyota-says-it-s-settled-338-cases-so-far-in-acceleration-mdl).

[20] The crash of Asiana Flight 214 at San Francisco airport in 2013 killed two passengers and injured 181 others; investigators have determined that the pilots did not understand the highly automated flight systems and were unable to recover control of the plane when a crash was imminent. (M. Wald, "Pilots in Crash Were Confused About Control Systems, Experts Say," New York Times, December 11, 2013.) An Air France jetliner disappeared into the Atlantic off the coast of South America in 2009, killing 216 passengers and a crew of twelve, including three pilots; again, the black box revealed that the pilots did not understand the plane's automated functions, some of which had failed. (See W. Langewiesche, "The Human Factor," Vanity Fair (October, 2014) (http://www.vanityfair.com/business/2014/10/air-france-flight-447-crash)).

[21] K. Naughton, "Regulator Says Self-Driving Cars Must Be Twice as Safe," Reuters, June 8, 2016 (https://www.bloomberg.com/news/articles/2016-06-08/u-s-auto-regulator-says-self-driving-cars-must-be-twice-as-safe.)

collision warning, and assisted parking are already doing so, and indeed should be made standard equipment in all vehicles. The point is that the gradual automation of driving will introduce a new set of risks. These risks will necessarily be far broader than those posed by vehicles today – suggesting that the ramifications for liability and insurance will be significant. A fully autonomous robot-based transportation system will likely reduce the number of crashes caused by human error, but that does not tell us anything about the overall impact of a fully autonomous system.[22]

2.1 Risk: Defective Hardware and Buggy or Biased Software.

The core hardware components of an autonomous vehicle are the computer and sensors. An array of electronic devices – presently, radar, lidar, and video – will be responsible for detecting the external conditions that the vehicle must navigate: road signs, and in their absence street markings; other vehicles (including bicycles, motorcycles, trucks); pedestrians (including seniors, and children); pets; traffic lights; street and highway signs; road construction; law enforcement activities; weather (fog, snow or heavy rainfall) and other natural phenomena (such as trees). The on-board computer system will collect the data from these inputs as well as external communications sources such as other vehicles, intelligent highways (more on that below) or satellite based traffic control systems, process the information and make decisions in a few milliseconds (a millisecond is 1/1000 of a second) that are presently executed by humans. Scientists have estimated that the human brain is thirty times faster than the fastest super computer;[23] it takes a neuron 0.5 milliseconds to transmit a signal [24] and 13 milliseconds for the brain to process an image.[25] A truly driverless vehicle must be capable of fully replicating and processing the immense data stream currently processed by the human brain, such as hand gestures, the facial expressions of other motorists and pedestrians, and a virtually infinite number of other variables in the interior and external driving environment.

Software will analyze the sensor and communications data flow and instruct the vehicle how to navigate. A particularly critical function of the software will be to replace the *judgment* of human motorists not just to avoid collisions but also to comply with traffic laws and rules. It will therefore be necessary for the software in driverless vehicles to make the split-second life and death decisions that human drivers make today when a collision is unavoidable. Confronted with the prospect of imminent harm to passengers in other vehicles, pedestrians, or the occupants of the AV itself, how will the self-driving software decide which course to take? On what basis will the software make such decisions? Who will it kill?

These life and death deciding programs will be coded by human engineers working for private corporations, at least initially.

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[22] See B. W. Smith, *Automated Driving & Product Liability* 2017 Michigan State Law Review 1 for a careful but admittedly provisional analysis suggesting simplistic assumptions about costs and savings may be incorrect.

[23] H. Hsu, "Estimate: Human Brain 30 Times Faster than Best Supercomputers," IEEE Spectrum, August 26, 2015 (http://spectrum.ieee.org/tech-talk/computing/networks/estimate-human-brain-30-times-faster-than-best-supercomputers.)

[24] http://news.mit.edu/2014/in-the-blink-of-an-eye-0116

[25] http://www.makeuseof.com/tag/geeks-weigh-in-does-a-human-think-faster-than-a-computer/

Will engineers program their computers with human ethics as well as a database of traffic laws? When Mercedes announced that its software would protect the occupants of Mercedes vehicles at the expense of everyone else, it provoked a public firestorm that led Mercedes to amend its statement.[26]

Will companies like Google, that have developed real-time facial recognition software, write algorithms to avoid harm to high net worth individuals, thus limiting their own liability? We simply do not know, because there are no rules that specify the answers to these questions, and software companies like Google consider their algorithms highly proprietary and steadfastly refuse to disclose the decision-making principles, values or formulae that determine the vehicle's actions.

Eventually, the engineers will teach the robot cars and trucks how to learn for themselves, a form of Artificial Intelligence called "machine learning." Once robots are taught how to learn for themselves, their decision-making process will be further removed from human oversight.

What we can say, with certainty, is that bugs in commercial software are frustratingly rampant, and take notoriously long for their manufacturers to eradicate. Consumers are unlikely to tolerate becoming "beta testers" for driverless vehicles, serving as human guinea pigs when the consequences are not a lost page of text but a loss of life.

2.2 Risk: Privacy and Security.

Modern cars have become computers on wheels, collecting significant amounts of data about the vehicle and the habits of the motorist that drives them; some insurance companies have installed "black boxes" in the vehicles they insure to track vehicle location, speed and other metrics.[27] By definition, evolving automation technologies will collect, process and communicate vast amounts of information. The recipients of the data stream will include, eventually, other vehicles and likely the government agencies that operate the intelligent transportation grid.

The data is extremely valuable to hardware/software manufacturers and insurance companies, but could prove costly for consumers.

• Auto makers and software designers will want the data for performance monitoring and safety improvement purposes, but also to dispute their liability for crashes.

• Google and other data collection companies will also want to enhance the vast digital dossiers they already compile on each American by including where motorists are going and what they're doing, so advertisers can target their products, and perhaps even subject motorists to continuous locality-based advertising as their vehicle chauffeurs them through the streets.

• Insurance companies will seek data from cars to determine who was at fault in an accident. But, increasingly utilizing "big data," insurance companies will also seek to use the data they collect to make

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[26] "Self-Driving Mercedes-Benzes Will Prioritize Occupant Safety over Pedestrians," Car and Driver Blog (http://blog.caranddriver.com/self-driving-mercedes-will-prioritize-occupant-safety-over-pedestrians/).

[27] Markey, Sen. Edward J., "Tracking and Hacking: Security and Privacy Gaps Put American Drivers at Risk;" https://www.markey.senate.gov/imo/media/doc/2015-02-06_MarkeyReport-Tracking_Hacking_CarSecurity%202.pdf, last accessed Nov. 28, 2015. Consumer Watchdog has warned that "black box" data recorders in vehicles could be misused in ways that threaten motorists' privacy. See http://www.consumerwatchdog.org/feature/pay-you-drive-workshop-comments-california-department-insurance.

underwriting decisions, enabling them to avoid certain customers they deem too risky – a form of the notorious historical practice of redlining– and to set premiums so as to maximize profits rather than price risks, a highly controversial practice known as "price optimization."[28]

As data becomes increasingly valuable, it increasingly becomes a target. Data breaches involving the accounts of *billions* of users reflect the hacking epidemic in recent years.[29] These incidents demonstrate that only to the extent the legal system imposes significant financial liability for such breaches will data collectors be motivated to undertake the expensive hardening of their systems to prevent third-party data incursions.

It's not just the data that is vulnerable in increasingly automated vehicles. The interconnected vehicles of the future will themselves be subject to criminal and even terrorist hijacking. In 2015, two security researchers managed to remotely hack into a 2014 Jeep Cherokee from a laptop ten miles away and disable critical functions such as the accelerator, paralyzing the car.[30] Fiat Chrysler had to recall 1.4 million vehicles to fix the Jeeps' vulnerabilities.[31] Another research firm reported its was able to remotely take control of a Tesla Model S and unlock the door of the car, take over control of the dashboard computer screen, move the seats, activate the windscreen wipers, fold in the wing mirrors and apply the brakes while the vehicle was in motion – from ten miles away. Tesla uploaded an over-air "software update" to fix the vulnerability – ten days later. [32]

In March 2016, the F.B.I. issued a warning to vehicle manufacturers stating: "it is important that consumers and manufacturers are aware of the possible threats and how an attacker may seek to remotely exploit vulnerabilities in the future."[33] The F.B.I. pointed out that hackers could gain access through a vehicle's cellular, USB, Bluetooth, or Wi-Fi internet connections: "An attacker making a cellular connection to the vehicle's cellular carrier – from anywhere on the carrier's nationwide network – could communicate with and perform exploits on the vehicle via an Internet Protocol (IP) address."[34]

A wide variety of criminal misconduct could be facilitated via hacking of automated and fully autonomous vehicles, ranging from smuggling, to kidnapping, to homicide. A systemic attack on the intelligent highway system could result in catastrophic loss of life and by orchestrating traffic jams, grind commerce literally to a halt, with serious financial repercussions.

