

# THE IMPACT OF AUTONOMOUS VEHICLES ON THE FUTURE OF INSURANCE

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## HEARING BEFORE THE SUBCOMMITTEE ON HOUSING AND INSURANCE OF THE COMMITTEE ON FINANCIAL SERVICES U.S. HOUSE OF REPRESENTATIVES ONE HUNDRED FIFTEENTH CONGRESS SECOND SESSION

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## THE IMPACT OF AUTONOMOUS VEHICLES ON THE FUTURE OF INSURANCE

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Wednesday, May 23, 2018

U.S. HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON HOUSING  
AND INSURANCE ,  
COMMITTEE ON FINANCIAL SERVICES,  
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 2:37 p.m., in room 2128, Rayburn House Office Building, Hon. Sean Duffy [chairman of the subcommittee] presiding.

Present: Representatives Duffy, Ross, Posey, Luetkemeyer, Hultgren, Rothfus, Budd, Cleaver, Sherman, and Gonzalez.

Chairman DUFFY. The Housing and Insurance Subcommittee will come to order. Today's hearing is entitled, "The Impact of Autonomous Vehicles on the Future of Insurance." Without objection, the Chair is authorized to declare a recess of the subcommittee at any time.

Without objection, all members will have five legislative days within which to submit extraneous materials to the Chair for inclusion in the record. Without objection members of the full committee who are not members the subcommittee will be participating in today's hearing for the purpose of making an opening statement and asking our witnesses questions.

The Chair now recognizes himself for a 5-minute opening statement. I first want to thank our panel for being here today. I apologize that we were late. We had a vote on the floor and it takes a while to get people back to the hearing room, but we are grateful for your presence and excited to hear your testimony on autonomous vehicles as it has a cross-section with insurance. Again, thank you for being here.

Now, while the focus of today's hearing will be on insurance, other committees have already been looking at the issue, and I suspect Judiciary may look at AVs from a product liability perspective as opposed to our insurance perspective.

Reality is catching up with movies like Blade Runner, Demolition Man, Minority Report. We have seen the capabilities of fully autonomous vehicles being tested in cities like San Francisco, Miami, Pittsburgh, and more.

Auto insurance policies have already been impacted by AVs. For instance, we already have level two and level three AVs on the road wherein vehicles assist the driver in accelerating, decelerating, and steering.

Manufacturers like Tesla already employing adaptive cruise control technology which lets you take your hands off the wheel for a lengthened period of time. There are a lot of people out there that are somewhat resistant to entrusting their lives with autonomous vehicles. And there are others who just want to drive. The freedom of shifting gears and being behind the wheel has an American freedom to it. They want to keep that. But at the end of the day, safety will be the top concern before the public is ready to fully trust AVs.

We have seen the reaction from both industry and the public to recent accidents and how it has altered views on how ready this technology is from and for being deployed. There are others ready for the change. Senior citizens are the perfect demographic for AVs. The oldest among us are clamoring for this new technology. They don't want to drive any more than we want to be behind a Cadillac going 10 miles an hour under the speed limit.

If you talk to millennials, their generation, they don't even own cars. They like public transportation. They think of Uber and Lyft also as public transportation. And in my D.C. office here, I only have two staff members that have cars and they are not millennials. They are older.

At the corporate level, UberSUVs and UberBLACK are how executives get around town. These ride-sharing companies are also looking at employing fleets of fully autonomous vehicles. I have eight kids. I have gone through the pain of teaching two of them how to drive. I think I got a lot of gray hair from that process. So not only do you notice the increased cost of insurance, especially after your daughter backs into your campaign staffer's car, but also the stress of your kids getting in an accident.

What does this technology do to keep our kids safe as they are new to the road and new to driving? As a parent, and eight kids, as many people know, you have fights in the back. What happens when you turn around, taking your attention off the road and trying to put out a fight? This technology can be remarkable in keeping our families and our kids safe.

In Wisconsin, some of you might have heard, there is a big investment from Foxconn. They are looking to work with Wisconsin DOT to create AV dedicated lanes to drive over 4,000 employees to their jobs at the company's plant.

All of a sudden transportation to and from work could be a perk of the job. Autonomous vehicles, they are coming. What we hope to find out today is how insurers are looking at AVs in terms of insurability.

Will auto manufacturers and tech companies developing the driving systems, will they retain liability for damage? Will specialized products be developed within the industry? How will data be shared for risk assessment?

I look forward to the panel's insights and thoughts on this topic. Again, this is the first time we have had a panel in our committee on this topic in the ever-changing space with auto insurance.

I am also interested in what role do you think the Congress should play. Do we have a space? If we do, what should it look like? Obviously, we don't want to crimp innovation. We want to make sure that we don't have laws that are aging as technology is racing forward. We welcome your insights on that as well.



My time is about to expire, so I now recognize the gentleman from Missouri, Mr. Cleaver, the Ranking Member for 5 minutes.

Mr. CLEAVER. Thank you, Mr. Chairman.

And thank you for being here to provide testimony for us. And I don't think this is something that has been scheduled too far in advance of a reality. This hearing will address the impact of autonomous vehicles on the future of insurance. This is an exciting topic as well as the fact that we will explore technology that very well may reshape our country and our culture. However, as with any new technology, the benefits must be carefully weighed and the relevant policies must be addressed.

I happen to be one of those who believe that new technology should be scrutinized. And I think we have that responsibility. And I appreciate the fact that the Chair has scheduled this hearing for that purpose.

These autonomous vehicles are characterized by different levels, one through five where the car is fully automated, with no role for the driver. Currently, a number of companies like Google, Apple, Uber have begun to explore manufacturing these vehicles with various levels of automation and various levels of success.

I was stunned a few years ago to read that Captain Kirk and Scotty actually laid the foundation for the flip phones that we started using. And that quite often scientists will go to movie makers and ask them about the future and to create something that doesn't seem real that eventually becomes real.

I think the technology is going to evolve. And it is important for the insurance sector to consider how it will be impacted. Most States require drivers to have an auto insurance that covers their private vehicle. A shift to autonomous vehicles may change the type of insurance coverage to more reliance on commercial coverage and product liability. This hearing will give us a chance to hear from the insurance sector on how they plan to address what could be a huge change in the American insurance market. I would like to hear how affordability will be addressed in this evolving insurance market to make certain that all Americans of all economic levels will have access.

And then finally, autonomous vehicles will collect huge amounts of data regarding where passengers travel. There are big questions, at least for me, that must be answered on who owns the data. What level of access should insurance companies have to it. And how will this data be protected. Thank you for being here today and I look forward to you shedding light on all of these knotty issues that we will have to deal with.

Thank you, Mr. Chairman. I yield back.

Chairman DUFFY. The gentleman yields back.

We now welcome our panel of witnesses. First we have Mr. Carlson, U.S. Manufacturing & Automotive Practice Leader at Marsh & McLennan, welcome.

I now want to look to the gentleman from Illinois, Mr. Hultgren, to introduce our next witness.

Mr. HULTGREN. Thanks, Chairman. It is a privilege to be able to recognize and welcome Ryan Gammelgard from State Farm who traveled all the way from Illinois to D.C. to testify before the subcommittee today.

Mr. Chairman, State Farm is a fixture in the Illinois insurance marketplace and I actually just had the pleasure of meeting with one of my State Farm agents, who serves my district, Jeff Keicher earlier this afternoon.

Ryan works as Counsel in Public Policy Resource Group of State Farm's law department in Bloomington, Illinois. And in this role, he has coordinated Federal and State public policy positions on automated driving systems including providing testimony at the State level. Ryan, thanks for being here, looking forward to hearing your testimony along with the rest of our great panel today. And with that I yield back.

Thanks, Mr. Chairman.

Chairman DUFFY. Thank you and not to be outdone by Illinois, we welcome our third witness, Sam Geraci, the Vice President of Strategy at American Family Mutual Insurance, a great Wisconsin company. Welcome.

And our fourth witness, Mr. Ian Adams, Associate Vice President of State Affairs at the R Street Institute and Mr. Gillis, representing the Consumer Federation of America. Welcome, all.

The witnesses will in a moment be recognized for 5 minutes to give an oral presentation of their written testimony. Without objection, the witnesses' written statements will be made part of the record following their oral remarks.

Once the witnesses have finished presenting their testimony, each member of the subcommittee will have 5 minutes within which to ask the panel questions. Now, on your table you will note that there are three lights. Green means go. Yellow means you have 1 minute left and red means your time is up.

Your microphones are sensitive, only when they are on though, please make sure they are on when you are giving your statement and answering questions. Now, with that, Mr. Carlson, you are now recognized for 5 minutes.

#### **STATEMENT OF DAVID CARLSON**

Mr. CARLSON. Chairman Duffy, Ranking Member Cleaver, my name is David Carlson and I am a Senior Vice President at Marsh & McLennan. And I lead our U.S. Manufacturing and Automotive Industry Practice.

Marsh is the globe's leader in insurance and brokerage and is part of Marsh & McLennan Companies based in the United States. The U.S. Manufacturing and Automotive Industry practice is a network of global employees in over 100 countries representing our clients.

I am honored to participate in today's hearing. And I will use this opportunity to share initial observations on mobility transformation and focus on the impact that autonomous vehicles will have on risk management and insurance industry.

The future of AV is now. We are already driving highly advanced vehicles and by 2025, we will probably be sharing the road with autonomous vehicle technology. AV technology is creating seismic shifts in the automotive industry and the insurance sector alike, the trend raises questions about how the insurance sector will incorporate AV risk and underwriting and help consumers realize the anticipated insurance safety benefits.

While AV risks are a shifting landscape for underwriters, the development and solutions must be embraced to manage risk effectively. Already, underwriting in principle of personal, commercial, and trucking auto insurance is taking into consideration the safety benefits of automated driving systems.

As trends in autonomous technology accelerate, manufacturers, component suppliers and technology companies will start to assume more liability for the performance of their systems. The liability pendulum will shift from personal auto to commercial product liability or a hybrid of some form of coverage.

Another likely key question involves risk management. As society becomes more dependent on various products, more liability and it will become necessary to refocus current risk management strategies to account for that shift.

Due to the anticipated positive societal and economic impacts of autonomous vehicle technology, legislator, and regulators must consider establishing a regulatory framework for AV as a high priority.

But, Government is not alone in moving with caution. The insurance industry is also in the early stages of adapting to the disruptive forces at play. As with cybersecurity and related insurance, there is value for public and private partnership to develop the technology and markets.

Autonomous mobility companies are struggling to buy competitively priced insurance for auto risks. Startups and smaller companies are buying insufficient capacity in personal line marketplace. And the traditional insurance marketplace is struggling to address the needs of small and midsize fleets looking to enter the AV market.

At Marsh & McLennan, we believe purposeful action is required. We have challenged ourselves and our insurance partners to develop scalable solutions that can address the risks as they exist today and evolve with the technology.

Just the same, regulations cannot evolve into a barrier to deploying autonomous vehicle technologies. Currently, regulatory framework can limit the development of innovative insurance products when there is insufficient loss data or case law.

Without flexibility, it is hard to develop solutions that address emerging technologies and changes in consumer demand. As consumers and companies no longer own assets, they'd rather buy them and use them as a service, insurance must respond accordingly.

The ability to innovate and develop new ride-sharing insurance solutions has been a catalyst to the growth of that sector. Marsh has developed the first ride-sharing policy to adapt to the fact that people are no longer using their vehicles for 100 percent of personal or 100 percent of commercial use.

The solution was pioneered leveraging the flexibility offered by the surplus lines market and had been codified by policymakers across the country. The solution provides protections for the ride-sharing public as well as the ride-share drivers.

Marsh has facilitated the creation of hundreds of insurance products throughout the personal insurance marketplace that have al-

lowed broad consumer choice to purchase the insurance that meets individual needs.

We envision a similar need for the innovation across the autonomous mobility platform. Consumer preference is moving away from the individual car ownership to mobility ecosystems. The effect of this is nothing short of revolutionary.

To further enable the advancement of AV, policymakers should embrace the significant social and economic benefits of new technology. The insurance sector must be able to be nimble and willing to change in a way to view risks.

Growing up, we were always reminded never to get into a car with a stranger. I am willing to bet that nearly everyone in this room got into a car with a complete stranger in the last week. Who knows, in another decade, we may regulate getting into a car with no driver at all. Thank you.

[The prepared statement of Mr. Carlson can be found on page 33 of the appendix.]

Chairman DUFFY. Thank you, Mr. Carlson.

Mr. Gammelgard, you are recognized for 5 minutes.

#### **STATEMENT OF RYAN GAMMELGARD**

Mr. GAMMELGARD. Thank you, Chairman Duffy, Ranking Member Cleaver, and other members of the committee. My name is Ryan Gammelgard and I am counsel in the Public Policy Resource Group of State Farm, where I work on public policy issues associated with automated vehicles.

State Farm thanks you for providing this opportunity to testify today on automated vehicle technology and its impact on insurance. We have submitted written testimony to this subcommittee which provides an overview of how we view this technology in some of our main public policy positions. For purposes of my testimony today, I will summarize some key points.

State Farm's mission is to help people manage the risks of everyday life and recover from the unexpected. State Farm has been the Nation's largest auto insurer for over 75 years. And we currently have over 45 million auto policies in place.

The majority of our \$76 billion in annual revenue primarily comes from auto insurance. So we do understand the potential impact the automated vehicle will have on the insurance industry.

We also understand that the insurance industry and State Farm are going to be looking at a number of issues to make sure that we can better protect our policyholders as they undergo this transition with automated vehicles.

To this point, we want to underscore the following. To the extent that automated vehicles enhance auto and highway safety, State Farm is excited about and in support of these technologies. At the same time, while automated vehicles may reduce or eliminate some risks, as recent events show, there will be crashes. And new risks are likely to emerge.

In order to learn more about automated vehicle technology, State Farm takes an active role in collaboration, multi-industry conversations, and research. One example is our support of MCity at the University of Michigan.

In addition to gaining access to a 32-acre test track for automated vehicles, we also work with other industry members such as GM, Ford, Intel, Verizon, and LG to identify research opportunities that need to be addressed in the automated vehicle space.

In addition to that collaborative work, we also want to make sure that we understand the technology for our own purposes. So we have a vehicle research facility in our home office in Bloomington, Illinois. And we also conduct our own customer surveys to gauge how people are actually perceiving this technology. More information on that is in our written testimony.

Bottom line, it is important for us to help prepare our 45 million auto policyholders for what the future holds. In regards to key public policy issues, I want to highlight the following.

Data access is a key issue for the insurance industry. Crash-related data is essential for developing proper pricing and underwriting of these vehicles, for determining who is at fault and who is liable for crashes that do occur and then also for the public.

Data access is important to determine the safety and reliability of this technology. Vehicle data access is also key for other key stakeholders as well. NHTSA (National Highway Traffic Safety Administration) in their most recent automated vehicle policy guidance referenced the importance of data access for third parties. And the American Association of Motor Vehicle Administrators (AAMVA), just within the past week issued guidance for States, outlining the importance for data access for law enforcement and other parties.

Liability issues are also key for State Farm and the insurance industry. State Farm's current policy position is that existing State liability and tort laws are sufficient to address the emerging risks associated with this technology.

However, we do recognize that more research and more work needs to be done in that area. There is a growing perception with the move to higher levels of automation and more of a move toward commercial fleet policy or more of a commercial fleet, there will be a shift toward more commercial and product liability issues.

However, we do want to make sure that we let the system evolve before we decide to define and create new systems of liability that may not actually be to the benefit of the public.

The final key point that we want to make is that as we look at legislation that is designed to help auto manufacturers, tech companies and suppliers innovate, the insurance industry needs to be able to innovate as well.

We are faced with situations where we might have to create, develop, and underwrite products that by law we are required to match price to risk. In this future State there might not even be any data to show whether or not these vehicles are safe.

And so I think we all need to work together as stakeholders in this conversation to make sure that we are allowed to innovate as well, to encourage the safe development of this technology.

Thank you.

[The prepared statement of Mr. Gammelgard can be found on page 42 of the appendix.]

Chairman DUFFY. Thank you.

Mr. Geraci, you are recognized for 5 minutes.

### STATEMENT OF SAM GERACI

Mr. GERACI. Thank you, Chairman Duffy, Ranking Member Cleaver, and members of the subcommittee. Thank you for inviting me to testify at today's important hearing. My name is Sam Geraci, and I am the Vice President of Strategy at American Family Insurance.

I look forward to testifying today about a topic that is of great importance to so many Americans and to American Family insurance policyholders. American Family Insurance is the Nation's thirteenth largest property casualty insurance group and is owned solely by our policyholders.

Supporting them is our only priority in business. American Family fully supports the development of automated driving systems or ADS. And we are among the organizations supporting ADS work at the University of Wisconsin-Madison College of Engineering and the Wisconsin Automated Vehicle Proving Grounds.

This work will benefit our policyholders, our community, and our environment. The development of ADS technology may be the most consequential transportation development of our time.

This new technology promises better mobility and greater safety for everyone on our roads. The development and deployment of proven, safe, autonomous vehicles will require significant technological advances, regulatory changes and an active partnership between technology companies, vehicle makers, insurance companies, and the Government.

Critical issues related to passenger safety, liability, and compensation require that insurance companies are included in the regulation of autonomous vehicles. Consumers will continue to look to property casualty insurers to provide them with the protections they have come to expect as this new frontier of automotive products evolves.

For decades, insurers have compiled data and analysis on human drivers in order to provide actuarially valid information to measure a human driver's risk. Unfortunately, there is no comparable data or analysis regarding the risk levels of autonomous vehicles. Each auto manufacturer may have data on their vehicles, but neither regulators, agencies like the National Highway Traffic Safety Administration, nor the insurance industry have consistent access to that information.

ADS vehicles are already producing enormous amounts of data as they are tested on public roads and it will be important to establish access to this data for insurers. At American Family, we believe that customers should have unrestricted access to their vehicles' operating data and the ability to share that data with third parties such as their insurers.

Vehicle operating data will play an essential role in developing rates and underwriting policies. In the event of an accident, insurers will also require access to crash data. This is the vital data insurers use to determine relative liability for the inevitable crashes and to compensate crash victims.

Detailed reviews of rates and coverages by State regulators requires insurers to provide extensive levels of actuarially valid data on crashes, on frequency and severity, and the type of operator that

was in control of the vehicle. But we cannot provide that without data.

Of course, this data would contain neither the ADS users' personal identifiable information (PII), nor any confidential business data of the vehicle manufacturer. We believe that State and Federal Governments should each continue to play a central role in ensuring the emergence of ADS technology while protecting consumers in the event of a crash.

The Federal Government through NHTSA should continue to make determinations on vehicle performance and safety, as well as data integrity of autonomous vehicles. At the same time, States and localities should retain their traditional authority to make the determinations of the registration, licensing, and operation of vehicles.

States should define and address personal liability issues in State law. Perhaps most importantly to American Family, States should retain the regulation of automobile insurance for the vehicle or operator.

Unfortunately, we all know about the terrible impact of auto accidents. It doesn't have to be this way. And automated vehicles have the potential to make lives safer and mobility more accessible for millions of Americans.

But in the meantime, we need to ensure that those involved in accidents continue to receive prompt and efficient help when they need it most. When crashes involving automated vehicles occur, insurers can help allocate responsibility among ADS, non-ADS, and other entities involved.

Existing State liability and tort laws can evolve to address responsibility and liability in the same way that tort law has evolved with other technological and social developments. Ultimately, the insurance industry supports the development of ADS technology and should be a partner to technology companies, vehicle manufacturers, and regulators to promote safety on our roads.

We look forward to continuing to be a central part of the discussion. And thank you for listening and look forward to answering any questions you may have.

[The prepared statement of Mr. Geraci can be found on page 48 of the appendix.]

Chairman DUFFY. Thank you.

Mr. Adams is recognized for 5 minutes.

#### **STATEMENT OF IAN ADAMS**

Mr. ADAMS. Thank you, Chairman Duffy, Ranking Member Cleaver, and members of the subcommittee. My name is Ian Adams, and I am the Associate Vice President of State affairs at the R Street Institute. For those of you not familiar with us, we are a free market think tank that is situated here in Washington, DC, though we have offices throughout the country. I am actually in from Sacramento, California.

Our motto is free markets, real solutions. And that means we are often focused on issues that are of high complexity but low salience. And so in concrete terms that has meant we have spent a lot of time looking at property and casualty insurance regulation.

In fact, our signature research project on an annual basis is an insurance regulatory report card that examines the 50 States and their approaches to insurance regulation. And as a result of that research, we have come to some conclusions about the role that insurance plays as a social good.

It allows consumers to evaluate, manage, and mitigate their risks. And we believe that when consumers are informed, they are best positioned to protect their interest. Risk-based rates and market competition have made U.S. roads safer places, because they have allowed consumers and automakers alike to understand both operational and design choices and how they impact risk.

And it is with that understanding in the prospect of lower rates and competitive advantages that safety has, until very recently, steadily improved on U.S. roads. And that is why I am so excited to be here today, because autonomous vehicles really do present a potentially transformational moment in road safety here in the United States.

Tens of thousands of people, as I am sure you are aware, are killed on U.S. roads every year and many more are injured. And yet the leading cause of death is not the failure of infrastructure and it is certainly not the failure of the operation of those vehicles. It is often the choices of the operator of those vehicles. Because we know that the leading cause of those injuries and deaths is human operator error, AVs present us an opportunity. They can offer us a safer approach to transportation.

However, even though AVs promise hitherto unimaginable safety improvements, much uncertainty remains about if, when, and how the technology will ultimately be deployed and adopted.

At R Street, we believe that risk-based insurance prices can actually help resolve some of that uncertainty. And we believe that those insurance products can help hasten the pace of deployment by providing consumers not only a safety rationale but a bottom line, dollars and cents rational for embracing the technology.

Now, if history is any indicator, safer vehicles will, over time, mean lower cost of operation provided consumers receive those price signals. However, today in some States, regulatory hurdles exist that undermine that process. For instance, in my home State in California, the law currently requires consideration of rating factors which will lead to the use of rates that are fundamentally irrational in the context of autonomous vehicles.

Now, the arrival of this promising technology underscores the importance of ensuring that there is no lag between regulatory capacity and product necessity. And with that, I look forward to having the discussion that we will undertake today.

Thanks for having me.

[The prepared statement of Mr. Adams can be found on page 28 of the appendix.]

Chairman DUFFY. Thank you.

Mr. Gillis, you are recognized for 5 minutes.

#### **STATEMENT OF JACK GILLIS**

Mr. GILLIS. Thank you very much. Good afternoon, Chairman Duffy and Ranking Member Cleaver. My name is Jack Gillis. I am



the incoming Executive Director of the Consumer Federation of America.

CFA is an association of 275 State, local, and national organizations working to protect consumer interests. And we greatly appreciate the opportunity to be here today. We appreciate the subcommittee holding this hearing today, because frankly, we have more questions than we have answers.

By raising these questions well before the AV is introduced, you are providing the time needed to resolve the intricacies associated with insuring these extraordinarily complex products. As the AV becomes the primary mode of transportation, we expect that insurance costs associated with personal injury will be significantly minimized. But the electronic sophistication needed to operate these vehicles could make them enormously expensive to repair.

We also need to consider the role of the Federal Government. Right now, Congress is considering the AV START Act, a bill with some serious shortcomings that would dramatically affect auto insurance. The bill allows millions of vehicles to be exempt from safety standards, has no provisions to maintain occupant protection, no performance standards for safety features, no cybersecurity protections, and accident data is not being made available to the public, including these insurers. Without these requirements, insurers will have to guess at AV risk levels or be solely dependent on the manufacturers' performance claims.

While there are many difficult questions related to insuring AVs, let me paint the picture of just one. With an autonomous vehicle, I will be able to program my vehicle to stop at my favorite coffee shop on the way to work. In my case, being from Massachusetts, I am going to choose Dunkin Doughnuts over Starbucks.

While, in the Bay State that may be considered a moral decision, for most of us it is clearly a matter of preference. But what about the moral decision. On that same trip to work my AV detected a stalled semi-trailer truck in front of me and has determined with mathematical precision that there is physically no way that my vehicle will stop in time.

However, it can move me out of that lane to avoid the truck. So imagine two choices. It can go left into a bike lane where a young, recently married couple, expecting their first child is riding to work. Or it can go right where on the sidewalk there is an elderly man in his early 90's hobbling along in a walker.

Which way will the autonomous vehicle go? More importantly, who will program that decision? Like my choice of Dunkin Doughnuts over Starbucks, will I be responsible for programming the moral decisions of the vehicle? Or will the manufacturer or the software provider? Or will the insurance company have a hand in the decision, or even underwrite policies based on which choice is embedded?

More importantly, where will the liability for that decision lie? And wherever that liability lies, who will insure it and what requirements will the insurer place on those being insured?

As I mentioned, we have many more questions than answers. And I have submitted a series of questions in my written testimony which I hope to work with this committee on over the next year or two to resolve.

But there are a wide variety of issues that will make assessing liability extremely complex. Responsibility for accidents, once determined by witness and police reports, will now include sophisticated computer data.

The search for true fault in accidents will require the full power of the civil justice system. The right to challenge corporate mistakes and reckless conduct in a judicial forum will continue to be essential.

And what about accident repair costs? Today, the sensing devices placed in plastic bumpers have significantly increased the cost of a fender bender. What will happen when the entire vehicle is covered with sensing devices? Will the manufacturers use proprietary technology in order to prevent a competitive marketplace for repair parts? If so, insurers will be forced to increase their prices while monopolistic manufacturers line their pockets selling overpriced repair parts that we need.

And what about the potential for redlining? Favoring those who can afford more expensive technology and discriminating against those who cannot? For insurance to work, it must be available to all.

So finally, we do have more questions than we have answers for. But thank you for beginning the process that will help ensure that the autonomous vehicle will live up to its enormous life-saving potential.

[The prepared statement of Mr. Gillis can be found on page 53 of the appendix.]

Chairman DUFFY. Thank you, Mr. Gillis and that was only 2 seconds over. That was fantastic. Thank you, panel, for your testimony. The Chair now recognizes himself for 5 minutes. And like I said, Mr. Gillis, it is a fascinating scenario that you lay out.

We as humans might make split second decisions in the scenario that you gave us, but this would be thought out and programmed into your vehicle what decision the car makes. And so here we are in a situation where you look at our age, our sex, our tickets, our accident record, put up a risk profile and determine rates.

With autonomous vehicles and the data conversation we are having, how do you assess risk, decisions that will be made when you don't have great access to data? And Mr. Carlson, I think you were indicating that you are writing policies in this space, was that correct?

Mr. CARLSON. Yes, we have worked with certain companies to collect data.

Chairman DUFFY. Are they providing you the data?

Mr. CARLSON. Yes.

Chairman DUFFY. OK. Is everyone else having trouble getting data, do you feel like there is not going to be cooperation?

Do you want to take this, Mr. Gammelgard?

Mr. GAMMELGARD. From a State Farm perspective, our primary insurance business is personal line automobiles. We have noticed a trend as we have been working on these issues with the States over the past couple of years, that any attempt to get into a State law any type of data access provision that merely seeks to sync up with existing event data recorder laws has been met with some sig-

nificant resistance from some of the manufacturers and tech companies.

So when I say existing laws, the EDR laws that talk about collecting data 30 seconds before a crash and 5 seconds after, things that on their face, we see and think are pretty innocent and straightforward and just mirror what is currently law, has been met with great resistance.

And typically what we have heard in that advocacy is it is impossible to detangle the proprietary information that makes automated vehicles work from the crash-related information that people typically have had access to, whether it is insurance companies or law enforcement.

As we look to the future state, that is a high priority for us. That's why it is one of our main public policy concerns, because we do anticipate this world where it is going to be a little bit more difficult to gain access to that information.

Chairman DUFFY. Mr. Geraci?

Mr. GERACI. If I may, the data we are looking for here is not proprietary information from the automaker. We are looking for the same data we would ask people today, so if you or I were in an auto crash, the police might ask us how fast were you going, were you stopped at the stoplight.

The data we are looking for would be things like just that. How fast was the vehicle going? Was it accelerating or decelerating? Were hands on the wheel? Was it stopped when it was supposed to be? This is not proprietary data nor confidential data that is personally identifiable.