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[28] Letter from Robert Hunter, Consumer Federation of America, to state insurance regulators, December 9, 2016 (http://consumerfed.org/testimonial/cfa-calls-insurance-commissioners-attention-unfair-price-optimization-practices/); "CFA's Hunter Reacts in Actuarial Battle: Allstate's Plan Is Price Optimization," Carrier Management, November 29, 2016 (http://www.carriermanagement.com/features/2016/11/29/161466.htm).

[29] K. Sheridan, "Data Breaches Exposed 4.2 Billion Records In 2016," Information Week, January 25, 2017.

[30] U.S. Says Only Jeeps Had Hacker Vulnerability Via Radios, Associated Press, Jan. 9, 2016 (http://www.wsj.com/articles/u-s-says-only-jeeps-had-hacker-vulnerability-via-radios-1452372453).

[31] "Autonomous cars to have 'thousands of security risks,'" Autocar, 12 September 2016 (http://www.autocar.co.uk/car-news/industry/autonomous-cars-have-'thousands-security-risks').

[32] S. Khandelwai, "Hackers take Remote Control of Tesla's Brakes and Door Locks from 12 Miles Away," Hacker News, September 20, 2016 (http://thehackernews.com/2016/09/hack-tesla-autopilot.html?utm_so...e+Hackers+News+-+Security+Blog%29&_m=3n.009a.1326.en0ao0609g.rxj.)

[33] "Motor Vehicles Increasingly Vulnerable To Remote Exploits," Federal Bureau of Investigation, March 17, 2016 (http://www.ic3.gov/media/2016/160317.aspx#fn1).

[34] *Id*.

2.3 Risk: Regulatory Failure.

Failure to properly regulate the safety of self-driving vehicles is rapidly becoming another serious safety risk. Congress enacted the National Traffic and Motor Vehicle Safety Act of 1966 (NTMVSA) fifty years ago "to reduce traffic accidents and deaths and injuries resulting from traffic accidents." The analysis of the proposed legislation by the U.S. Senate concluded that:

> The promotion of motor vehicle safety through voluntary standards has largely failed. The unconditional imposition of mandatory standards at the earliest practicable date is the only course commensurate with the highway death and injury toll.[35]

The central safety focus of the NTMVSA, and NHTSA's activities since its creation, has been the promulgation, after careful study and a public hearing process, of Federal Motor Vehicle Safety Standards. However, in an unprecedented departure from its statutory mission, NHTSA entered into an unprecedented "voluntary agreement" with twenty auto manufacturers in March 2016 to allow the industry to self-regulate the sale of three safety technologies, known as Automatic Emergency Braking (AEB), that assist cars in braking to avoid or limit the damage from collisions.[36] NHTSA rejected a petition by Consumer Watchdog and other consumer advocates to require manufacturers to install even established safety technologies, such as Automatic Emergency Braking, as standard equipment in light vehicles – which NHTSA itself has acknowledged would prevent tens of thousands of deaths and serious injuries annually.[37]

The decision marked a radical departure from the agency's traditional mission. NHTSA Administrator Mark Rosekind argued that, "the agency cannot make vehicles safe simply by imposing new regulations and handing down fines.…We're going to have to find new tools – that means new collaborations, new partnerships."[38] Referencing the voluntary agreement for the deployment of AEB technology, NHTSA claimed that "bypassing the regulatory process would save three years in making automatic braking systems standard equipment."[39] "The unprecedented commitment means that this important safety technology will be available to more consumers more quickly than would be possible through the regulatory process."[40]

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[35] Committee Report on S. 3005, The Traffic Safety Act of 1966, June 23, 1966, at 274.

[36] "U.S. DOT And IIHS Announce Historic Commitment Of 20 Automakers To Make Automatic Emergency Braking Standard On New Vehicles," NHTSA (Press Release) March 17, 2017(https://www.nhtsa.gov/press-releases/us-dot-and-iihs-announce-historic-commitment-20-automakers-make-automatic-emergency). See Consumer Watchdog's letter to NHTSA criticizing this action: http://www.consumerwatchdog.org/newsrelease/consumer-advocates-demand-federal-agency-act-auto-safety-petition).

[37] NHTSA, Request for Comments, New Car Assessment Program, Docket No. NHTSA-2015-0119, p. 110-118. In 2016, Consumer Watchdog and other advocates formally petitioned NHTSA to promulgate a safety regulation making AEB standard equipment. Ultimately NHTSA denied the petition. For more information: http://www.consumerwatchdog.org/search/apachesolr_search/NHTSA%20AEB?filters=type%3Anewsrelease).

[38] Exclusive: U.S., Major Automakers to Announce Safety Accord Friday, David Shepardson, Detroit News, January 11, 2016).

[39] J. Peltz, "Automakers agree to make automatic braking a standard feature by 2022," Los Angeles Times March 17, 2016 (http://www.latimes.com/business/autos/la-fi-hy-auto-safety-20160317-story.html).

[40] *Id*.

As recently as 2013, NHTSA had adopted a go-slow approach to self-driving vehicles, concluding, "At this point, it is too soon to reach conclusions about the feasibility of producing a vehicle that can safely operate in a fully automated (or 'driverless') mode in all driving environments and traffic scenarios."[41]

But in early 2016, the Secretary of the Department of Transportation told reporters that he "wants to ease some of the regulatory restraints to make it easier for the technology to develop."[42]

In September 2016, NHTSA issued a 116 page "Federal Automated Vehicle Policy," which called upon manufacturers of automated and self-driving vehicles to "self-certify" that they have considered a fifteen point "checklist" of issues related to driverless vehicles.[43] NHTSA's Guidance leaves the evolution and deployment of automated vehicles to hardware and software manufacturers, where it will remain shrouded in secrecy and outside the purview of the public generally, and motorists in particular.

If NHTSA's abdication of its safety responsibilities continues, the introduction and deployment of autonomous technologies will proceed on a manufacturer-by-manufacturer basis, without any enforceable, industry-wide standards. Without industry-wide standards, the cost of safety features will be prohibitive for all but the wealthiest consumers. The deregulated deployment of automated vehicles will exacerbate safety, liability and insurance issues.

2.4 Current Status of Robot Cars.

No fully autonomous passenger vehicle is presently approved for sale, much less being marketed. While proponents insist robot cars are right around the corner, more objective observers expect a step-by-step progression toward greater automation of vehicle functions – but with the driver required ultimately to assume control.

Google, whose robot car unit is now known as Waymo, began testing self-driving cars in 2009. California enacted AB 1298 in 2012 requiring the Department of Motor Vehicles to enact self-driving vehicle regulations. Rules covering testing robot cars took effect in 2014 requiring a test driver behind a steering wheel. The regulations required companies to get a permit, report any crashes within 10 days and file annual disengagement reports explaining when the self-driving technology being tested failed. Most of what we know about testing activities in California comes from the reports which the DMV, after pressure from Consumer Watchdog and others, posts on its website. Currently 21 companies have permits to test robot cars in California. The firms have refused requests to disclose other important information, including on board video and telemetry, from their testing.

The disengagement reports demonstrate that the self-driving vehicles are *not ready* to be deployed, at least without human drivers behind a steering wheel who can seize control when the self-driving technology fails. The latest report shows that Google/Waymo's test vehicles logged 635,868 miles and the human test driver had to intercede 124 times.[44] In the past, the company has said that its robot cars

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[41] NHTSA, Preliminary Statement of Policy Concerning Automated Vehicles, May 15, 2013, p. 3.

[42] POLITICO, Pro Transportation Report, Friday January 15, 2016.

[43] NHTSA, Federal Automated Vehicles Policy, September 2016, p. 15-16.