Chairman DUFFY. If we look at Waymo, and Uber, and Lyft and Tesla, and Ford, GM, Volvo, are they going to self-insure or how do they ask you to ensure them without providing the data? How does this gridlock break?

Mr. Gammelgard?

Mr. GAMMELGARD. Yes. Short answer to that is you are starting to see some collaboration in this space. Tesla, for example, is partnering with Liberty Mutual on an insurance product. And there have been some other startups that have looked to partner with tech companies and auto manufacturers for the specific purpose of getting some of that information.

I think the difference between what we are thinking about with our public policy considerations is how do you really move that out to address all of the public policy, all the public concerns. So to American Family's point, when we talk about data access, it is data related to the crash, data that's not proprietary. How do we make sure that there is an ecosystem that makes that information available to the benefit again of not just the insurance industry, but others as well.

Chairman DUFFY. Mr. Gillis?

Mr. GILLIS. Mr. Chairman, this is really where you come in. We are going to need your help to ensure that everyone has access to this data. It is our data. We are the consumer. This is our vehicle. This is our accident. This is our experience. That is one set of data that needs to be made publicly available.

The second set of data, something the insurance industry is going to need desperately, is how does all this technology work? What are

the success levels of the automatic braking system created by Ford versus the one created by Tesla versus the one created by Chrysler? There are so many different variables and data is the only way we are going to be able to assess which ones work and which ones don't.

Chairman DUFFY. Do you see the tech companies trying to self-insure?

Mr. GILLIS. We heard that originally they said they would like to self-insure.

Chairman DUFFY. They would.

Mr. GILLIS. They would. However, now, we are seeing them back off a little bit and say, "We are only going to insure for technological problems that can be attributed to ourselves." Now, we get back to assigning liability. Was it a technological problem that created the failure or did the driver make a mistake, or did I fail to download the software when I was notified to download new software, or did I not know that I was supposed to download new software?

There are going to be huge liability issues associated with these AVs.

Chairman DUFFY. My time is up, but one quick last question. Do you guys factor in driver assist technology on your rates?

Mr. GERACI. Right now, we have discounts or rather it is really in the early stages of this. The vehicle identification number, the VIN number has a lot of information in it around cars. It might tell us for example whether you have antilock brakes. But it doesn't have the presence of ADS technology in there or the type of ADS technology that is in there.

For example, antilock brakes are antilock brakes. But artificial intelligence is as varied as human intelligence. The quality of that might vary from vehicle to vehicle.

Chairman DUFFY. OK. My time is expired.

I now recognize the Ranking Member, Mr. Cleaver for 5 minutes.

Mr. CLEAVER. Thanks, Mr. Chairman.

Mr. Adams, I am trying not to be troglodytic in my views. In the 21st century, my own children criticize me for only calling on the cellphone, that is a waste of money. I am very interested in this technology. But frankly, I have some fears and one of them is—maybe you can give me information to calm myself down.

Do you believe travel in vehicles or vehicular travel in the years to come will reduce the number of automobile deaths in the country?

Mr. ADAMS. Thank you, Congressman. Yes, I absolutely do.

This technology is going to remove the single greatest factor in the casualties we see on our roads to date. And early returns on the testing and limited deployment of this technology has been remarkably positive. I am very optimistic about it.

Now, I agree with you as well. It is important that we exercise caution. When I think about what unfolded in Tempe and I think about the response of Governor Ducey to focus on one player in the environment, in the jurisdiction, and to tailor a solution based on their behavior, I think that's how we are going to have to move forward. We can't be putting the brakes on this technology across the board because its promise is so enormous.

To answer your question, yes, I believe that we are going to see fewer deaths on the road.

Mr. CLEAVER. If you are right and I think you probably are, how do you figure out the insurance market—how do you price insurance in the years to come if the number of accidents are decreasing. Does that put a burden on the insurance industry to figure out new ways to assess those who use these vehicles?

How are you going to survive if it is so safe that people don't even need insurance.

Mr. ADAMS. Sir, that's also an excellent question. It is going to be incumbent upon insurers and tech companies and just developers at large to be working together, because I think it is the case that we will continue to see crashes. Their frequency I believe will go down dramatically, but our early returns our experiences with level two vehicles is that these systems are more expensive.

And while over time the cost curve will be bent down I believe as a result of mass production and probably some design changes, moving some of those sensors from the front of the car to other places in the car where they are less vulnerable, you will ultimately see products that are going to be priced in such a way that there will be serious consumer side savings. That is going to redound to everyone's benefit.

Mr. CLEAVER. Mr. Carlson, I talked about affordability in my opening statement and I used the example, I moved here 14 years ago and I stupidly didn't buy a house not too far from here because it was considered to be a bad neighborhood. Now, I can't afford to live there.

The gentrification is happening everywhere. What happens with this new technology in terms of affordability? Is it just—and will only insurance agents be able to use the technology? The billionaires that you are.

Mr. CARLSON. Now, I think if anything, it is going to level the playing field. Having that much data accessible and as we have all said, making sure that it is accessible in the right ways and the right data, utilizing it to the consumer's end. Consumer preferences change and we have more informed consumers than ever before.

The models of buying cars in general online is changing. You can look online and certain auto manufacturers are actually offering up insurance products beyond what the traditional was like glass and wheels and other things. I think it is actually going to introduce competition into the marketplace. And if it does the right thing, it should actually open the door for more people to have more affordable insurance and it should be based on actual real world data of your driving.

Sudden starts, sudden accelerations, I am a bad driver, people can collect that information and understand that I am not the safest person in the world. Years ago, decades ago, that type of information wasn't going to be available to a police officer who shows up at the scene. Maybe there are some skid marks. Maybe there is somebody who was local that saw it, there was a witness, but outside of that, you were stymied by that.

Mr. CLEAVER. Thank you. My time is up.

Chairman DUFFY. The gentleman yields back.

The Chair recognizes the gentleman from Illinois, Mr. Hultgren, for 5 minutes.

Mr. HULTGREN. I thank the chairman again. Thank you all for being here. This is very interesting and I think it is important for us to have these conversations.

Mr. Gammelgard, if I can start with you, I want to begin by asking you about, some of this has already been discussed, but maybe just get a little bit more specific. The shift in liability that is expected to occur if an individual is using an autonomous vehicle instead of operating it him or herself, according to a report from the RAND Corporation, they said and I quote, "Liability could shift to the companies that created the software and technologies in the vehicle or the manufacturer that integrated those technologies into the car," end quote.

Do you believe State Farm or other insurance providers will have to reconsider the policies that they make available? And how are you working with auto manufacturers and their technology suppliers to understand the risks or lack thereof from autonomous vehicles and how to underwrite new policies?

Mr. GAMMELGARD. Yes. Definitely as the technology changes, as you see higher levels of automated vehicles on the road, that more than likely is going to necessitate a change in how policies are written in the different products and coverages that insurance companies offer.

That is something that I know from a State Farm perspective and I think for most other insurers, they are examining what is the potential impacts on insurance and what new products can you create. One thing that I do want to highlight that State Farm has explored and I know some other insurance companies, and I think this might address some of Representative Cleaver's questions as well is the introduction of personal mobility policies.

Instead of ensuring the vehicle, ensuring the passenger of the vehicle, ensuring the person every step on their journey during the day, and that could open up product opportunities for people who never would have ever thought about buying auto insurance. From a State Farm perspective, we do view it as what are the opportunities afforded in this space. In regards to working with other companies, I can't disclose some of the specific opportunities that we are looking at with some of the auto manufacturers, the suppliers, but I can offer this up.

Through our research partnerships at MCity for example and others, we do work closely with manufacturers and tech companies to get a better understanding of what this technology looks like, because we want to make sure that we understand the real world implications of this technology.

Going forward, I think it is important to realize that as we develop these new products, as we look for these new opportunities, there are going to be new stakeholders and new participants in this whole automated vehicle ecosystem and we are always on the lookout for who that is.

Mr. HULTGREN. One last quick question for you if I could. I don't know if it is quick or not. But I don't know if you or State Farm have an opinion or thought of where liability should fall if we are talking about a fully autonomous vehicle, what personal liability

might be there. Go to the manufacturer, which manufacturer would you go to?

Mr. GAMMELGARD. Yes. Our main public policy position regarding liability is, would you think the existing tort system is adequate to examine things as they currently exist? But I think there is a perception again and an understanding that as this does really go toward the operating system being in control, then, does it shift to more of a product liability system? I think that is a fair assumption.

At the same time, some of the things that we are working with and working against in some cases are attempts to carve out liability exceptions. For example, one thing that we see quite a bit around the States are attempts to carve out liability for manufacturers or tech companies if there has been a modification to the operating system that was not approved by the manufacturer. Without really defining what modification is that is a huge red flag for us.

To help address that, we do try to work with standards-setting organizations like SAE to make sure that we do have a better understanding of how they are developing some of those standards so that we can offer our input as well. Because again, we want to make sure we know as much about this technology as possible.

Mr. HULTGREN. Great.

In my last minute, Mr. Carlson, if I could address a couple off questions to you about current underwriting practices and how these may evolve with the technologies for autonomous vehicles. Currently, how do you factor in the autonomous driving characteristics of a vehicle? And I do understand that some vehicles have things that operate more like a driver assist such emergency braking features while others are very close to being fully automated. How do you all factor that in, the differences?

Mr. CARLSON. From a risk based perspective, looking at the data, we are going to have to take a nontraditional approach because a traditional approach will yield just that. I think it is collecting the data in a way that looks at what are the most at-risk opportunities in the vehicles themselves, what type of characteristics—the chairman was talking earlier about where is the moral compass going to happen and where would the data be most critical.

I think using that information with some of the actuarial services as well, again, without data and without enough loss or case law, it is very difficult for many of the colleagues in the panel to come up with something that says, “Hey, this is solid. We know this is going to work.” We have had to look at very different things.

I would say that artificial intelligence is going to come into play here at some point in time. With the millions of data points that are going to be collected, you are going to need very powerful tools, analytical tools, algorithms that are going to be able to come up with something and then really smart people are going to say, “This is where we should be now” and we are going to probably change in 5, 10 years. It is just going to continuously change and improve on that as far as getting the data in the car and the rest.

Mr. HULTGREN. Thank you.

My time is expired. I yield back.

Chairman DUFFY. The gentleman yields back.

The Chair now recognizes the gentleman from Pennsylvania, Mr. Rothfus, for 5 minutes.

Mr. ROTHFUS. Thank you, Mr. Chairman. I want to thank you for calling today's hearing. Autonomous vehicles represent a great opportunity for our economy and their potential impact on automotive safety could be profound.

KPMG estimates that autonomous vehicles could help reduce accident frequency by 80 percent by 2040. Considering that nearly 40,000 people died in motor vehicle crashes in 2016 alone, that means that this technology could save thousands of lives every single year. I am proud that much of the research in autonomous vehicles is being conducted in Pittsburgh by companies like Uber and Argo.

I actually had the opportunity to take my first ride in one of these vehicles to the streets of Pittsburgh last summer. I can see the promise of autonomous vehicles and I want to ensure that Washington and State level regulators create a fertile environment for the further development of this industry. I am looking forward to hearing from today's witnesses and what you have been testifying about.

First, I want to talk to Mr. Gammergard or Mr. Geraci. While this industry is new in developing products and testing in city streets, I am wondering how they are looking at the insurance aspects of it. Have you or others worked with the technology companies or auto manufacturers to develop insurance products?

Mr. GAMMELGARD. Thank you for the question. Without being able to speak to specific work that we may be exploring, I can say that State Farm does have a long history in relationship with a number of different auto manufacturers in relation to examining data that we have access to that we are analyzing as we are adjusting claims. We do expect that relationship to continue going forward.

I do think from my own observation having worked on this for the past few years, if you go back 2 or 3 years ago, there was this perception amongst those in the auto industry that self-insurance might be the way forward. I think that has changed a little bit. It seems, to me at least, there is a little bit more willingness to explore opportunities, and I think you are seeing that, for example, in Liberty Mutual partnering with Tesla. And I mentioned that earlier, but they were very, very public about that partnership.

And I think it is fair to say that in this world, when you look at all the different stakeholders that are in the mix here, it is only natural that the insurance industry would start to be brought more into that conversation.

Mr. ROTHFUS. Mr. Geraci.

Mr. GERACI. Yes. And American Family also has a history of partnerships with different groups. But as an industry, we do as well with the automakers. The Insurance Institute for Highway Safety (IIHS) has a long history of working with auto manufacturers. The companies that partner with them often do crash test data. You have seen the crash test dummies. A lot of that takes place with IIHS.

Mr. ROTHFUS. If we could talk a little bit about the State aspect of it, Mr. Adams, in your testimony, you discussed the importance



of an accommodating regulatory framework that enables flexible product development, deployment, and pricing. Can you elaborate on what States are doing to allow for more flexibility?

Mr. ADAMS. Thank you for the question. It is a mixed bag and that is part of the challenge with the laboratory of democracy approach that you have some States that had incumbent systems where you have to get prior approval for rates, and in some of those States, the timelines are really quite dramatic. And then, you have other States that require you to take factors like years driving, right, take driver experience into account.

And as we see these new technologies come onto the scene and be deployed in larger numbers, what we are going to be observing is scenarios where we are asking how effective a driver has been over the last several years, and that data really doesn't have a lot to do with the actual risk being presented. It is something that the National Association of Insurance Commissioners, I know that this is on their radar, the National Council of Insurance Legislators, I know that this is something that they are looking at.

But I think that the immediate answer to your question is we haven't seen any rapid regulatory changes being contemplated across the country yet.

Mr. CARLSON. If I may?

Mr. ROTHFUS. Yes.

Mr. CARLSON. I think it is accretive to this conversation that several States have put arbitrary \$5 million liability limits out and part of our solution was to actually build an insurance facility with several insurance companies that met a primary and a secondary layer that allowed risk to be managed. That is a business advantage and not a barrier.

I think that is part of what has to occur is the ability and the willingness to create the sandbox where we can all get in and say "OK. What must you have and what must the customer or the company testing these vehicles in order to meet and get some progress here", but in a very methodical and very thoughtful way.