[44] "California Robot Car Disengagement Reports Show Technology Not Ready for Safe Deployment Without Human Driver Behind Steering Wheel to Take Control, Consumer Watchdog Says," February 1, 2017 (http://www.consumerwatchdog.org/newsrelease/california-robot-car-disengagement-reports-show-technology-not-ready-safe-deployment-wit).

had difficulty correctly perceiving commonplace "threats" such as potholes, rain, wind and overhanging tree branches.[45] There were also software glitches and instances when the human test driver took over because the robot car made an unwanted maneuver.[46] In the February 2016 sideswipe of a city bus by a Google robot test car in northern California, requiring the bus to stop and its passengers to disembark, Google claimed that the accident was a "misunderstanding" and a "learning experience."[47] Delphi's 2016 report stated that its two test robot cars drove 3,125 miles in self-driving mode and had experienced 178 "disengagements." Reasons given for disengaging included: construction zones; problems changing lanes in heavy traffic; poor lane markings; the presence of emergency vehicles, pedestrians, cyclists; failure to detect a traffic light and unexpected behavior from another driver.[48] Mercedes, which has asserted it will deploy an autonomous vehicle by 2020, reported 336 disengagements in 673 miles.[49]

Tesla reported two fatal crashes in 2016 (one in Florida, one in China), both of which occurred while Tesla's "Auto Pilot" feature, which the company famously introduced in 2014, was engaged.[50] Tesla continues to deceptively refer to its automated system "Auto Pilot," though after the fatalities, it reprogrammed its Auto Pilot software to, among other changes, disengage unless the driver touches the steering wheel at regular intervals, indicating they are monitoring the vehicle.[51] Surprisingly, NHTSA later cleared Tesla of responsibility for the Florida fatality, but an agency spokesperson incongruously noted that humans must still manually pilot a Tesla equipped with Auto Pilot: "Autopilot requires full driver engagement at all times."[52]

In the rush to market of so-far unregulated robot technologies, the adequacy of the current testing paradigm is questionable. Google/Waymo claims that its computer-controlled vehicles have logged 300 years of human driving experience. But the testing that would be required in order to match the safety tolerance of commercial airplanes is estimated at over one hundred millennia.[53] A lower level of safety – "a level of 80 percent confidence that the robotic vehicle is 90 percent safer than human drivers on the

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[45] "Consumer Watchdog Cites Shortcomings In Driverless Car Technology; Says DMV Rules For Robot Cars Must Require Steering Wheel So Human Drivers Can Take Over," March 19, 2015 (http://www.consumerwatchdog.org/newsrelease/consumer-watchdog-cites-shortcomings-driverless-car-technology-says-dmv-rules-robot-cars).

[46] See footnote 44.

[47] M. McFarland, "For The First Time, Google's Self-Driving Car Takes Some Blame For A Crash," Washington Post, February 29, 2016 (https://www.washingtonpost.com/news/innovations/wp/2016/02/29/for-the-first-time-googles-self-driving-car-takes-some-blame-for-a-crash/?utm_term=.f19f6bdc6f4d).

[48] See footnote 44.

[49] *Id*.

[50] N. Boudette, "Self-Driving Tesla Was Involved in Fatal Crash, U.S. Says," New York Times, June 30, 2016 (https://www.nytimes.com/2016/07/01/business/self-driving-tesla-fatal-crash-investigation.html); N. Boudette, "Autopilot Cited in Death of Chinese Tesla Driver," New York Times, September 14, 2016 (https://www.nytimes.com/2016/09/15/business/fatal-tesla-crash-in-china-involved-autopilot-government-tv-says.html?_r=0)

[51] F. Lambert, "Tesla Autopilot 'Nags' And Restrictions Under V8.0 Software Update – Breakdown," Electrek, September 22, 2016 (https://electrek.co/2016/09/22/tesla-autopilot-nags-and-restrictions-under-v8-0-software-update-breakdown/).

[52] N. Boudette, "Tesla's Self-Driving System Cleared in Deadly Crash," New York Times, January 19, 2017 (https://www.nytimes.com/2017/01/19/business/tesla-model-s-autopilot-fatal-crash.html). See Consumer Watchdog's criticism of this decision: http://www.consumerwatchdog.org/newsrelease/"midnight-action"-nhtsa-ends-probe-fatal-tesla-florida-crash-accepting-company's-propaga.

[53] See Smith, *Automated Driving & Product Liability*, footnote 22, p. 31.

road," would still require 11 billion miles of testing (or about 5,000 years), according to researchers at the University of Michigan, which is why they are looking to shortcut the testing process, at least partly through computer simulations.[54]

2.5 Current Status of Intelligent Transportation Infrastructure.

The system of vehicle-to-vehicle, vehicle -to-satellite, vehicle-to-road sensor communications – collectively referred to as vehicle-to-everything, or "v2e" – infrastructure that would permit *tens of millions of vehicles* to simultaneously and securely operate without human intervention is not even in the planning stage.

Studies of the technology are underway, but NHTSA only just proposed uniform standards needed to ensure that all vehicles can connect with each other regardless of manufacturer in December 2016, and the proposal faces opposition from telecommunications companies that want to use wireless channels for other purposes.[55] How to include pedestrians in such a system has not been resolved. Nor is there any consensus on how to construct such a system – much less how local, state and the federal government will cover the cost of upgrading the 4.12 million miles of roadway in the United States.

2.6 The "Driverless Divide."

The affordability of automated vehicles (and the cost of insuring them) is an important safety issue in its own right, with profound consequences when it comes to assessing the impact of autonomous vehicles on liability and insurance.

Because no autonomous passenger vehicles are presently for sale, any discussion of pricing is speculative. However, the price of robot cars will directly affect the rate of deployment of the vehicles; the higher the price, the fewer the number of people who will be able to afford them. Those who cannot afford them will continue to operate traditional cars that lack at least some safety features, placing them at some correspondingly greater risk in the event of a crash.

Deployment will be further reduced because of NHTSA's abdication of its regulatory responsibilities, discussed above. This is because the nation's auto safety regulator indicated through its 2016 "Federal Automated Vehicle Policy" that it intended to rely on industry self-regulation for self-driving vehicles, rather than promulgate formal Federal Motor Vehicle Safety Standards (FMVSS) that would require all new vehicles be equipped with the fully autonomous capability as standard equipment.[56]

Mandatory federal safety standards create manufacturing economies of scale from mass production that dramatically reduce the price of the technology. Automakers resist industry-wide safety standards because they can then treat expensive safety innovations as options to be introduced in their most expensive vehicles, for which such options are priced at a premium. It is not until the features become mandated through the FMVSS process that they are rolled out in all vehicles fleet-wide, and

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[54] S. Collie, "Focusing On Tricky Situations Could Accelerate Testing Of Self-Driving Cars," New Atlas, May 29, 2017 (http://newatlas.com/university-michigan-self-driving-testing-acceleration/49768/).

[55] R. Beene, "Federal V2V Mandate Meets Growing Resistance," April 17, 2017 (http://www.autonews.com/article/20170417/OEM06/170419865/federal-v2v-mandate-meets-growing-resistance).

[56] NHTSA, Federal Automated Vehicles Policy, September 2016.

manufacturers drop the price. Thus the cost of cars equipped with higher levels of automation will likely put them out of reach of all but the wealthiest motorists.

Other price factors that will affect broad deployment will be car repair and insurance premiums. Present day automotive electronics, though increasingly complex, are relatively simple compared to the technologies that will be needed to even partly automate passenger vehicles. However, they have significantly raised the cost of repairs (and insurance) for cars of more recent vintage. [57]

In other words, at least for the foreseeable future, there will be the equivalent of what, in the early era of personal computing, was described as a "digital divide": a significant disparity among Americans between those who can afford vehicles with substantial automation capabilities and those who cannot.

2.7 The "Hybrid Highway."

There are diverging estimates of the date when a fully autonomous vehicle – one that requires no human intervention – will be marketed to the American public. However, any objective analysis demonstrates that America is *decades away* from a transportation system that is *completely* automated: one in which *all* vehicles on the road operate *autonomously,* and there are no human drivers, no steering wheels, no brakes, nor other human-based control devices; in which cars are in constant electronic communication with each other, with "intelligent" road systems built and maintained by municipal, state and federal governments, and with pedestrians equipped with their own electronic devices.

The average age of vehicles on the road today is estimated at 11.5 years.[58] Thus, even if a vehicle capable of operating under all conditions without any human involvement (and absent the assistance of intelligent highway infrastructure) were to come to market far sooner, such vehicles will constitute a very modest percentage of the total number of vehicles on the road.

Thus, it is clear that there will be a lengthy period in which motorists and robots will share the roads in a *hybrid* system of human-driven and highly automated, if not autonomous, vehicles.[59]

This "hybrid highway" period will feature complex, potentially dangerous interactions between people (motorists and pedestrians), computer-driven cars, trucks and buses, remote-controlled drone vehicles, and eventually the so-called "intelligent" public streets and freeways that are supposed to help them all navigate safely.