Mr. ROTHFUS. Thank you.

I yield back, Mr. Chairman.

Mr. HULTGREN [presiding]. The gentleman yields back.

The gentleman from North Carolina is recognized for 5 minutes.

Mr. BUDD. Thank you, Mr. Chairman. And thank you again to all of our witnesses. I look forward to hearing your thoughts this afternoon on what is an interesting and very important topic and even more so in the future.

The National Association of Mutual Insurance Companies or NAMIC recently released a policy paper on AVs. The author, Tom Karol, points out that the single most important reason to support the development of AVs is the potential to enhance safety and to save lives.

Karol notes that the enhanced safety must always be the primary focus of AV development and this brings a question to mind. How safe must an AV be before is allowed on the roads, Mr. Geraci and then Mr. Gammelgard if you could weigh in on that?

Mr. GERACI. Sure. To be clear, the technology is really on version 1.0. They are still really evolving. It is in the testing phase. The relevant hurdle if you will is making the technology safer than a

human driver. Right now, it is 40,000 deaths per year because humans aren't perfect drivers as well. What we really need though is to get the data to understand how safe those vehicles are, which ones are at what level of safety.

The Senate's Start AV Bill had a good amendment, the Inhofe amendment that would establish the Data Access Advisory Committee wherein the manufacturers and insurance companies and other interested parties would work together to determine access and ownership of data.

With that, help from Congress that could assist in establishing some of the data that we—

Mr. BUDD. Good. Thank you.

Mr. Gammelgard.

Mr. GAMMELGARD. Yes. And to echo those comments and not to sound like a broken record, but data access is key and we can't stress that enough. When we look at current, I will just call them semi-automotive components that are on vehicles, Insurance Institute for Highway Safety does a number of testings, so does State Farm where we can actually get in and look to see how these components were working on a vehicle and that has led to some pretty good outcomes, right?

We are seeing some real-world information that shows that some of these components actually work as advertised, but it is not a one-size-fits-all approach and everything really is contingent on being able to analyze that data. State Farm much like others and American Family are supportive of the amendment, the AV Start Act that talks about that Data Advisory Committee.

The important thing there is, I think, it talks about a multi-stakeholder approach. It is the insurance industry. It is law enforcement. It is other organizations or other parties that are looking for the best way to go forward on this while understanding that data access is a key issue.

And the final thing I will point out is as NHTSA is updating its automated vehicle policy guidance, we have filed comments with NHTSA and I know Insurance Institute for Highway Safety has as well, that starts to outline what different data variables do we think are relevant in this future state.

We have definitely evolved, from this position of just broad general data access, to starting to get more refined so that we can respect that interplay between proprietary information and what is needed to appropriately determine whether or not this technology works.

Mr. BUDD. Good. Thank you for that.

NAMIC, and this is also you too as well, so NAMIC's policy paper also points out that the critical issues related to passenger safety, liability, and compensation after a crash require that insurance companies are included in the development of AVs. There have been legislative proposals that would preempt State and local authorities from regulating and enforcing performance standards for AVs.

But in terms of insurance, do you believe that the State should maintain their traditional authority in regulating matters of liability and insurance surrounding these AVs? There was a little bit of

thoughts on that earlier, but I would appreciate your comments on that.

Mr. GERACI. At American Family and I think this is true with State Farm as well is, yes, we believe that States should retain their traditional role. It is a little bit of a case of if it is not broke, don't fix it. And particularly as autonomous vehicles come out, they work better in different environments. In dry, flat environments, they tend to work best. You might want different rules there. We really do believe that now and in the future, you are going to want to see States controlling this.

Mr. GAMMELGARD. Yes, and from a State Farm perspective, and we are also involved with NAMIC AV Council that has helped craft those policy positions. Very supportive of the States continuing to be able to regulate the business of insurance, it is something that is very important to us and also something that I would argue in this State as the technologies develop, is actually much needed.

Mr. BUDD. Very good. Thank you both for your time.

Chairman DUFFY. The gentleman yields back.

The Chair now recognizes the gentleman from California, Mr. Sherman, for 5 minutes.

Mr. SHERMAN. As we move to self-driving vehicles, I hope things get safer. That is a good thing for society as a whole. It will of course affect insurance companies, attorneys, body shops, et cetera. There will still be some accidents and a question will arise as to whether we focus on a product liability model or on a driving negligence model and this will come up most in the area of what I would call failure to drive defensively.

If I am in the right and I drive through and some idiot hits me, the fact that if I was a better driver, might have been able to avoid the accident notwithstanding his mistake. I was in the vehicle code. I have no liability. On the other hand, in the product liability area, if you could design a car that can avoid an accident even if an idiot does this or that, even if a road has this or that flaw, and you fail to do so, the fact that the vehicle operates consistent with the vehicle code may not be sufficient.

And it will be interesting to see how the law develops and it will develop through case law and it will be unknown what the situation is. It would be better if we as a country could wrestle with these issues while the engineers are developing autonomous vehicles and have a national standard, and maybe you folks can give us some suggestions, the idea that we could keep up with the engineers here in Congress and—I don't know if we can do it. But at least we would have a try if we can.

OK. Mr. Gillis, we are approaching a world where it may not be inconceivable that cars won't be owned by individuals. The ride hailing services will control the market. And when Uber sends you the picture of the driver who is driving the car that picks you up, it may just be a round circle or maybe—in any case, not a human being driving that car. And obviously, large companies would have more leverage in negotiating with insurance companies.

Could you discuss how the dominance of a few large insurance purchasers instead of tens of millions of insurance purchasers would affect the industry?

Mr. GILLIS. The good news is that many of the companies right here are financially dependent on those hundreds and thousands of consumers that need automobile insurance. We would not be able to own automobiles if there was no insurance. We just can't—simply can't absorb the risk.

As consumers move into not owning vehicles, they will not need personal auto insurance. What they will move into is what we have heard a little bit about today is personal mobility insurance. They will likely have to buy some type of insurance that covers themselves when—rather than get into a battle with one of the big technology companies who reportedly is going to take on the liability for failure. But still, there has to be fault. The fault will have to be determined.

Mr. SHERMAN. Right now, there are plenty of people who have absolutely no insurance and absolutely no car. They call Uber and nobody is selling them a policy, an Uber-user policy. I wonder whether if I give up my car and start hailing the Uber that has no driver, whether I will need any insurance at all.

Mr. Gammelgard, there are two types of autonomous vehicles, those where there is a driver in them now and then the autonomous vehicle assist, but the human has some responsibility versus situations where there is no human in the driver's seat, just in the back seat.

Can you expand on the insurance implications of fully self-driving cars as opposed to self-driving cars where you are behind the wheel and you are supposed to take the wheel when necessary?

Mr. GAMMELGARD. Yes. And I think currently on the road, you have levels zero through two vehicles. We definitely insure some of those on the higher end of that scale. And then, the big question will be that transition to level four and five where theoretically, you don't have to have a driver. There might not even be a steering wheel in the vehicle.

I think the challenge is going to be in that level three space. And if you look at some of the research that has occurred, it is this big question about whether or not a vehicle that has an operating system driving the car can push control back to a human operator. There is a safety critical situation. How long does a person need to get re-acclimated into driving a vehicle. I think those are going to be the challenges that the insurance industry faces as you see that transition from level two into level four.

And those are the things that we need additional research, we need additional data access in order to be able to better judge how do we create and craft policies to help cover those risks.

Mr. SHERMAN. I wonder if I can sneak in one more. OK.

Mr. Geraci, the autonomous vehicles are not required to submit safety assessment letters to the National Highway Traffic Safety Administration before they are deployed for testing. At least that is what I am told. What steps are you taking to validate the safety of autonomous vehicles before they go out on the road?

Mr. GERACI. We need to be able to get data to understand the safety of those vehicles. In order to understand the safety of the autonomous vehicles, we really need to get the data that would underlie the performance of those cars, so what is their record, what is their safety record, what is their performance. And getting access

to that data would be foundational in order to help assess the risk that those cars pose or don't pose.

Mr. SHERMAN. Maybe Congress ought to help with requirements that you get that data.

Mr. GERACI. You could help with that. Yes.

Chairman DUFFY. The gentleman yields back.

The Chair now recognizes the gentleman from Missouri, the Chair of the Subcommittee on Financial Institutions, Mr. Luetkemeyer for 5 minutes.

Mr. LUETKEMEYER. Thank you, Mr. Chairman.

Welcome, gentlemen. I apologize for stepping out a while ago. If I ask some questions that are duplicative, please say so and I will move on. I am just curious. We are talking about the liability exposure of the company. How does this work whenever you have an autonomous vehicle, it is driving down the street, a pedestrian steps out in front of them and there is a car coming the other way.

Does the car hit the pedestrian? Does the car hit the other car coming on? Like, who decides which decision is the right one that minimizes liability? How does that work?

There are five of you, anybody want to take a try?

Mr. CARLSON. Yes. Yes. Without divulging client names, many of the conversations have been around the morality of your question. It is a great question. The ultimate is the responsibility to the current passenger as I understand it is right now, we are going to protect the passenger.

The ability for the car to—

Mr. LUETKEMEYER. When you say protect the passenger, you are saying that the car will make a decision on which one is going to be least harmful to the passenger. If it is to hit the pedestrian versus the other car, he will hit the pedestrian.

Mr. CARLSON. If it can make that decision. I can't give you an answer on whether it is going to hit a tree, a pedestrian, a dog, or a squirrel. What they are trying to do is utilize vehicle-to-vehicle data, vehicle-to-environment or what they call v-to-x and that technology is going to take time to development because not everything is interconnected.

Right now, you have vehicles out there that can't communicate with other vehicles that are 30 yards ahead, 40 yards ahead. Vehicle-to-X environment would be a situation where the vehicle is actually able to collect data off of infrastructure in other places. That should help with the morality issue where the vehicle is able to start making decisions and discriminate, if you will, between what is an object and something that can't be.

I know it is a great question that many companies are trying to solve for, because that morality issue is something that from a risk management perspective, they do want to address to ensure that the vehicles are as safe as possible, but then also pedestrians and others. I would add that I ride a road bike and I would love for them to know that I am an object that shouldn't be hit while I am riding on the road.

And earlier, one of the conversations was about how does this make a decision? What if a young athlete or a driver is driving along, makes a decision to scoot over and scare me off the road?

That could be really bad for me. An autonomous vehicle won't make that decision.

Mr. LUETKEMEYER. OK. Thank you.

You guys got into some discussions, I listened to some of those discussions with regards to State laws being—we want to make sure the States continue to enforce insurance laws. Is there an effort to work with the different State jurisdictions and say, “Hey, we have this going on. Can you give us some direction?” They have some ideas. Do they have any studies going on to help them with how they need to manage the oversight of this at all, or is it wait until you guys do something and then come back and see if it works.

Mr. GAMMELGARD. From a State Farm perspective, I know we have been very engaged with AAMVA, American Association of Motor Vehicle Administrators, basically all the State department of transportations and administrators have been able to participate in a number of different events that they have had and spoken and provided input.

And they recently just in the past week issued some guidance and guidelines for what they think the States should follow. We have been very engaged with the National Conference of State Legislatures. That is basically a nonprofit that helps collect different information that State policymakers then look at and review.

Mr. LUETKEMEYER. Are they helping facilitate between the manufacturer and insurance companies to be able to see you guys get the information you need to be able to make good decisions on insurance?

Mr. GAMMELGARD. They are helping facilitate those conversations to the degree that they can, right?

Mr. LUETKEMEYER. Yes.

Mr. GAMMELGARD. When they do have meetings and when they have different public partner, private partnerships, they are trying to make sure to reach out to a number of different stakeholders, so not just the manufacturers and the insurance industry, but other people and other groups that may be impacted by this technology as well.

Those are the attempts that are going on that come most to mind. At the same time, I think there probably needs to be continued work to make sure that everybody tries to work together going forward on these issues.

Mr. LUETKEMEYER. Very good.

I see my time is about to expire, Mr. Chairman. I will yield back the balance. Thank you.

Chairman DUFFY. The gentleman yields back.

Mr. CLEAVER. Mr. Chairman, I would like to enter into the record this article from Consumer Watchdog entitled, “Self-Driving Vehicles: The Threat to Consumers.”

Chairman DUFFY. Without objection.

Chairman DUFFY. If I could take the liberty to ask two questions, cyber hacking on these autonomous vehicles concerns, threats? Mr. Carlson?

Mr. CARLSON. Yes. I think it is a great question. I think it got a lot of fanfare when people were able to hack into a vehicle and without knowing all the knowledge actually, they had to remove

the entire dash, they had to have a laptop. This was not just—and then, the second time they did it, they got a little smarter.

My position and the thought is, is getting into that vehicle is maybe not the endgame for a malicious person. The end game may be getting into the financial services group of one of these large lenders where you are buying your cars. Personally identifiable information, I am pretty sure nobody really cares about me, but I am pretty sure that they would love to get into one of the large OEMs' global networks and make some type deleterious attack and do something that would stop production, industrial control systems, something of that nature.

It is a possibility and it is not outside the realm.

Chairman DUFFY. Anyone else?

Mr. Adams?

Mr. ADAMS. We think it is a very serious problem and it is a very personally serious problem. There is absolutely no question. We have seen attacks on schools. We have seen attacks on shopping centers. It is inevitable that a vehicle will be attacked, and that's why we are begging Congress to set up cyber security requirements as part of the AV Start Act, very, very important.

Chairman DUFFY. Anyone else?

Mr. GERACI. At American Family, we believe it is the Federal Government's role to help with that. Manufacturers are taking steps, so, there are only periodic uploads and downloads of data so that someone who is of malicious intent can't always access a vehicle, only at certain brief periods of time. But it would be good if Congress could include that in the legislation.

Mr. ADAMS. Sir, if I may, I think it is important to recognize that the manufacturers are actually doing a fair amount in this space. They realize that one of the most important elements for the adoption of this technology is the trust of the consumer. They have a clearinghouse of information for vulnerabilities, they work together. This is something that is at the top of their mind.

Chairman DUFFY. OK.

I want to thank the panel for their testimony today. I would just ask that you continue to advise and provide your insights and intelligence on what we in Congress should be doing specifically on our subcommittee and committee as a whole. We look forward to your wisdom and continued dialog.

The Chair notes that some Members may have additional questions for this panel, which they may wish to submit in writing. Without objection, the hearing record will remain open for 5 legislative days for Members to submit written questions to these witnesses and to place their responses in the record. Also, without objection, Members will have 5 legislative days to submit extraneous materials to the Chair for inclusion in the record.

Without objection, the hearing is now adjourned.

[Whereupon, at 3:54 p.m., the subcommittee was adjourned.]





# **A P P E N D I X**

May 23, 2018



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**Testimony of Ian Adams  
Associate Vice President of State Affairs  
R Street Institute**

**U.S. House Committee on Financial Services  
Subcommittee on Housing & Insurance  
"The Impact of Autonomous Vehicles on the Future of Insurance"  
May 23, 2018**

Chairman Duffy, Ranking Member Cleaver and members of the Subcommittee,

My name is Ian Adams, and I am associate vice president of state affairs of the R Street Institute, responsible for coordinating R Street's outreach and engagement at the state and local level, as well as our research into next generation transportation. I am also an attorney at Orrick, Herrington & Sutcliffe LLP, where I advise clients on matters at the intersection of law, business and public policy with a focus on highly-automated vehicle technologies and insurance.<sup>1</sup>

I appreciate the opportunity to testify and the work done by this committee to examine issues pertaining to both the future of transportation and the future of related insurance product offerings.

R Street is a nonpartisan, nonprofit public policy research organization based here in Washington, D.C. Through our research and outreach, we seek to promote free markets and limited, effective government at both the state and federal level, with a particular focus on issues that might be considered relatively low salience and high complexity. We have a commitment to work with broad coalitions and, wherever possible, to build support for pragmatic market-oriented proposals that can earn bipartisan consensus. As one notable example of that commitment, R Street is a part of the Self Driving Coalition for Safer Streets, a group of civic organizations and businesses dedicated to bringing the vision of fully self-driving vehicles to America's roads and highways.<sup>2</sup>

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<sup>1</sup> <https://www.rstreet.org/team/ian-adams-2/>

<sup>2</sup> <http://www.selfdrivingcoalition.org/about/mission>

## 2 | The Impact of Autonomous Vehicles on the Future of Insurance

R Street's research into autonomous vehicles stems directly from our insurance project, which has been a core part of our mission since we opened our doors six years ago. Annually, we publish a "report card" evaluating the regulatory environment for insurance in each of the 50 states.<sup>3</sup> Our work seeks to highlight the crucial role that competitive private insurance markets play in sending price signals that allow society to better evaluate, mitigate and manage risk. It is in no small part thanks to the risk-based insurance rates produced through private competition that America has significantly safer roads and workplaces today than it did 50 or 100 years ago. The prospect of lower premiums has offered strong incentives for employers, automakers and drivers to opt for safer behavior and safer processes.

However, such price signals can be muted or deliberately distorted where underwriting and ratemaking decisions are subject to explicit government-imposed price controls, as is the case in many states that require administrative "prior approval" before a rate may be used.<sup>4</sup> As policymakers grapple with the opportunities and challenges posed by autonomous vehicles, they should always be mindful of the need for risk-based pricing and the types of regulatory environments best able to facilitate such outcomes. Encouraging flexible product development, deployment and pricing will be vital if consumers are to understand both the safety and financial benefits of autonomous vehicles.

### Insurance in the Autonomous Vehicle Era

**Role of insurance:** As is true today, the role of insurance in an era dominated by highly automated technologies will continue to be to provide financial certainty to the owner and operator of a vehicle in the event of an accident, theft or other damage to that vehicle. This will remain true regardless of how such vehicles are deployed or what entity is responsible to pay insurance premiums.

However, in a world of autonomous vehicles, insurance may play additional roles as well. For example, using data shared by vehicle developers, insurers could provide real-time modifications to a vehicle's activity based on risk management models. Which is to say, while insurers historically have championed safety modifications for drivers and vehicles alike, automated systems may allow them to act proactively to modify how these systems behave.

**Pricing of insurance policies:** Insurance pricing will depend largely on the loss experience that autonomous vehicles have on the road, as well as the scope of the coverages considered necessary for those vehicles, which may differ from those that are standard today. It remains to be seen what access insurers will have to data related to vehicle operation, how deployed autonomous vehicle systems change over time and how existing regulatory structures will respond to near real time product and pricing demands.

Insurers will need to be able to access data related to autonomous vehicle operation if they hope to create products that meaningfully reflect risk. While we do not believe that compulsory access to such

<sup>3</sup> <https://2o9ub0417chl2lg6m43em6psi2i-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/126-1.pdf>

<sup>4</sup> <https://www.rstreet.org/wp-content/uploads/2015/10/RSTREET43.pdf>

### 3 | The Impact of Autonomous Vehicles on the Future of Insurance

data is appropriate, there are strong incentives for autonomous vehicle developers to share vehicle information with insurers for risk management purposes. It also is important regulators not adopt policies that would meaningfully hinder insurers from being able to obtain data vital to underwriting, rating and claims-settlement practices.

Autonomous vehicles are likely to present meaningfully different approaches to operation based on what software they run. As we already see today, it is likely that vehicles will be updated on an ongoing basis. For that reason, at bottom, it is vital that insurers have maximum flexibility to develop rates for these vehicles. In practice, including both the pace at which such rates are rolled out and the rating factors that insurers are allowed to consider.

For their part, regulators also will confront evolving and unfamiliar datasets. Existing regulatory approaches to both product underwriting and rating will be stressed, as systems designed to assess risk based on the characteristics of a driver are confronted by loss experience driven – at least in part – by automation. Any regulatory structure unable to account for the behavior of the vehicle as much, if not more, than its operator, will fail to present consumers with vital price information.

For instance, in California, it is currently the case that private passenger auto policies have a prescribed hierarchy of rating factors that must be adhered to. The three most important mandatory rating factors are, in order of weight and significance: driver safety record; annual miles driven; and years of experience. An autonomous vehicle's insurance policy must account for and weigh factors that have limited relevance to the actual risk profile of the vehicle. In other words, California law mandates that certain autonomous vehicles be subject to insurance products that are irrationally priced.

#### **Provision of Insurance – Individual versus Fleet Coverages**

The frequently cited SAE Levels of Automation provide policymakers and the public with a tool to understand the capabilities of the systems installed on vehicles.<sup>5</sup> Some vehicles are more capable than others at performing tasks without requiring the attention or intervention of a driver. Of course, the distinctions between systems' capabilities have direct bearing on the risk profile of the technologies as they are deployed, but they will also play a large role in determining what sort of model for deployment developers will choose to employ.

Personal vehicle ownership – and, thus, private passenger automobile policies – may still be broadly viable in the context of Level 3 technologies. If experience with Level 2 systems is indicative of future Level 3 systems, loss frequency is likely to decrease while the financial severity of losses is likely to increase. Systems employed to date have contributed to improvements in driver and passenger safety, but have a mixed track record of cost savings. There is much that autonomous vehicle developers could do improve the cost profile of their systems by using conscious vehicle engineering choices and mass autonomous vehicle production. What all of this will mean for the premiums paid by operators of highly

<sup>5</sup> [https://www.sae.org/standards/content/j3016\\_201609/](https://www.sae.org/standards/content/j3016_201609/)

#### 4 | The Impact of Autonomous Vehicles on the Future of Insurance

automated systems remains unclear – though we are optimistic that costs will align with favorable safety outcomes.

Level 4 and 5 technologies are more often envisioned operating in fleets, particularly in the context of ridesharing companies. Rather than private passenger auto policies, fleet operators would need commercial property and casualty coverages to cover both the physical assets and any liability their operation might pose to the lives or property of third parties. Initially, this coverage would likely need to be procured in the relatively unregulated excess and surplus lines market. However, as fleets proliferate and become larger, we expect a level of standardization for commercial line autonomous vehicle fleet policies to develop. In that context, commercial autonomous vehicle fleet coverages are likely to become admitted coverages subject to greater underwriting and rating scrutiny.

One clear benefit of the ultimate shift toward an admitted product line would be that policyholders will have recourse to guaranty associations in the event of a solvency issue with an insurer. This might prove particularly important in the event that a state moves away from the negligence-based liability system that we see today toward a model based on strict product liability. Yet, it will also mean that state insurance regulators will retain greater control of product pricing and approval – which, in some jurisdictions, may result in the perversion of cost signals.

Ultimately, conventional knowledge suggests that if Level 4 and 5 vehicles operated in fleet contexts result in meaningfully better safety outcomes vis-à-vis crash frequency, we should see significant cost savings. However, without loss experiences borne out in reality, this assumption must be understood as speculative.

#### **The Future of Automobile Liability**

Until there is a clear reason to change course, we believe that an approach to civil liability based on negligence and not strict or product liability is the best way forward when it comes to autonomous vehicle technology. We have three reasons for this, two legal and one practical:

- 1) A fault with an AV's technology does not automatically indicate a lack of due care – as would be the case with a product liability system;
- 2) The human/vehicle interface lends itself to a shared liability scenario based on the nature of control;
- 3) Excessive liability could seriously retard the development and deployment timeline of these vehicles. In a mixed-fleet environment, we believe these concerns are particularly pronounced.

What's more, insurers have a history of responding to negligence claims in a way that consumers are generally satisfied with. Moving away from that situation, to one in which developers are tasked with marshaling a response would be challenging.

#### **Affirming Jurisdiction**

While it is the case that some states handle product approval and pricing better than others, the U.S. system of state-based insurance regulation established by the McCarran-Ferguson Act of 1945 remains strong. Toward that end, the federal government must do its part to ensure that design, safety and performance standards for autonomous vehicles remain clearly within the remit of its authority – and its authority alone. Likewise, the federal government should affirm that insurance considerations will remain the province of state regulators. Confusion or ambiguity on this point will complicate the already dizzying set of issues confronting the industry when it comes to adapting to the arrival of autonomous vehicles.

#### **Conclusion**

In closing, I'd like to again emphasize that what action can be taken prospectively to ensure that there is no lag between regulatory capabilities and product necessity should be pursued. With respect to product approval and pricing in the mixed-fleet era that confronts us in the near term, this is particularly important. The shortcomings of such systems are already well documented.

Likewise, it is vital that policymakers avoid potentially disruptive modifications to existing systems used to apportion liability without first gaining a better understanding of the effects that such a modification would have on consumers, insurers and developers.

While obstacles remain, the promise of autonomous vehicles is profound. At R Street, we believe that private insurance, as an effective tool for signaling the relative safety of modes of transportation via price, is well positioned to aid in the adoption and proliferation of the technology.



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Testimony of  
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Before the US House of Representatives  
Committee on Financial Services  
Subcommittee on Housing and Insurance

"The Impact of Autonomous Vehicles on the  
Future of Insurance"

May 23, 2018

### Introduction

Good afternoon and thank you for the opportunity to participate in today's hearing. I am David Carlson, a Senior Vice President at Marsh, where I lead our US Manufacturing and Automotive Industry Practice.

Marsh is the world's largest insurance broker and part of Marsh & McLennan Companies, which is headquartered in the United States and operates through four market-leading brands — Guy Carpenter, Mercer, Oliver Wyman, and Marsh. Together, the 65,000 employees of Marsh & McLennan provide advice and solutions to clients in 130 countries across an array of industries in the areas of risk, strategy, and human capital. Since 1871, our companies have worked at the forefront of emerging technologies and the risks that accompany them. In particular, Marsh and Oliver Wyman have developed specialties in both identifying and mitigating key risks related to autonomous vehicles as well as advising executives across the broader automotive industry.

Marsh's US Manufacturing and Automotive Practice is comprised of a global network of more than 500 dedicated manufacturing and automotive insurance and risk management professionals located in more than 100 countries. We serve approximately 12,000 manufacturing and automotive clients globally, including nearly 1,000 based in the US. Our clients include two-thirds of the top 50 US logistics firms and the top 100 US for-hire carriers.

Marsh's focus on today's topic led to the creation of our Sharing Economy and Autonomous Mobility Center of Excellence. This group has developed insurance solutions for several clients that are testing autonomous vehicles, including:

- Auto manufacturers.
- Technology companies.
- Autonomous software developers.
- Component suppliers (including microchips and LiDAR).
- On-demand platforms.
- Trucking companies.

Our sister company, Oliver Wyman, supports leading auto manufacturers and suppliers worldwide in developing and operationalizing business strategies and models. These consultants help auto companies generate more value for their customers, innovate and optimize their products and operations, and develop their brands. They support suppliers with strategic problem-solving, innovation, development, and cost-cutting programs. Oliver Wyman's broad experience allows Marsh & McLennan to also support wholesalers, car importers, and service providers, as well as private equity companies and investment banks in the auto industry.

In today's testimony, I will share initial observations on mobility transformation and focus on the impact autonomous vehicles may have on risk management and the insurance industry.



### **Autonomous Vehicles and the Future of the Automotive Industry**

The automotive industry is experiencing a level of change and innovation not seen since the introduction of the passenger car. While this sector has traditionally been dominated by original equipment manufacturers (OEMs) and their suppliers, today it welcomes a host of new players that are transforming the world's relationship with vehicles. Transportation network companies, such as Uber and Lyft, and sharing economy companies, including Zipcar and Getaround, are leading a transition away from individual ownership and driving toward new ways of moving around communities and accessing vehicles without the obligations of ownership.

Overall, the industry is healthy. Automotive manufacturing growth remains strong, with light duty truck and sport utility vehicles fueling industry performance. Expansion of regional manufacturing growth has been significant, with China in particular exhibiting a compound annual growth rate of 15% since 2003. The development and manufacture of vehicles, their component parts, and their software and service platforms are all becoming increasingly complex.