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[57] See, e.g., N. Brown, "Conventional Car Repair Costs Increased, While Hybrids Saw a Decrease," CleanTechnica.com, April 13, 2013 (http://cleantechnica.com/2013/04/15/conventional-car-repair-costs-increased-while-hybrids-saw-a-decrease/); S. Finlay, "More Technology in Cars Increases Repair Costs," WardsAuto.com, September 17, 2013 (http://wardsauto.com/dealerships/more-technology-cars-increases-repair-costs); J. Selingo, "Repair Shops See Roadblocks Set by Dealers," New York Times, October 25, 2006 (http://www.nytimes.com/2006/10/25/automobiles/autospecial/25repair.html).

[58] Hirsch, Jerry, "Better Quality Raises Average Age Of Cars On U.S. Roads To 11.5 Years," *Los Angeles Times*, http://www.latimes.com/business/autos/la-fi-hy-ihs-average-car-age-20150729-story.html last accessed Nov. 4, 2015

[59] The Insurance Institute for Highway Safety and the Highway Loss Data Institute concurs: "Vehicles with humans at the wheel still will dominate the fleet for many years. 'Even if the U.S. government were to require all new vehicles sold to be autonomous tomorrow, it would take at least 25 years until nearly 95 percent of the vehicles on the road would have the capability.'" "Robot cars won't retire crash-test dummies anytime soon," *Status Report*, Vol. 51, No. 8 , November 10, 2016 (http://www.iihs.org/iihs/news/desktopnews/driver-seat-robot-cars-wont-retire-crash-test-dummies-anytime-soon).

3.0 The Personal Responsibility System and Self-Driving Vehicles.

3.1 Tort liability.

The judicial branch is responsible for interpreting and applying laws. However, state courts[60] also play a unique legislative role: they are the source of what is known as "common law." Originating from ancient English law, and often dating back to the formation of the United States, common law is a body of case decisions issued by state courts that defines rights and remedies *in the absence of any underlying statutory authority*. State legislatures have the authority to amend or even repeal the state's "common law," and they frequently do so.

A tort is a wrongful act that causes bodily injury or property damage. The common law of torts is a collection of legal rights, responsibilities and remedies developed and applied by civil courts when a wrongful act has caused harm. The purpose of tort law is to expose wrongdoing, compensate victims of the wrongdoing, punish the wrongdoers and deter future wrongdoing.

3.1.1 Negligence.

Generally, tort liability is predicated upon the following judicial determinations: (1) the defendant owed to the plaintiff a duty of reasonable care; (2) the defendant breached that duty (3) the breach caused damage to the plaintiff. Under the Personal Responsibility System established by tort law, a person or company who committed a tort is liable for the injuries, property damage, lost wages, physical pain, emotional damage any and other kind losses that arise as a result. Intentional wrongdoing that is considered particularly egregious or oppressive may be punished by punitive damages: the wrongdoer is penalized for such misconduct.

Disputes over torts are typically adjudicated through the civil court system, which is the practical embodiment of the common law right to a trial by jury, one of America's most hallowed traditions. However, as discussed below, auto insurance has evolved as a mechanism for ensuring compensation without necessity of bringing legal action in modest disputes.

3.1.2 Product liability.

A separate set of consumer friendly rules has evolved for relatively more rare torts involving products that are considered "inherently" dangerous, such as cars. In California, for example, a defendant is held *strictly liable* for injuries caused by such products, when a product was used in intended or reasonably foreseeable manner (includes reasonably foreseeable misuse, abuse, changes, alterations, etc.); was in defective condition when it left defendant's possession; and the defective product was the legal cause of the plaintiff's injuries or damages.

Unlike regular negligence cases, in product liability disputes the injured consumer is not required to prove that the defendant was negligent, i.e. that the defendant failed to exercise reasonable care, or intended to cause harm. The public policy behind this variation in tort law is that it would be prohibitively difficult and expensive for a consumer to prove that the manufacturer of a product was careless in making the product, nor would a consumer have the ability to determine whether the product

[60] The sole exception is Louisiana, which is known as a "civil law" state. In Louisiana, courts lack any authority to adjudicate a matter absent a statute.

was defective prior to purchase. The protections of strict liability rules have been extended to include entities that re-sell or distribute the products. However, defects in road design, construction and maintenance are sometimes governed by more restrictive state statutes.

It is widely assumed that as vehicle automation progresses, and motorists cede driving functions to the vehicle's computer systems, responsibility will shift from motorists to manufacturers of the hardware and software, and claims will be adjudicated under product liability law.

3.1.3 Common Carrier Liability.

Another long established common law principle is common carrier liability. Common carriers are companies that transport people (or goods) pursuant to a license provided by a government agency. Common Carriers include taxis, buses and ferries. Common Carriers are held to a very high legal standard. Under California law, for example, "A carrier of persons for reward must use the utmost care and diligence for their safe carriage, must provide everything necessary for that purpose, and must exercise to that end a reasonable degree of skill." "Common carriers are responsible for any, even slightest, negligence to passengers and are required to do all that human care, vigilance, and foresight reasonably can do under all the circumstances."

3.1.4 Liability Scenarios.

As noted above, human-operated vehicles will remain the predominant form of personal transportation for the foreseeable future. Vehicles with wide disparities in the level of onboard technology will share the roads with newer vehicles containing an equally wide variety of the more sophisticated automation technologies. The intelligent infrastructure of vehicle, satellite and road communications that many view as integral to the safety of an autonomous transportation system has yet to be planned, much less constructed, and will not play any significant role for the foreseeable future.

This Hybrid Highway will be the product of a hugely complex system of hardware and software built, marketed, maintained and operated by corporations manufacturing hardware and software, engineers, software programmers, public agencies as well as motorists.

Compounding the threat matrix are vehicle security failures, ranging in consequence from privacy breaches to criminal or terrorist hacking; the absence of federal safety rules to standardize technologies; wealth based disparities in the affordability of autonomous technology. Flaws and failures in any single aspect of this complex environment could lead to death, injury and property damage.

Even in a distant theoretical future in which *all* vehicles are controlled by robots, the same concerns apply.

The table below is based on the taxonomy for self-driving vehicles published by the Society of Automotive Engineers (SAE),[61] which has been broadly endorsed as a tool for discussion of these issues. The table illustrates who will be responsible under some likely risk and liability scenarios; the leftmost column describes the SAE level of automation and the top row lists particular liability risks.

[61] "Surface Vehicle Recommended Practice," Society of Vehicle Engineers (J3016), September 2016.

Legal System – Risk/Liability Matrix

Scenario >	Negligent or intentionally dangerous operation of vehicle.	Defective design, manufacture of vehicle hardware, incl. sensors, computer, communications.	Defective design, manufacture of vehicle software.	Defective design, construction, maintenance of roads, "intelligent highway" communications system.	Security breaches, invasion of privacy, criminal or terrorist hacking of vehicle or "intelligent highway."	Defects in maintenance, operation of public transportation services (buses, trains, taxis).
Automation Level (Society of Automation Engineers)						
Human Driver No Automation (Level 0)	Driver: tort liability. Private services (Uber): Possible liability for driver hiring or training. Possible common carrier liability.	Manufacturer: strict products liability.	N/A	Govt. agency: negligence, subject to statutory limitations.	Manufacturer: strict products liability. Govt. agency: negligence, subject to statutory limitations.	Common carrier liability.
Partial Automation (Levels 1-4) Human driver required to perform some driving tasks; at Level 3, driver must be prepared to intervene upon request of the computer. At level 4, car is autonomous in certain circumstances; it may delay a request by human driver for control.	"	"	Manufacturer: strict products liability.	"	"	"
Car is autonomous in all circumstances; it may delay a request by human driver for control. (Level 5)	Operator: Tort liability for failure to properly maintain vehicle, possibly for failure to request control from vehicle.	"	Manufacturer: strict products liability.	"	"	"

As the table illustrates, there is no scenario in which disputes will not require resolution through the civil justice system. Note the SAE taxonomy explicitly assumes that the vehicle may issue a "request to

intervene" to a human occupant of a fully self driving vehicle (though in the highest automation modes, the robot car or truck will not have an "expectation that a user will respond" to such a request). It is implicit in this analytical framework that the vehicle will contain the necessary equipment (steering wheel, brake pedal, etc.) that will enable the occupant to seize control. In other words, the SAE framework envisions no scenario in which a human cannot ultimately obtain control of a robot car. No company planning to sell robot vehicles has stated whether they will come equipped with the complement of control devices present in traditional vehicles today. (For purposes of shifting liability to consumers, manufacturers of self driving vehicles may choose to retain those devices.)

Assume, for example, that a vehicle is capable of operating autonomously, but a passenger is still *expected* to seize control of the vehicle in some circumstances (Level 3-4 under the SAE taxonomy). That person, presumably clearly designated as such by the vehicle itself, will remain subject to liability for failure to intercede properly.