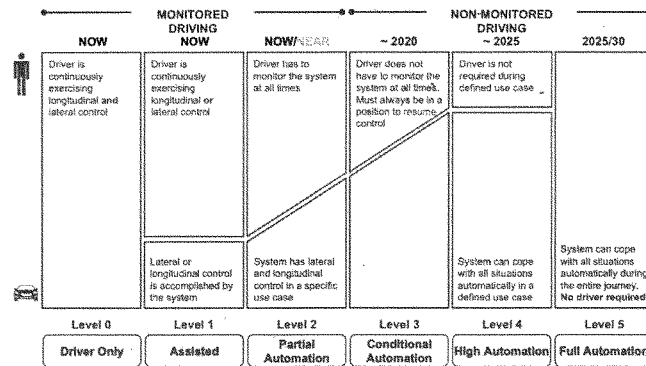
In our view, seven trends, enabled and accelerated by digitization, artificial intelligence, and machine learning, will dominate the automotive industry for the next decade:

1. Human-machine interfaces — new and digitized control concepts for driver/car interaction.
2. Changing customer structures — partial replacement of individual vehicle buyers with large fleet or group buying, driven by mobility-on-demand services.
3. New distribution channels — pay for use and ride-sharing.
4. Digital industry — increasing digitization of processes through predictive and adaptive data capability.
5. E-mobility — increasing electrification of powertrains, resulting in decreasing penetration of internal combustion engines.
6. Autonomous vehicles — progression of today's partially automated driving into fully driverless vehicles.
7. Connected vehicles — additional safety and services through increasing connectedness.

These trends are leading to a seismic shift for the automotive industry, the way consumers use its products, and the way they both use insurance to manage risk. Marsh advises a majority of the companies working to transform the automotive industry. As a result, we have an unrivaled view into the implications that autonomous vehicles, transportation network companies, and sharing economy companies have for the insurance sector. We bring deep industry knowledge and risk management insights to bear on these innovations and emerging risks. We are driving change in the insurance sector to create innovative insurance solutions that will help to fuel the automotive industry and unlock the next generation of consumer benefits. Figure 1 below demonstrates the evolution of the automation process.

Figure 1

Autonomous vehicles – The evolution has already begun  
 Autonomous driving is still in early stages but is expected to reach full automation levels between 2025 and 2030



Source: NHTSA, SAE, Oliver Wyman analysis

© Oliver Wyman

1

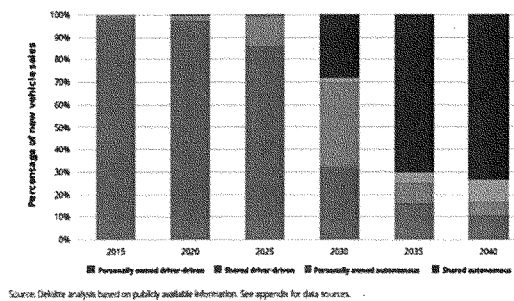
### The Impact on Risk Management and the Insurance Industry

Autonomous vehicle technologies are creating enormous shifts in the automotive industry and insurance sector alike. Questions about liability, risk assessment, losses, and many other issues are being asked in boardrooms, courtrooms, and committee rooms like this one.

Today, auto liability generally focuses on three factors: the driver, the vehicle, and road conditions. According to the National Motor Vehicle Crash Causation Survey, 94% of auto claims are due to driver error, 2% are due to malfunctioning equipment, 2% are due to environmental conditions, and the remaining 2% are unidentified. Insurance solutions in this world are straightforward — they involve understanding the driver and the vehicle and modeling the propensity for loss. While we often imagine the autonomous personal vehicle when discussing this topic, the impact of fleets of autonomous vehicles on our roads, rails, waterways, and skies has the potential to radically alter responsibility and liability in ways that will greatly impact the business of insurance.

As autonomous vehicles become a majority of new vehicles in the next two decades (see Figure 2), the 94% of auto claims due to driver error seems sure to fall. This decline will lead to lower costs for drivers and carriers and has the potential to save many of the estimated 37,000 lives lost each year in traffic accidents according to the National Highway Traffic Safety Administration. The trend raises questions about how the insurance sector will incorporate driverless technologies and help consumers benefit from them. While autonomous vehicle technologies are new, the development of solutions that embrace innovations and manage emerging risks is second nature to the insurance sector.

Figure 2

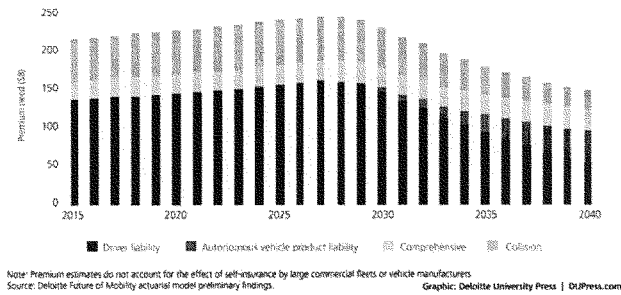


Soon, the historic factors used to determine the likelihood of an auto accident and to price insurance will no longer be viable. The change will lead insurers to examine other industries that have experienced transformational safety changes. Aviation is prime example.

Already, the underwriting and pricing of risks for personal, commercial, and trucking insurance is beginning to take assisted driving technology advances into account. Across the fleet space, companies are rapidly integrating assisted driving technologies in order to reduce the frequency of accidents, identify drivers with risky behaviors, and stem losses related to distracted driving and driver fatigue. Those companies deploying these technologies more slowly are being penalized with significant premiums and a lack of available limits of insurance.

With the advancements in autonomous technology, these trends will accelerate. As seen in Figure 3, the shift of premium in total and how that is allocated will be part of this transformational change. Notably, manufacturers, component suppliers, and technology companies will start to assume more liability for the performance of their systems.

Figure 3



It is worth noting the trend for collision coverage projected in Figure 3. While a reduction over time is expected, more accidents are initially forecast as human-driven and driverless cars share the road. Ultimately, driverless cars will have a positive impact, reducing both injury rates and insurance payouts.

Today, however, there is concern over how to ensure autonomous vehicles are safe before they interact with the public. Among the challenges for policymakers is how to mitigate public concern about the convergence of human-driven and autonomous vehicles, while not stymieing the advance of technology that can save lives. Once the collision coverage curve starts to bend around 2029, roads will be much safer than they have been for the past century, but product liability insurance premiums for manufacturers are projected to grow substantially.

Another factor with which policymakers will have to grapple is the severity of future auto crashes. Below, Figure 4 shows the projected steep decline in accident rates as autonomous vehicles become common. It is contrasted with a similarly steep increase in Figure 5, which shows that as accident rates fall the cost of each accident will increase significantly. This is because the cost of a vehicle is projected to increase significantly over time.

Figure 4

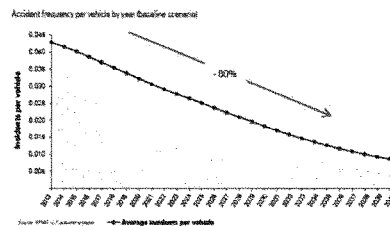
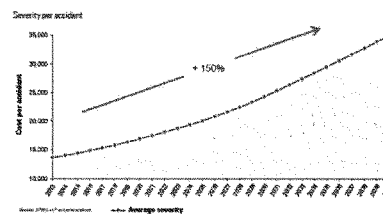
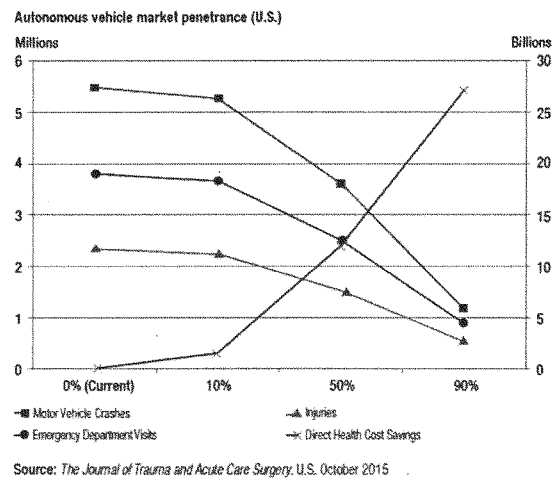


Figure 5



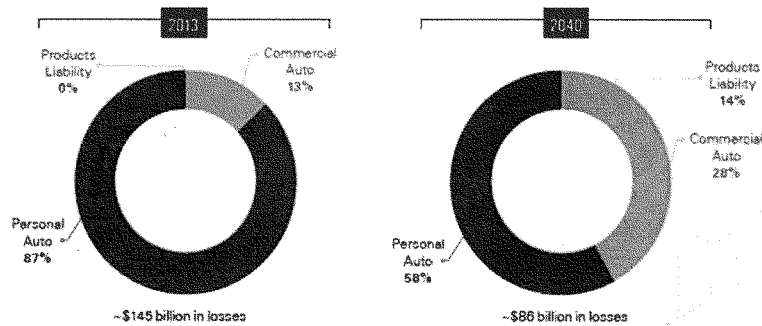
A correlating factor to consider is the potential impact on health care coverage. The adoption of autonomous vehicles is predicted to greatly reduce the volume of injury-causing vehicle crashes. As Figure 6 shows, this is forecast to result in substantial direct health care savings. While it will be a great benefit to society, the change will likely cause financial losses for hospitals, medical care providers, and a wide variety of industries in ways we cannot forecast today.

Figure 6



The strongest growth in insurance will be in the area of product liability. A key question is how organizations will appropriately manage this risk. As society becomes more dependent on various products, those products' manufacturers and distributors will bear more liability. It will become necessary to refocus current risk management strategies to account for this shift.

Figure 7



Source: KPMG LLP actuarial analysis

### **Trends in Legislation and Insurance Coverage**

Policymakers in Washington, in statehouses, and in regulatory agencies around the world are in the first phase of enabling the transition to autonomous vehicles. Despite the likely broad societal and economic impact, legislators and regulators have made establishing a regulatory framework for autonomous vehicles a relatively low priority.

But, government is not alone in moving cautiously. The insurance industry is also struggling to adapt and looking to policymakers for guidance. As with cybersecurity and related insurance, there is value for a public-private partnership to help develop the technology and marketplace.

As you know, the US Department of Transportation's National Highway Traffic Safety Administration released helpful new federal guidance in *Automated Driving Systems: A Vision for Safety 2.0* in December 2017. The guidance calls for industry, state, and local governments, safety and mobility advocates, and the public to lay the path for deploying automated vehicles and technologies. The states of California, Connecticut, Nevada, New York, and Tennessee now require \$5 million of automobile liability insurance for manufacturers to test autonomous vehicles. Indeed, almost all states have evaluated the need for specific legislation to address the testing and deployment of autonomous vehicles.

However, autonomous mobility companies are struggling to buy competitively priced insurance for their auto risks. Smaller companies were buying insufficient capacity in the personal lines marketplace. The traditional insurance marketplace is struggling to address the needs of small- to midsize fleets looking to enter the autonomous vehicles market.

At Marsh & McLennan Companies, we believe this is not satisfactory. We have challenged ourselves and the insurance marketplace to rapidly develop solutions that can address the risks as they exist today, and quickly evolve and expand as the technology moves forward. Just the same, regulations cannot evolve into a barrier to deploying autonomous vehicle technologies. The US must not let an underdeveloped insurance market or regulations prevent this technology from moving forward.

Facilitating the autonomous shift requires regulatory flexibility to allow insurance solutions to evolve. As consumers and companies no longer own assets — but rather buy access to them — we need to transition the way insurance functions. Marsh & McLennan is committed to working with insurance companies to develop new insurance products that cover individuals or assets for specific actions or over certain periods of time, potentially on parametric triggers.

The current regulatory framework limits the development of innovative insurance products when there is not specific historical loss data or case law. Without flexibility, it is hard to develop products that address emerging technologies and changes in consumer demand for insurance products. That flexibility to innovate and develop new products has helped enable the success of ride-sharing insurance solutions over the last five years.

Working with industry leaders in the space, Marsh developed the first ride-sharing policy to adapt to the fact that people were no longer using their vehicles for 100% personal or 100% commercial use. The solution we pioneered — leveraging the flexibility offered by the surplus lines framework — has been codified by policymakers across the country. The insurance solution provides protections for the ride-sharing public as well as the drivers of ride-share automobiles. Marsh has facilitated the creation of hundreds of insurance products throughout the personal insurance marketplace that have allowed broad consumer choice to purchase insurance that meets individual needs. We envision similar innovation enabling successes across the autonomous mobility space.

### **Conclusion**

Growing up, we were always reminded to never get into a car with a stranger. I'm willing to bet that nearly everyone in this room used a transportation network company in the past week and got into a car with a complete stranger. Who knows — in another decade, we may regularly get into a car with no driver at all.

The shift is on. Society is moving from driving our individually owned cars, to sharing cars that we or someone else drives, to sharing cars that are autonomous. The effect of this is nothing short of revolutionary. Policymakers should embrace the significant social and economic benefits now and the insurance sector must be nimble and willing to change the way it views risk and offer competitively priced enhanced insurance for the next millennium.



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Public Policy Resource Group  
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May 23, 2018

## **The Impact of Autonomous Vehicles on the Future of Insurance**

### **Testimony of Ryan Gammelgard, Counsel, State Farm Public Policy Resource Group, Before the House Financial Subcommittee on Housing and Insurance**

Mr. Chairman and Members of the Committee,

My name is Ryan Gammelgard and I am Counsel in the Public Policy Resource Group at State Farm, where I work on public policy issues related to automated vehicles. Thank you for the opportunity to provide comments regarding automated vehicle technology and its impact on insurance.

State Farm's mission is to help people manage the risks of everyday life and recover from the unexpected. State Farm has been the nation's largest auto insurer for over seventy-five years, with over 45 million auto policies in force. Its 18,000 agents and more than 65,000 employees serve more than 83 million policies and accounts. While State Farm provides over a hundred product lines, the majority of our \$76 billion annual revenue comes from auto insurance. Automated vehicle technology will significantly impact how insurers protect policyholders from financial loss and risk – and, to the extent these advancements enhance auto and highway safety, State Farm is excited about and supportive of these technologies.

Throughout our ninety-five year history, State Farm has supported technology advancements that improved safety for the benefit of our customers, including seatbelts, airbags, and child car seats. We support developments that have the promise of saving lives and avoiding injuries, including higher levels of automation associated with automated driving systems (ADS). According to the National Highway Traffic Safety Administration (NHTSA), over 90 percent of car crashes are attributable in some part to driver error; ADS may eliminate a large number of these crashes, benefiting all. While ADS will reduce or eliminate some risks that drivers face today, new risks are likely to emerge.