Assume a vehicle is capable of full autonomous operation, but a person in the vehicle is still *able* to request that the vehicle "surrender control" (SAE Level 5). Or assume that the vehicle issues a request for the user to intervene – even though the user is not expected to. In the event of a crash, a person's failure to demand control, or agree to accept control, could itself be the basis for liability.

And as automated technologies become more sophisticated, and cars and trucks are able to operate autonomously from human intervention, manufacturers of the hardware and software will face strict liability for design or manufacturing defects that caused a crash.

In all of five of the SAE scenarios, third parties, *including manufacturers*, will be permitted to dispute whether the vehicle, or the motorist, was responsible. Facing strict liability for crashes, manufacturers will certainly have an incentive to dispute their responsibility. And it's worth noting that in several of the most highly publicized crashes involving Tesla to date, the company has been reluctant to accept full responsibility. In a highly-publicized accident in which a Tesla owner died when his Tesla, on Autopilot, failed to recognize a truck crossing the road, Tesla went so far as to release "black box" data from a vehicle to support Tesla's position that the driver was at fault, not the car.[62] Similarly, the ridesharing firm Uber blamed test drivers when its vehicles, illegally operating in self-driving mode, were caught running red lights in San Francisco.[63]

While a self-driving vehicle will collect vast amounts of data that will potentially offer enormous insight into the reasons for a crash, key questions may not be answered by that data. For example, did the vehicle correctly inform the designated passenger of the status, such that the passenger should have known to assume control? Did the vehicle fail to request human intervention? Did the vehicle

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[62] See, for example, D. Shephardson, "Google Takes the Blame -- Sort of -- for Its Self-Driving Car Crash," Reuters, February 29, 2016 http://time.com/money/4242030/google-self-driving-car-crash-fault/); "Tesla Says Autopilot Not to Blame in Crash With Bus in Germany," Reuters, September 29, 2016 (http://fortune.com/2016/09/29/tesla-autopilot-crash-germany/); C. Davies, "In New Model X Crash, Tesla Suggests Autopilot Not To Blame," Slash Gear, July 6, 2016 (https://www.slashgear.com/in-new-model-x-crash-tesla-suggests-autopilot-not-to-blame-06447354/).

[63] "Witness Saw Uber Robot Car Drive Through Red Light Three Weeks Ago in San Francisco," Consumer Watchdog, December 20, 2016 (http://www.consumerwatchdog.org/newsrelease/witness-saw-uber-robot-car-drive-through-red-light-three-weeks-ago-san-francisco); J. Hood, "California Orders Uber's Self-Driving Cars Off The Road," Consumer Affairs, December 15, 2016 (https://www.consumeraffairs.com/news/california-orders-ubers-self-driving-cars-off-the-road-121516.html).

improperly reject a user's demand for surrender of control? Would it matter to the inquiry what the passengers were doing at the time of the crash? It is not clear to what extent the vehicle will collect all the data necessary to determine what happened in the seconds before a crash. Will there be a continuously recording camera and microphone in the passenger compartment, such that third parties could argue the passenger was distracted?

Consumers who own or lease self-driving vehicles will face far greater maintenance responsibilities than they bear today. For example, self-driving vehicles will be reliant on external sensors – the eyes and ears of the robot car's brain. A scrape or dent that impairs a sensor while the vehicle is in the driveway could lead to deadly consequences when the vehicle is on the road.

Moreover, the computer brains of robot cars will inevitably require software updates. What happens if the consumer fails to download a software update, or visit the dealership if that is required? No potential manufacturer of a self driving vehicle has offered to assume liability for a crash caused, even partly, by the consumer's failure to maintain the vehicle's operational status.

Each of these scenarios confirms that an inquiry into a consumer's "fault" will be necessary even in the era of fully autonomous vehicles.

Complicating these scenarios is the fact that hardware and software manufacturers consider their technology proprietary; indeed, for security reasons, it may be impossible for even the owner to access any vehicle data.

Finally, the manufacturers of automated vehicles acknowledge their self-interest when it comes to liability. Not one manufacturer has agreed to assume *all* liability for the harm caused by their automated vehicles. Three companies have been quoted as stating that they will accept legal liability when their cars are in fully autonomous mode: Volvo, [64] Mercedes and Google.[65] But news reports indicate that Mercedes and Google added a salient limitation on their pledge: that "their technology is at fault."[66] Of course, that caveat will leave the owner of the robot car exposed to liability in cases where the manufacturer insists the crash was not the fault of its hardware or software – necessitating an inquiry into the drivers' fault.

The search for truth and justice in such circumstances will require the full powers of the civil justice system. The right to challenge corporate mistakes and reckless profit-driven conduct, in an impartial judicial forum with all the procedural protections of the civil justice system, starting with trial by jury, and including the strict liability of hardware and software manufacturers, will be critical.

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[64] M. Harris, "Why You Shouldn't Worry About Liability for Self-Driving Car Accidents," IEE Spectrum, October 12, 2015 (http://spectrum.ieee.org/cars-that-think/transportation/self-driving/why-you-shouldnt-worry-about-liability-for-selfdriving-car-accidents).

[65] M. Ballaban, "Mercedes, Google, Volvo To Accept Liability When Their Autonomous Cars Screw Up," Jalopnik, October 7, 2015 (http://jalopnik.com/mercedes-google-volvo-to-accept-liability-when-their-1735170893).

[66] *Id.*

3.2 Insurance.

The determination of fault and compensation for injury and property damage are matters made by courts. However, the evolution of the automobile as the predominant form of transportation in the United States led to the establishment of mandatory minimum auto insurance coverage requirements – known as "compulsory financial responsibility laws" – in Massachusetts in 1927; today every state but New Hampshire requires such coverage. Thus motorists, as a condition of owning or leasing a vehicle for operation on public roads, must buy insurance that will cover, to at least a minimum extent, that motorist's liability should he or she cause injury or damage to another person or their property. California, for example, requires most motorists to obtain a policy that would pay up to $15,000 in bodily injury compensation per person (for a maximum of $30,000 among all injured parties) and $5,000 in property damage.[67]

In the event of a crash, persons who suffer loss or damage as a result of the at-fault driver make a claim upon the at fault driver's insurance coverage. The insurance company is required to make an objective determination of the fault of its insured (the exact requirements for that determination vary depending upon state law, and in California are governed by Proposition 103- see below), and pay the claim.

Mandatory auto insurance coverage assures that motorists will have the means to provide at least a minimum level of compensation for modest accidents they cause – hence the term "financial responsibility." Absent such insurance, the at-fault motorist risks a potentially devastating civil judgment against his or her home or other assets. Auto insurance also alleviates what would otherwise be a significant burden on courts to adjudicate even minor disputes involving car accidents.

The cost of insurance and the underwriting and marketing practices of insurance companies have long been a source of public dissatisfaction and are often highly controversial. Regulation of insurance rates and practices is a matter of state law. The requirement that motorists purchase third party insurance coverage from private insurance companies has necessitated the establishment of consumer protections to assure that consumers are treated in a fair and non-discriminatory fashion when buying insurance, and in the event an insurance claim has been filed. However, the degree of protections afforded consumers varies sharply from state to state, as a 2013 report by the Consumer Federation of America found.[68]

3.2.1 Insurance and autonomous vehicles.

In 2015, United States-based insurance companies held a total of $8.4 *trillion* in assets.[69] They wrote roughly $192 billion net auto insurance premiums nationwide in 2015 (not including commercial insurance) and projected they would pay $145 billion in claims.[70]

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[67] Other insurance coverage, though typically optional, is often purchased by consumers to protect their own vehicles against fire or weather damage (comprehensive coverage), or crashes that don't involve a third party – such as with a tree or other object (known as collision coverage). In states where many motorists operate without insurance, consumers often find it prudent to purchase "uninsured motorist" coverage, so that if they are hit by an uninsured motorist, their expenses are covered.

[68] "What Works? A Review of Auto Insurance Rate Regulation in America," Consumer Federation of America, November 12, 2013.

[69] "Annual Report On The Insurance Industry," Federal Insurance Office, U.S. Department Of The Treasury (September 2016), p. 12.

[70] Insurance Information Institute (http://www.iii.org/fact-statistic/auto-insurance, last visited June 12, 2017).

The insurance industry initially appeared to view self-driving vehicles as an existential threat. Within the insurance industry, there has been frequent speculation, sometimes verging on panic, at the prospect of that revenue stream evaporating with the advent of accident-free, driverless vehicles: if there are no accidents, the industry reasoned, then why would anyone buy insurance?