#### **I. Collaboration and Research**

In order to learn more about ADS technologies and its potential impact on insurance and our policyholders, State Farm takes an active role in collaborative, multi-industry conversations and research. For example, State Farm has a unique public-private relationship with the University of Michigan called MCity, providing early access to the latest data and research findings in the area of connected and automated ecosystems. State Farm is the only insurance company Leadership Circle Member of MCity. In this role, it helps guide MCity's research programs along with other automotive and tech Leadership Circle Members such as Ford, GM, Intel, Verizon, and LG. State Farm recognizes that development of ADS is occurring with a heightened state

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of interconnectivity between a number of different industries, and this is reflected in the membership of MCity.

State Farm is also a key partner in Stanford University's Center for Automotive Research and was the only insurer to be appointed to the U.S. Department of Transportation's Advisory Committee on Automation in Transportation. State Farm also conducts ADS research at its Vehicle Research Facility and Technology Research and Innovation Laboratory. State Farm also conducts surveys on the public's perceptions of ADS technology.<sup>1</sup> From these efforts, State Farm has data, insight, and experience regarding existing risks that may be mitigated by this technology and the new risks that may emerge.

## II. Public Policy Considerations

State Farm understands that ADS will impact its business. Currently, cars are capable of varying levels of automation from SAE Levels 0 to 3; however, the timing for movement to the SAE Level 4 and 5 is of great interest and speculation. Most recently, GM announced its intentions to have a commercial fleet of SAE Level 4 vehicles on the road in 2019. The Insurance Institute for Highway Safety (IIHS), however, estimates that it may take thirty years from the time fully automated and connected vehicles are introduced to market saturation. In the meantime, our roads will include a range of SAE levels, requiring State Farm to continue to adapt to needs of customers while focusing on the future.

Key issues for State Farm and insurers in this public policy discussion relate to our ability to assess risks presented by our customers, to price that risk appropriately, and to handle claims that result from crashes. State Farm helped create the National Association of Mutual Insurance Companies' (NAMIC) Automated Vehicle (AV) Council, which is comprised of public policy and technical experts from select member companies. The NAMIC AV Council, with State Farm input, adopted these public policy principles regarding automated driving systems:

- **Safety is paramount:** We fully support ADS innovation and development that enhances safety.
- **Insurer data access is critical:** Insurers should have access to ADS information and data – including crash accident and incident information and data – that is timely, complete and useful.
- **Standards should be set nationally:** The Federal government – through NHTSA – should have the authority to make determinations for the required performance and safety, as well as data integrity, of ADS.
- **Administration should remain local:** States and localities should have the authority to make their own determinations of the registration, licensing, and operation of ADS in their jurisdictions
- **Insurance requirements should be set by the states:** States should continue to regulate ADS insurance for the vehicle or operator.
- **Existing liability principles/authorities should apply:** States should define and address ADS personal liability issues in state/tort law and regulation in line with existing liability constructs. States and federal authorities should have the authority to define and address ADS liability issues in law and regulation.

<sup>1</sup> <https://newsroom.statefarm.com/state-farm-releases-autonomous-vehicles-survey-results/>

- **Data security/privacy standards must adapt to the reality of ADS:** States and federal authorities working together should make clear and workable data security and privacy requirements for AVs.

From these public policy principles, several key issues emerge for State Farm – data access, liability laws, and the ability for the insurance industry to innovate.

#### **a. Data**

First, data access is a key issue for the insurance industry. Data access is (1) essential to developing proper pricing and underwriting of vehicles, (2) critical for liability determinations, and (3) from the general public's perspective, important in determining the safety and reliability of technology. Insurers should have access to automated driving system information and data – including crash accident and incident information and data – that is timely, complete, and useful. It is important to note that access to data does not infringe on the proprietary nature of that data and the access is relevant to specific issues of, for example, underwriting and liability, as opposed to the wholesale collection of all data associated with a vehicle.

It is important to note that ADS data access is a key issue for numerous stakeholders. State Farm was encouraged to see the U.S. Department of Transportation's and NHTSA's "Automated Driving Systems 2.0: A Vision for Safety" Guidance noting the importance of ADS data being made available to other parties and specifically referencing federal regulations on event data recorders in discussing how ADS should collect and make available crash data.<sup>2</sup> More recently, the American Association of Motor Vehicle Administrators (AAMVA) issued its "Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles" highlighting in a number of sections the need to make crash related data available to law enforcement and other parties.<sup>3</sup>

#### **b. Liability Landscape**

The liability landscape is critical to insurers from two perspectives – liability laws and cybersecurity issues. State Farm's current position is that existing state liability and tort laws are sufficient and can evolve sufficiently to handle evolving technology, just as tort law has evolved historically. There is a growing perception that with the move to higher levels of automation and more of a move to a commercial fleet ownership of ADS vehicles, there will be more of a shift toward commercial insurance and product liability issues. Accordingly, there may be continued examination in the insurance industry as to how to position itself to transition from personal owned automobile insurance to commercial (including ride sharing companies) owned fleets and product liability coverage. In addition, there may be greater focus on personal mobility coverage (i.e., insurance that covers the passenger as opposed to the vehicle). However, before there is any attempts to define or create new liability structures there needs to be additional research and thought in regards to what is the best approach going forward.

In considering the evolving liability landscape, cybersecurity is critical, as there are growing concerns regarding the ability for a person, entity, or state to hack into an ADS, ultimately

<sup>2</sup> U.S. Dept. of Transportation and National Highway Traffic Safety Administration's "Automated Driving Systems 2.0: A Vision for Safety" Guidance at page 14 (2017).

<sup>3</sup> American Association of Motor Vehicle Administrators "Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles (2018)" (<https://www.aamva.org/default.aspx>).

causing accidents. These risks will increase the complexity of underwriting and adjusting cyber insurance products, but may also provide opportunities for new product development.

**c. Ability to Innovate**

Finally, as there is a continued focus on allowing manufacturers, suppliers, and tech companies innovate in the connected and automated vehicle space, there needs to be an examination of how insurers will also be able to innovate in relation to product and coverage development for these new technologies. There is a greater understanding of the role of the insurance industry as a stakeholder in the future of these technologies. As recent events show, there will continue to be crashes regardless of what level of automation exists on a vehicle, and thus a need for the ability to properly address risk in the future state.

As laws expand and are amended to allow for testing and implementation of these technologies, it will be appropriate to determine how insurers can appropriately match price to risk and develop new products. For example, how will insurers be able to match price to risk when there is limited data to use to underwrite these technologies. Also, considering the traditional way of reviewing and approving insurance coverages and rates, will insurers be able to sync up their new products with the pace of development of connected and automated vehicle technologies? It may be worth exploring the need to allow for the insurance industry to better adapt to the future state of connected and automated vehicles. This in turn can help encourage the safe implementation of connected and automated vehicle technologies.

**Conclusion**

State Farm supports technology advancements that improve safety for the benefit of our customers, and is a key stakeholder in the development of automated vehicle technologies. We look forward to continue to help influence the safe development of these technologies and look forward to continued opportunities to help shape this debate. Please let us know if you have additional questions as we continue to work on these issues together. Thank you again for the opportunity to provide this testimony.

Sincerely,

Ryan Gammelgard, CPCU, CLU, ChFC  
Counsel, Public Policy Resource Group  
State Farm Insurance Companies

Enclosure



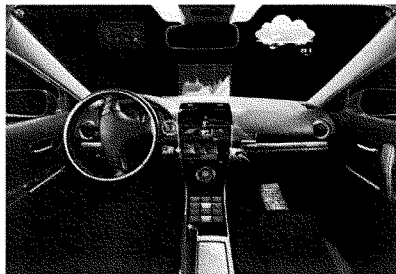
## Automated Driving Systems

State Farm® is committed to the safety of our customers and the motoring public. For decades, we have collaborated with academic, industry and advocacy organizations with the goal of preventing crashes, injuries and deaths on our nation's roadways.

Many of today's crash avoidance technologies, such as automatic emergency braking and electronic stability control, have demonstrated positive results in moving towards this goal.<sup>1</sup> However, there is still a long way to go and will require a holistic approach that encompasses the occupants, the vehicle and the environment (roadway, policy, social).

State Farm supports mobility innovation that enhances safety, including the development, testing and implementation of Automated Driving Systems (ADS).

The Society of Automotive Engineers (SAE) defined the six levels of automation, ranging from L0 (no automation) to L5 (full automation). The SAE levels are depicted below. Advanced driver assistance systems (ADAS) fall within levels 0-2, whereas ADS aligns with levels 3-5.



SAE Levels of Automation

	Level of Automation	Motion Control	Monitoring	Fallback Control	Where can it operate?
ADAS	0 No Driving Automation				n/a
	1 Driving Assistance <small>steering OR acceleration/braking</small>				limited
	2 Partial Automation <small>steering AND acceleration/braking</small>				limited
ADS	3 Conditional Automation				limited
	4 High Automation				limited
	5 Full Automation				unlimited

ADAS – Advanced Driver Assistance System

ADS – Automated Driving System

<sup>1</sup>Insurance Institute for Highway Safety;  
IIHS Real-world benefits of crash avoidance technologies

Recognizing the role of insurance within the transportation ecosystem, **State Farm recommends the following principles when considering public policy related to ADS:**

- Insurers should have timely access to comprehensive data about the vehicle and its ADS, including technical specifications, performance and crashes or notable incidents.
- The federal government, through the National Highway Traffic Safety Administration (NHTSA), should have the authority to make determinations for the required performance and safety, as well as data integrity, of the ADS.
- States and localities should have the authority to make determinations of the registration, licensing and operation of ADS in that state/locality.
- States should retain the regulation of ADS insurance for the vehicle or operator.
- States should define and address ADS personal liability issues in state/tort law and regulation in line with existing liability constructs. States and federal authorities should have the authority to define and address ADS liability issues in law and regulation.
- States and federal authorities working together should make clear and workable data security and privacy requirements for ADS.

**We should never lose sight of the most important consideration — the safety and needs of the occupants.**

State Farm gains understanding on automotive technology through its own research facilities and through support of a number of university research programs. In addition, State Farm has conducted extensive research with consumers to better understand their perspectives on automated vehicles. We have captured insights on their awareness and knowledge of the technology, comfort level and concerns, as well as current and future mobility needs. Select results from the latest studies indicate:

- **Sixty-eight percent** of respondents expect more safety testing to occur with new automated technologies compared to the testing of conventional vehicles. Seventy-nine percent expect even more testing of fully self-driving vehicles.<sup>2,3</sup>
- **Over 70 percent** of respondents believe auto manufacturers should be involved in testing the safety of technologies/vehicles produced.<sup>2,3</sup>
- **Nearly two-thirds** of respondents believe the federal government should be involved with regulating the development of new automated vehicle features, while even more (71 percent) feel the same way about the government's involvement in the development of self-driving vehicles.<sup>2,3</sup>
- **Sixty-four percent** of respondents indicated they would be more likely to engage in at least one secondary task when the vehicle is driving itself compared to when they're driving. This is particularly problematic for SAE levels 3 and under, where the driver is required to instantly take back control of the vehicle at any time.<sup>2,3</sup>

Results from additional State Farm consumer surveys are available online:

**2016 State Farm Autonomous Vehicles Survey Report**

<https://newsroom.statefarm.com/state-farm-releases-autonomous-vehicles-survey-results/>

**2016 State Farm & Bloomberg Autonomous Vehicles Survey Report**

<https://newsroom.statefarm.com/state-farm-driverless-car-survey-results/>

<sup>2</sup>State Farm, 2018 Automated Vehicles Survey

<sup>3</sup>State Farm, 2016 Autonomous Vehicles Survey

**Statement**  
**of the**  
**American Family Mutual Insurance Company, S.I.**  
**to the**  
**United States House of Representatives**  
**Committee on Financial Services**  
**Subcommittee on Housing and Insurance**  
**Hearing on**  
**“The Impact of Autonomous Vehicles on the Future of Insurance”**  
**2128 Rayburn House Office Building**  
**May 23, 2018**

Chairman Duffy, Ranking Member Cleaver, and members of the subcommittee, thank you for inviting me to testify at today's important hearing. My name is Sam Geraci, and I am the Vice President of Strategy at American Family Insurance. I look forward to testifying today about a topic that is of great importance to so many Americans and American Family policyholders.

American Family Insurance is the nation's thirteenth-largest property/casualty insurance group and is owned solely by our policyholders. Supporting them is our only priority in business. At our founding in 1927 as Farmers Mutual Insurance Company in Madison, Wisconsin, we only offered auto insurance and were primarily focused on serving the farming community. Today, American Family serves millions of policyholders through a suite of auto, homeowners, life, business, and farm/ranch insurance.

American Family fully supports Automated Driving System (ADS) innovation and we are among the organizations supporting the ADS work at University of Wisconsin–Madison College of Engineering and the Wisconsin Automated Vehicle Proving Grounds. This work will benefit our policyholders, our communities, and our environment.

### **The Rise of AVs**

The development of ADS, or Automated Vehicles (AVs) may be the most consequential transportation issue of our time. New technology promises faster and better mobility that will be less expensive, more environmentally friendly, and more convenient. It also promises the opportunity for increased mobility for those individuals who are today, unable to drive on their own, but the single most important reason to support the development of highly automated driving systems is the potential for AVs to enhance safety and to save lives.

The development and deployment of proven, safe AVs will require significant technological advances, regulatory changes, and an active partnership between technology companies, vehicle makers, insurance companies, and the government. Critical issues related to passenger safety, liability, and compensation require that insurance companies are included in the regulation of AVs. Consumers will continue to look to property/casualty insurers to provide them with the protections they have come to expect as this new frontier of automotive products evolves.

### **Safety Opportunities and Concerns**

The potential safety benefits of AVs are tremendous, and the insurance industry is committed to supporting the development and deployment of vehicles that will lead to safer roads. While we are incredibly optimistic about the promise of the technology to reduce fatalities and improve the safety of our nation's roadways, recent accidents with AVs have clearly underscored the need to better understand autonomous vehicle safety.

For decades insurers have been compiling mountains of data and analysis on human drivers, and can provide actuarially valid information to measure a human driver's risk.