With the benefit of several years of hindsight, the insurance industry's immediate fears appear to have subsided. Under any transportation system in which a consumer is or may be required to operate a vehicle, or even simply to maintain it, state tort laws will hold them accountable. Consumers will continue to purchase insurance coverage to protect innocent third parties against injuries or property damage and to cover their own repair expenses.

Indeed, as automation technologies enable vehicles to operate without human intervention, the makers of the vastly more complex hardware and software will face increased tort liability for defectively designed or manufactured products. These firms will seek to purchase insurance product liability insurance coverage to pay such claims. Self-driving cars and trucks will create new markets for vehicle insurance coverage that do not exist today.

It is too early to know the full financial, economic or social impacts of robot cars will be at this juncture. But we do know that insurance coverage will remain an essential protection in the era of driverless vehicles.

For consumers, the pricing of insurance, historically a significant concern, is likely to become a major economic factor as vehicle automation increases.

As noted previously, while it seems logical that the evolution of auto safety systems will lead to fewer crashes, there is as yet no evidence behind the surmise that robot cars will lead to an *overall* reduction in crash frequency, severity or claims costs. The incorporation of electronics in today's cars and trucks, though rudimentary by comparison to the complex hardware and software needed to maneuver vehicles without human drivers, have already spiked repair costs and insurance premiums.[71] The far greater cost of repairing automated vehicles will likely lead insurance companies to dramatically inflate the price of liability, collision and comprehensive insurance coverage.

Moreover, risks that today are not especially relevant to cars and trucks – such as privacy, security or even mass terrorism – will be much more of a threat to robot vehicles. Insurance companies will likely assess the heightened risk/threat matrix of the new and untested technologies and the hybrid highway as a basis to argue for substantial rate increases in the near term.

Finally, there is a very real danger that insurance companies will pursue a new form of "redlining" to favor motorists who can afford more expensive cars with expensive computer-based systems and discriminate against those who cannot by refusing to sell them insurance, or adding surcharges to the price of insurance –practices with pervasive historical antecedents in the insurance industry.

[71] See Section 2.6.

Strengthened consumer protections against excessive insurance premiums will prove crucial for as insurance companies price the risk of highly automated vehicles – particularly since state insurance regulators often lack the authority (or desire) to bar abusive rates and practices.

3.2.2 The Proposition 103 Model.

According to a 2013 report by the Consumer Federation of America, "California stands out from all other states in having the best regulatory system for protecting consumers."[72] Enacted by California voters in 1988, California's insurance reform law provides precisely the stronger protections consumers will require in the era of robot vehicles.

• **Review of insurance rates.** Proposition 103 applies to automobile, homeowner, business, and all other property-casualty insurance. It mandated a one-time rollback to November 1987 levels and a further 20% reduction in premiums. Over $2 billion in refunds were paid by insurance companies under this directive. The measure requires all property-casualty insurance companies to open their books and justify existing or proposed rate changes, subject to stringent controls on insurance company profiteering, waste, and inefficiency, and to obtain the Insurance Commissioner's approval before such changes may take effect. Insurance companies must show that their rates are based on verifiable loss data and legitimate expenses.

• **Prohibition on anti-consumer and discriminatory practices.** The measure bars "unfairly discriminatory" rates or premiums. It also subjects the insurance industry to lawsuits for violation of Proposition 103's provisions and California's civil rights, consumer protection and other laws.

• **Public disclosure and transparency.** The law authorizes the Insurance Commissioner to obtain any data – such as rate and premium data – from insurance companies that is needed to regulate their rates and practices. The Commissioner must disclose to the public all information –that insurance companies provide.

• **Public participation.** The law authorizes and encourages consumers to monitor and challenge existing rates, applications for rate changes, or any other practices that may be unlawful, either in the courts or before the California Department of Insurance. Under certain conditions, the Insurance Commissioner must hold a public hearing on such challenges. The law requires insurance companies to pay the legal fees and expenses of consumers who

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In 1984, the California Legislature amended its financial responsibility law to address the growing number of uninsured motorists. The amendment allowed police officers to request proof of insurance and to cite those who did not produce it. While Californians were required by law to purchase insurance, California's insurance law did not require insurance companies to sell it to all individuals; nor were there any limits on the price insurance companies charged. Many Californians could not afford to purchase auto insurance, particularly in neighborhoods that were subject to insurance "redlining," even if it was available.[72] The inequities of the mandatory purchase requirement, combined with escalating auto, home and business insurance premiums, sparked a voter revolt that led to the passage of Proposition 103 in November, 1988. The measure (Insurance Code section 1861.1 et seq.) fundamentally rewrote California's insurance laws. For a detailed discussion of the origin, purposes and provisions of Proposition 103, see Harvey Rosenfield, Auto Insurance: Crisis and Reform, 29 University of Memphis Law Review 69 (Fall 1998). Much more information about Proposition 103 is available at www.ConsumerWatchdog.org.

participate and make a "substantial contribution" to the outcome of a legal proceeding. The law also made the Insurance Commissioner, usually an appointed position, an elected post.

Preventing insurance companies from seeking unjustified rate increases will be critical as self-driving vehicles become more commonplace, particularly because initially insurance companies will have limited experience in assessing the risk they pose, and for that reason alone will seek to inflate projections of future claims and the cost of repairing or replacing vehicles.

• **Special protections against unfair automobile insurance premiums.** Particularly relevant to self-driving vehicles, Proposition 103 established a special set of rules that govern the pricing of automobile insurance.

Auto insurance premiums must be determined principally by three specified rating factors – the insured's driving safety record; annual mileage, and years of driving experience – and, to a lesser extent, by any "optional" rating factors that "the commissioner may *adopt by regulation* and that have a substantial relationship to the risk of loss."[73] The use of any other criterion constitutes unfair discrimination and is unlawful.

Making the driver's own safety record the principal determinant of premiums gives motorists a strong incentive to drive safely. The measure further requires insurers to offer a 20% good-driver discount to all qualifying consumers: individuals with a virtually clean driving record (one moving violation is permitted) for the preceding three years. This provides a further incentive for careful driving.

Basing auto insurance premiums on a motorist's individual responsibility, as reflected by their driving record, will remain of paramount importance for consumers in the era of self-driving vehicles, because in every conceivable scenario the consumer may still bear potential liability in the event of a crash.

As today, when a motorist is driving a vehicle, they bear responsibility for any injuries or property damage for which they are at fault. During times when the robot is driving the vehicle, the consumer occupant will very likely still have a legal duty to take control in the event of an imminent accident. Even when a self-driving vehicle is parked, the consumer will be responsible for maintaining it in proper condition. A consumer's driving safety record will be based on whether the automated car can avoid tickets and accidents in all these circumstances. And, as noted, the hardware and software manufacturers of automated vehicles will have a financial motive to dispute fault. Because there will never be a 100% guarantee that the occupant will not be responsible for a traffic violation if a vehicle fails to properly stop as a pedestrian enters a crosswalk or crosses into an intersection in heavy traffic or if a vehicle's sensor fails, or the computer is hacked, and a crash results, a motorist's driving safety record should be the predominant factor is setting premiums.

Similarly, annual mileage and years of driving experience, along with several of the optional rating factors previously adopted by the Commissioner, reflect the motorist's risk, without

[73] See California Insurance Code section 1861.02(a). The current list of authorized optional rating factors can be found at 10 CCR 2632.5(d).

regard to whether the policyholder is driving a car equipped with automation technology. Cars equipped with improved technology will be rated, as they are today under Proposition 103, based on their repair or replacement cost for purposes of comprehensive (weather damage, fire and theft) and collision coverages.

Other optional rating factors that will remain applicable: the percentage use of vehicle by rated driver; type of vehicle; vehicle performance capabilities, including alterations made subsequent to original manufacture; and vehicle characteristics, including engine size, safety and protective devices, the vehicle's vulnerability to damage, repairability, and installed theft deterrent devices. Cars and trucks equipped with improved technology will be rated, as they are today under Proposition 103, based on their repair or replacement cost for purposes of comprehensive (weather damage, fire and theft) and collision coverages.

Assessing the overall impact of these reforms in its 2013 analysis, the Consumer Federation of America determined that California was the only state in the nation where the average auto insurance premium went down between 1989 and 2010, saving motorists alone over $100 *billion* in premiums since the law took effect.[74]

Apart from preventing price gouging and discriminatory practices, Proposition 103 provides regulators and consumers with the tools and methodology to address other issues raised by autonomous vehicles.

For example, as noted above, insurance companies collect significant amounts of data about motorists; some have begun installing black boxes in their vehicles to track mileage and other metrics.[75] An even more troubling abuse is the recent phenomenon, previously noted, of insurance companies utilizing the vast trove of personal data collected by Google, Amazon, various credit bureaus and other firms to individualize a motorist's premiums based on algorithms that consider rating factors that have nothing to do with risk, such as the likelihood that a particular consumer will accept a modest overcharge without protest – a practice known as price optimization that is unlawful in nineteen states and the District of Columbia.[76] Under Proposition 103, such practices can be challenged in court and investigated by state Department of Insurance. Acting at the request of the Los Angeles Superior Court, where a class action has been filed, the California Department of Insurance is presently investigating whether Farmers Insurance is engaged in the practice, which is unlawful under Proposition 103.[77]

As another example, the evolution of the car industry into a more frequent litigant may create conflicts in the duties the insurance industry owes its policyholders. Some manufacturers of self driving hardware and software may purchase large quantities of insurance coverage against product liability suits. If so, significant conflicts of interest may arise: if the same insurance company sells insurance policies to motorists or owners of automated vehicles and to manufacturers, the legal duty to handle its

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[74] "What Works? A Review of Auto Insurance Rate Regulation in America," Consumer Federation of America, November 12, 2013.

[75] See footnote 27. In response to advocacy by Consumer Watchdog, regulations promulgated pursuant to Proposition 103 bar insurance companies from collecting data about the location of an insured vehicle, except as part of an emergency road, theft, or map service. See 10 CCR § 2632.5(c)(2)(F)(i)5.

[76] See Section 2.2.

[77] In the Matter of the Rating Practices of Farmers Insurance Exchange And Mid Century Insurance Company (File No. NC-2017-00003).

policyholders' claims in good faith, which each insurance company owes its individual policyholders, could well collide with its financial incentive to protect the interests of the manufacturer that bought a product liability policy.

In other words, in the era of self-driving vehicles, manufacturers and insurance companies may have a vested financial interest in protecting each other's bottom line, in which case the threat to consumers when it comes to crashes is that every accident will be treated as "your fault." New rules to protect consumers against such conflicts will likely be necessary. Proposition 103 provides the Commissioner and the courts with the authority to adjudicate these unexpected secondary effects in an open and transparent forum.

4.0 The Industry Agenda to Roll Back Consumer Rights

Over the last five decades, Americans have benefitted from a paradigm change in consumer protection. Across the economy, rules have been put in place to expand the rights of consumers exposed to physically or financially injurious products or services. Many of these laws, such as those barring and punishing false advertising, defective products, sharp financial practices, have become deeply ingrained in consumers' bedrock expectations of the marketplace.

These norms have long been the target of a national attack by insurance companies, automakers and other powerful corporations, their lobbyists, and sponsored allies in academia, seeking to restrict consumer rights under the Personal Responsibility System.[78] They are now recycling discredited anti-consumer proposals to limit corporate accountability, backed by big business, insurance companies and their network of lobbyists and academics, that have failed throughout the United States, and which California voters have rejected multiple times at the ballot box (Propositions 101, 104 and 106 in 1988; Propositions 200, 201 and 202 in 1996).

As noted previously, the suggestion that the transformation to a completely automated transportation system is imminent is a fantasy. But it's a fantasy that automakers and insurance companies are now attempting to exploit in order to press lawmakers to re-write consumer protection laws in their favor.

To do so, they are replicating themes that have proven successful in previous campaigns.

4.1 Restrictions on liability laws to encourage "innovation."

Manufacturers of hardware and software are quietly proposing to revise liability laws and rules so as to limit their financial responsibility for deaths and injuries caused by their automated or self-driving technology. Insurance companies, which profit primarily through the investment of premiums, have a similar financial motive to press for limits on liability, since the fewer and smaller claims payouts leaves more premium dollars for insurance companies to invest, particularly in states where regulators do not have the authority to limit rate increases to reasonable projections of future losses.

Among the proposals advanced by manufacturers and insurance companies are arbitrary caps on how much compensation juries can award to victims of negligence or intentional misconduct that causes

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deaths or injuries, and restrictions on how much attorneys can charge for their representation of such victims.[79]

A different approach, adopted by the George W. Bush Administration although most certainly unconstitutional,[80] called for NHTSA and other federal agencies to override state consumer protection laws.[81] The Obama Administration later reversed it.[82] (The Trump Administration is reportedly preparing its own "guidelines" for self driving vehicles; according to the new Secretary of the Department of Transportation: "We don't want rules that impede future technological advances."[83])

Often, arguments in support of such proposals are couched in a threat: that absent such liability limits, manufacturers will not bring a product to the American marketplace. Thus the liability protections are described as "impediments" to innovation.

Perhaps the most illustrative example is the liability bailout of the American nuclear power industry in the 1950s. After World War II, Americans were enamored with atomic energy; the "peaceful use" of the atom was heralded as providing electricity so inexpensive for American households that it would be "too cheap to meter." There was catch. In what should have been understood as a grave warning sign of the risks of nuclear power, the insurance industry claimed it could not provide the insurance that the nascent atomic energy industry needed to cover its potential liability for a nuclear meltdown or other accident. *Potential liability is what stood in the way of "progress,"* supporters of nuclear power insisted. In 1957, Congress obligingly passed the Price Anderson Act, which immunizes the atomic energy industry from liability to the American public in exchange for a tiered fund consisting of a contribution from the nuclear industry of up to $13 billion, followed by an expected congressional bailout. Nuclear power has proven to be an economic disaster for American taxpayers and ratepayers.[84] (The $13 billion limit on the nuclear industry's liability is woefully inadequate: the Japanese government's latest estimate of the cost of the 2011 meltdown at Japan's Fukushima Daiichi Power Plant – still underway – is $188 billion.[85])

A report by the U.S. Chamber of Commerce's dedicated anti-liability law unit insists that legal liability will "chill this promising technology [autonomous vehicles] and the huge advances in overall public

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[79] R. Nader, "Suing for Justice," Harpers, April 2016.

[80] D. Vladek, "The Emerging Threat of Regulatory Preemption," The American Constitution Society, January 2008.

[81] M. Levin and A. Miller, "Industries Get Quiet Protection From Lawsuits," Los Angeles Times, February 19, 2006 (http://articles.latimes.com/2006/feb/19/nation/na-preempt19)..

[82] P. Rucker, "Obama Curtails Bush Policy That Let Federal Rules Override State Laws," Washington Post, May 22, 2009 (http://www.washingtonpost.com/wp-dyn/content/article/2009/05/21/AR2009052104016.html).

[83] D. Shephardson, "U.S. Plans To Update Self-Driving Guidelines In Coming Months," Reuters, June 5, 2017 (http://www.reuters.com/article/us-usa-selfdriving-idUSKBN18W2JR).

[84] R. Nader, "Nuclear Power's Insanities—Taxpayer-Guaranteed," Common Dreams, September 06, 2014 (http://www.commondreams.org/views/2014/09/06/nuclear-powers-insanities-taxpayer-guaranteed).

[85] Y. Obayashi and K. Hamada, "Japan nearly doubles Fukushima disaster-related cost to $188 billion," Reuters, December 9, 2016 (http://www.reuters.com/article/us-tepco-fukushima-costs-idUSKBN13Y047).

safety it promises."[86] It continues: "Where liability exposure poses a threat to an emerging technology, legislators should adopt reasonable constraints on liability."[87]

In a lengthy paper on legal liability and self driving vehicles published in 2016, RAND Corporation, which has received substantial funding from the insurance industry and has been a long-time advocate of restrictions on victim compensation rules, makes the same point:

> Current liability laws may well lead to inefficient delays in manufacturers introducing AV [autonomous vehicle] technologies. The gradual shift in responsibility for automobile operation from the driver to the vehicle may lead to a similar shift in liability for crashes from the driver to the manufacturer. Recognizing this effect, manufacturers may be reluctant to introduce technology that will increase their liability.[88]

4.2 Restrictions on liability laws to "lower insurance rates."

The insurance industry is now resurrecting a long-abandoned and discredited scheme known as "no fault" auto insurance. RAND's report concludes: "Th[e] shift in responsibility from the driver to the manufacturer may make no-fault automobile-insurance regimes more attractive."[89]

Insurance companies have long blamed liability laws for escalating insurance premiums, and proffered restrictions on compensation to auto accident victims – so-called "no fault" laws – as the solution. "No fault" barred or gravely limited compensation to people for so-called non-economic losses: principally the intangible pain and suffering uniquely experienced by a human being that cannot be reduced to a specific dollar value. In exchange, the insurance industry promised lower premiums and richer insurance benefits for objective out-of-pocket losses such as medical expenses and wage loss. At its peak, twenty-four states had adopted some form of "no fault" auto insurance.

As a practical matter, however, "no fault" proved to be a disaster for consumers. "No fault" auto insurance became vastly more expensive than the traditional liability system, and insurance companies quickly argued they needed to cut the benefits in order to bring prices under control.[90]

The turning point was the electoral contest over insurance reform in California. The insurance industry and its allies placed two "no fault" related proposals on the California ballot in 1988, as an alternative to Proposition 103. They were rejected by the voters by a three to one margin.[91] Insurance companies placed another "no fault" initiative on the ballot in 1996. It, too, was decisively rejected, with 65% of Californians voting against it.[92] Four states significantly altered or repealed their no-fault systems

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[86] U.S. Chamber of Commerce Institute for Legal Reform, "Torts of the Future: Addressing the Liability and Regulatory Implications of Emerging Technologies," March 2017, p.2.

[87] *Id.*, p. 54.

[88] J. Anderson, et al., Autonomous Vehicle Technology: A Guide for Policymakers, RAND, 2016, p. 118.

[89] *Id.*, p. 116.

[90] H. Rosenfield, "Auto Insurance: Crisis and Reform," 29 U. Memphis Law Review 69 (Fall 1998), p. 87-97.

[91] *Id.*, p. 83-84.

[92] See https://ballotpedia.org/California_Proposition_200,_No_Fault_Automobile_Insurance_(1996)(last visited June 12, 2017).

between 1989 and 1995: Georgia, Connecticut, Pennsylvania, and New Jersey, experiencing rate reductions as a result.[93] Today, only twelve states employ any form of "no fault" insurance.

4.3 Repealing protections against insurance company price gouging and discrimination.

The insurance industry reliably opposes any form of regulation or consumer protection legislation, and the potentially destabilizing advent of self driving vehicles, with its host of unique and unprecedented risks to consumers, is certain to inspire the consideration of broader regulation at the state level. Proposition 103's protections will no doubt be considered a model for consumers in other states as automated vehicles are rolled out.

Insurance companies vehemently opposed Proposition 103 at the ballot box – spending a record $63 million in their campaign to defeat it – and many insurers have sought to evade or contest its reforms since they were upheld in a series of unanimous decisions by the California Supreme Court after the measure passed. The industry, as well as individual insurance companies, continues to fight the rate reductions and premium rollbacks in the courts.[94] So it is hardly a surprise that some insurance companies hope to exploit the discussion about insurance and liability in the era of autonomous vehicles to argue that, as one industry source candidly put it, "the Prop 103 model should be scrapped entirely."[95]

The industry contends that Proposition 103's protections against discriminatory rates and practices are outdated and will no longer be necessary once robots, not humans, are driving vehicles.[96] However, as discussed above, no fully autonomous vehicle is available for purchase today, nor has any date been set for the sale of such vehicles, and America is decades away from a fully autonomous transportation system (if it ever happens). Between now and that very distant future, our roads will be a "Hybrid Highway" of vehicles with greatly varying degrees of automation, ranging from none to a great deal. So long as consumers are subject to liability for injuries and property damage caused by the crash of a self-driving car or truck, they will require insurance coverage. And so long as insurance companies attempt to overcharge motorists for that protection, the protective provisions of Proposition 103 will remain essential.

Self driving vehicles will place the insurance industry at a crossroads. Rather than resist or work to undermine reform, insurance companies would be better advised to focus their resources on the extremely important consumer protection role they could choose to play as vehicle automation increases. Historically, the insurance industry has exhibited limited interest in safety and "loss prevention," perhaps because insurers are cost-plus, cash flow based institutions: their profits are largely based on their projected costs, so when claims rise, insurers can justify charging higher premiums, and earn more

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[93] H. Rosenfield, "Auto Insurance: Crisis and Reform," 29 U. Memphis Law Review 69 (Fall 1998), p. 87-97.

[94] "CA Supreme Court Rebuffs Insurance Industry Assault on Proposition 103 Rate Protections," Consumer Watchdog, May 11, 2017 (http://www.consumerwatchdog.org/newsrelease/ca-supreme-court-rebuffs-insurance-industry-assault-proposition-103-rate-protections).

[95] I. Adams, "Does Prop 103 Violate Itself?" Personal Insurance Federation of California, October 21, 2014 (http://www.pifc.org/prop-103-violate/).

[96] *Id*. See also R. Peterson, New Technology—Old Law: Autonomous Vehicles and California's Insurance Framework, Santa Clara University School of Law, May 21, 2012; D. Jergler, "Prop. 103 vs. Self-driving Cars Revving up in California," Insurance Journal, Sept. 17, 2014 (http://www.insurancejournal.com/news/west/2014/09/17/340898.htm); I. Adams, "Can Prop 103 Handle Driverless Cars?" R Street, August 27, 2014, (http://www.rstreet.org/2014/08/27/can-prop-103-handle-driverless-cars/).

investment income.[97] These incentives have discouraged insurance companies from using their vast information database on vehicle hazards to alert manufacturers of vehicle dangers and press them – and lawmakers –for safety improvements. This moment in history, marking a rapid evolution in vehicle technology, is the time for the insurance industry to weigh in – with a commitment to strong federal safety regulation, for example, and much more resources for affiliated organizations whose mission is public safety and loss prevention.

5.0 Guiding Principles.

To protect consumers against the challenges posed by autonomous vehicle technology, Consumer Watchdog believes six principles must be adopted.

1. **Protect the civil justice system.** The state-based civil justice system – open courts, impartial judges and citizen juries – is fully equipped to handle the determination of legal responsibility as our transportation system evolves over the coming decades. Disputes over who is at fault in a crash involving a self-driving car or truck will require the full power of civil justice system, with its procedural safeguards of an impartial judge, full public transparency, and trial by citizen juries, to investigate and publicly expose the cause of crashes, compensate the victims for deaths, injuries and property damage, punish the wrongdoer, and force manufacturers to make changes in their products to prevent future harm. When their autonomous technologies fail, hardware and software manufacturers must be held strictly liable. Lawmakers should reject legislation to limit or restrict state consumer protection laws. Manufacturers must not be permitted to evade these consumer protections by inserting arbitration clauses, "hold harmless" provisions or other waivers in their contracts.

2. **Enact stronger state consumer protections against insurance company abuses.** According to a 2013 report by the Consumer Federation of America, "California stands out from all other states in having the best regulatory system for protecting consumers." Enacted by California voters in 1988, California's insurance reform law provides precisely the stronger protections consumers will require in the era of robot vehicles. The reforms, known as Proposition 103, have protected motorists (along with homeowners, renters, businesses and medical providers) against unjust insurance rates (including product liability insurance rates) and anti-consumer and discriminatory practices. The law's emphasis on rewarding drivers with lower insurance premiums based on their safety record, their annual mileage, their driving experience, and other rating factors within their control that are "substantially related to the risk of loss," will be critical in the new automotive era. Proposition 103's mandate for public disclosure and public participation in regulatory matters are essential components of a system that will be trusted by consumers.

3. Enact auto safety standards. Private companies cannot be trusted to develop and deploy robot cars and trucks without rules. The federal auto safety agency, or in its absence, state auto safety agencies, must develop standards for the testing and deployment of the multiple technologies required by robot vehicles. These standards must address safety; security; privacy and the software that determines the robot's actions in the event of an impending collision and as it makes life and death decisions. They must be enforceable by consumers in courts of law.

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[97] H. Rosenfield, "Auto Insurance: Crisis and Reform," 29 U. Memphis Law Review 69 (Fall 1998), p. 76.

4. **Stronger laws are needed to protect consumers' privacy.** The laws have not kept pace with the evolution of technology and the collection and monetization of consumers' personal data. Hardware and software manufacturers and insurance companies must be barred from utilizing tracking, sensor or communications data, or transferring it to third parties for commercial gain, absent separate written consent (which should not be required as a condition of accessing the services of the vehicle/ manufacturer, and which should be revocable by the consumer at any time).

5. Bar federal interference in state consumer protection laws. Neither Congress not federal agencies should be permitted to preempt or override stronger state based civil justice, insurance reform or auto safety laws.

6. **Respect democratic and human values.** The sponsors of self-driving vehicles have promoted the myth that machines are infallible in order to justify the wholesale departure from a panoply of norms that form founding principles for the nation, beginning with the rule of law; individual and corporate responsibility; long held legal principles that distinguish between human beings and property; and the transparency of public officials and institutions that is a hallmark of democracy. The strategy of substituting robot values for human values has reached its apotheosis in the determination by robot car company executives to program computers to make life and death decisions, and to keep that decision-making process secret. Lawmakers will need to impose the rule of law and other attributes of American democracy upon the executives of the hardware and software companies that manufacture self-driving cars.