Unfortunately, there is no comparable data or analysis regarding the risk levels of AVs. Each auto manufacturer may have data on their vehicles, but neither regulators, agencies like the National Highway Traffic Safety Administration, nor the insurance industry – the most trusted sources of compiled auto crash and safety data – have consistent access to that information.

The risks associated with AV technology increase dramatically when companies or individuals take non-AVs and add components and software to the vehicle to create AVs. NHTSA may have approved the safety of the non-ADS vehicle, but there is no governmental authority that reviews or validates the creation of an ADS in the aftermarket.

### **The Importance of Data Access**

Automated vehicles are already producing enormous amounts of data as they are tested on public roads, and it will be important to establish access to this data for insurers. At American Family, we believe customers should have unrestricted access to their vehicle's operating data and the ability to share that data with third parties, such as their insurers. Vehicle operating data will play an essential role in developing rates and underwriting policies. While we understand some consumers may be hesitant to share this data with insurers, we believe many will see the benefit in sharing this information, much as today they allow insurers to collect data in return for premium discounts, and they cooperate in accident investigations.

In the event of an accident, insurers will also require access to crash data. This is vital data insurers will need to determine relative liability for the inevitable crashes and compensate crash victims. While particular data points may change as further development and innovation takes place, data will always be critical for insurers to be able to fully protect policyholders.

Highly regulated review and validation of rates and coverage requires insurers to provide state insurance regulators with extensive levels of actuarially valid data on crashes, their frequency and severity, and the type of operator that was in control of a vehicle. This type of objective and independent validation is exactly what is needed to help consumers, technology companies, and vehicle makers understand the safety of AV systems, features, and operations, but we cannot provide that validation without data. Of course, this type of data would contain neither personally identifiable information of the AV user, nor confidential business data of the AV manufacturers.

### **The Need for Greater Clarity in Regulatory Responsibility**

We believe that the state and federal governments should continue to play a central role in ensuring the emergence of AVs while protecting consumers in the event of a crash. The Federal government – through the NHTSA – should continue to make determinations for the required performance and safety, as well as data integrity, of AVs.



At the same time, states and localities should retain their traditional authority to make the determinations of the registration, licensing, and operation of AVs. States should define and address AVs' personal liability issues in state/tort law and regulation in line with existing liability constructs. Perhaps most importantly to American Family, states should retain the regulation of ADS insurance for the vehicle or operator.

Almost every state requires some level of auto insurance coverage. The relevant state Department of Motor Vehicles is responsible for administering that state's financial responsibility laws. We believe that these requirements should apply to drivers, or operators, of autonomous vehicles in any situation where the driver or operator is able to take control of the vehicle in any respect. We also believe that new, distinct, financial responsibility standards should be developed for manufacturers of autonomous vehicles for situations where the vehicle or its software, not the operator, is responsible for causing an accident. The consistent purpose of these requirements is to help ensure that those responsible are appropriately prepared to compensate victims for damages that they may cause on our highways.

### **Conclusion**

Unfortunately, we all know about the terrible impact auto accidents have on human lives. It doesn't have to be this way, and AVs have the potential to make lives safer - and mobility more accessible - for millions of Americans.

But in the meantime we need to ensure that those involved in accidents continue to receive prompt and efficient help when they need it most. When crashes involving AVs occur, insurers can help allocate responsibility among AVs, non-AVs, and other entities involved. Existing state liability and tort laws can evolve to address responsibility and liability, in the same way that tort law has evolved with other technological and social developments.

Insurance will need to evolve to address changes in both vehicle technology and the increased vehicle sharing (fleets of AVs operated by ridesharing services like Uber or Lyft) that is enabled by that technology. While it is likely AVs will increase the use of ridesharing vehicles and reduce individual ownership, we do not believe personal autos will disappear entirely. The expansion of ridesharing fleets will need to be covered by expanded commercial insurance coverages, just like the expansion of any other commercial fleet of vehicles.

Cybersecurity will add additional nuance to these determinations, and insurance companies are already examining the risks and complexities of underwriting and adjusting cyber insurance products to protect policyholders.

Ultimately, the insurance industry supports the development of AV technology and should be a partner to technology companies, vehicle manufacturers, and regulators to promote safety on our roads.

Comments of American Family Insurance  
**"The Impact of Autonomous Vehicles on the Future of Insurance"**  
May 23, 2018

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We look forward to continuing to be a central part of the discussion and solution for protecting consumers in this emerging landscape. I look forward to answering any questions you may have.



**Consumer Federation of America**

Statement of  
 Jack Gillis, incoming Executive Director  
 Consumer Federation of America  
 Author, *The Car Book*  
 before the  
 U.S. House of Representatives  
 Committee on Financial Services  
 Subcommittee on Housing and Insurance  
 on  
 “The Impact of Autonomous Vehicles on the Future of Insurance”  
 2128 Rayburn House Office Building  
 Washington, D.C.

May 23, 2018

Good afternoon. My name is Jack Gillis and I am the incoming executive director of the Consumer Federation of America (CFA) and author of *The Car Book*. CFA is an association of 275 state, local and national organizations working to protect consumer interests. I have been a long time auto safety advocate having begun my career at the National Highway Traffic Safety Administration and, along with many other auto safety advocates including former National Highway Traffic Safety Administration administrator Joan Claybrook, the Center for Auto Safety, and the Advocates for Highway and Auto Safety, worked closely with the insurance industry in the fight for safer vehicles. In fact, this collaboration between these parties that hold opposing views on a variety of other public policy issues, has been responsible for the majority of advances in auto safety. I’ve also worked with the insurance industry on efforts to keep accident repairs affordable while protecting consumers from unsafe and shoddy repair parts.

CFA is a research-based advocacy organization and we sincerely appreciate this Subcommittee raising the issue of auto insurance as it relates to the autonomous vehicle (AV). I would like to submit for the record a report recently issued by one of our members, California's Consumer Watchdog. This report goes into detail on many of the issues associated with autonomous vehicles including consumer liability, insurance practices and regulatory oversight with the widespread introduction of the AV.

We appreciate the Subcommittee's efforts today and going forward because, quite frankly, we have many more questions about insuring the AV than answers. The good news is that this Subcommittee is beginning to raise and address these questions and, as a practical matter, because the AV is still in a relatively early stage of development, there is no need to rush to judgment when it comes to resolving the intricacies associated with insuring these extraordinarily complex products.

When you consider the universal importance of the automobile to each one of us, as well as the nation's economic well-being, there are few products that have more impact on society. They play a critical role in our family life, ability to work, and for many of us, there is the emotional quotient that comes with buying and owning a particular vehicle. Because of the enormous risk associated with car ownership and operation, automobile use would be impossible without a highly functioning system of insurance. Individuals simply could not afford to absorb the risk associated with automobiles without insurance. In fact, insurance is so important to the automobile's existence and public safety, that 49 states require consumers to purchase auto insurance. Going forward, as the autonomous vehicle is introduced and becomes a primary mode of transportation, the importance of insurance will remain, but the intersection of driver, car, and insurer could change dramatically.

First of all, let me be clear: autonomous vehicles have the potential to be a technological vaccine that can significantly reduce the tragic toll that automobiles take on America's public health. However, like any vaccine, they must not be introduced into the market until they are thoroughly tested and proven effective. Because they are still years away from widespread introduction, we have plenty of time to raise and answer questions of liability and insurance. On a very basic level, one should expect that insurance costs associated with personal injury could

be significantly minimized as autonomous vehicles are expected to significantly reduce the number of driver related causes of accidents. On the other hand, because of the electronic sophistication needed to operate these vehicles, even the inevitable 'fender-bender' could be enormously expensive to repair.

In order to better understand the insurance needs, let me provide a brief overview of the various levels of vehicle "autonomy":

Level 0: No automation, the driver controls all aspects of the vehicle.

Level 1: Most of the functions are controlled by the driver; however, certain features can be automatic such as steering or braking.

Level 2: This is the case in which the control of certain functions that have been combined, such as steering and braking, is turned over to the vehicle and the driver can take their hands off the wheel and feet off of the pedals. However, the driver must be able to instantly retake control of the vehicle.

Level 3: This is when the vehicle can take over all critical functions and the driver does not need to monitor the vehicle's performance but must be ready to instantly take control of the vehicle at all times with notice. This is the most controversial level as driver attention is imperative yet the driver can be severely distracted due to the autonomous nature of the vehicle. The concern is that the driver will not be able to take back control in an emergency.

Level 4: This means that the vehicle can operate in a fully autonomous fashion with no interaction with the driver but only in certain environments. For example, it can be totally autonomous on the highway, but not in the city. Because of the challenges inherent in the human/machine interface, many in the industry are attempting to skip the lower levels and achieve level 4.

Level 5: This is when the vehicle is fully autonomous in all driving conditions. However, some have indicated that there still needs to be some form of human override.

When the concept of the AV was introduced, there was concern in the insurance industry that there would no longer be a need for certain insurance products. It is now understood that just the opposite will occur. The need for

adequate, comprehensive and fairly priced insurance will increase. This is not only the case on the personal front, but also on the commercial liability front as vehicle and technology manufacturers assume liability for the performance of their products.

As a practical matter, the need for insurance will be present at each level of autonomy—including the fully autonomous Level 5 vehicles. Because the vehicle mix will include autonomous and non-autonomous vehicles for some time, in collisions between autonomous and non-autonomous vehicles, liability will have to be determined. Did the computer fail, or did the “driver” of the AV err, or was the non-AV driver at fault? Beyond this traditional analysis of fault, the question of where responsibility lies will no longer solely be determined by witnesses and police reports. While initially many companies manufacturing AVs vowed to take full responsibility for accidents, they are quickly revising their positions to cover only technological failures of their own systems. Will consumers have to prove that it was the vehicle’s technology and not themselves who created the accident? Additionally, what happens when a consumer inadvertently fails to, or did not know to, or was not notified to, download corrective software and that results in a vehicle failure?

There are many, many confounding questions related to insurance. Let me paint a picture of one:

Consider the fact that I will be able to program my vehicle to stop at my favorite coffee shop on the way to work. In my case, being from Massachusetts, the choice will be obvious—Dunkin Donuts over Starbucks. While in the Bay State, that may be considered a moral decision, for most of us it’s clearly a matter of preference. But what about the moral decisions? For example, on the way to work my autonomous vehicle has detected a stalled semi-trailer truck in front of me and has determined, with mathematical precision, that there is physically no way that my vehicle can stop in time. However, it can move me out of that lane in time to avoid the truck. Imagine two choices, it can go left into a bike lane where a young, recently married couple, expecting their first child, are riding to work. Or it can go right where on the sidewalk is an elderly man, late 80’s or early 90’s, slowly hobbling along in his walker. Which way will the autonomous vehicle go? More importantly who will program that decision? Like my choice of Dunkin over Starbucks, will I be responsible for programming my own moral decision into the vehicle? Or will the manufacturer or software provider? Or will the insurance

company have a hand in the decision, or even underwrite policies based on which choice is embedded? More importantly where will the liability for that decision lie? And wherever that liability lies, who will insure it and what requirements will the insurer place on those being insured?

Like human drivers, with every mile driven the autonomous vehicle will be required to make thousands of potentially life altering decisions on a nearly instantaneous basis. But unlike human drivers, those decisions are pre-determined, algorithmic, removed from the instant at which they are made, and subject to external forces. This opens up significant questions related to insuring these vehicles.

As I mentioned, we have many more questions than answers, but the following are some of the concerns that we have:

There will be vehicles with wide disparities in technological prowess that will share the roads with low-tech vehicles. How will insurers consider these factors in pricing?

By necessity, the AV will be gathering tremendous amounts of personal data as they take us from place to place. Will there be liability for privacy violations? Will insurers be subject to privacy constraints, or will they use such information to establish premium charges? Who will own and who will have access to the tremendous amount of pre-crash data that will be available in an autonomous vehicle?

Communication based technology is increasingly subject to cyber security threats. Who will be responsible for the inevitable hackers, and even terrorists, who take control of autonomous vehicles and create mayhem?

Even considering today's miraculous technology, who among us hasn't had a cell phone malfunction at an important time, or experienced a software glitch on a laptop that wreaked havoc on our project? Will there be performance standards established and how will those standards impact insurance costs?

Insurers often require compliance with local motor vehicle operating compliance laws. Will there be vision tests for autonomous vehicles such as those

required of humans at the DMV? Who will set the requirements for an autonomous vehicle's ability to "see" and respond to its surroundings? We've already seen an autonomous Uber vehicle fail to see and properly respond to a pedestrian with tragic consequences.

Even with level 5 vehicles, if they are equipped with steering wheels and pedals, will the occupant be expected to take control in catastrophic situations? Keeping some human controls in the vehicle is controversial because of the incredibly complicated human/machine interface. But will keeping them in allow the shifting of liability to the driver? Or will taking them out prevent the driver from avoiding a disaster?

Moreover, AVs offer the promise to provide mobility to people with disabilities. What will happen if a blind person is in an AV in a crash? What type of insurance will be offered to cover this scenario?

Will there be an effort by manufacturers of the hardware and software to avoid strict liability for design or manufacturing defects that caused a crash? As they have demonstrated in the past, auto manufacturers have always tried to dispute their responsibility. In fact, in the few tragic AV crashes to date, manufacturers have attempted to avoid responsibility for the crashes. Especially at the lower levels of AV, will individual drivers find themselves pitted against both another injured party who filed a claim and their car's manufacturer as it disclaims liability?

Because so many AV accidents will require an inquiry into a consumer's "fault," and because this may become a more nuanced question in the era of the AV, fair pricing will require even more oversight to ensure that safe policyholders are ensured fairly priced insurance. Moreover, it will require rigorous oversight of the claims process, because the difference between the coverage available as a result of a car manufacturer's product liability compared with that available if a driver is deemed to have caused the accident could have life altering impacts on innocent victims of future accidents. And these determinations will involve more and more complicated liability questions than exist today, especially in the event of catastrophic accidents.

Let's be clear, "fault" will not be eliminated with the autonomous vehicle. The search for truth and justice in such circumstances will require the full powers



of the civil justice system. This is not the time to take away consumer's legal rights. 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 essential with the advent of the AV.

As vehicle and technology manufacturers do take responsibility for product failures, strict liability must remain the norm. And should commercial liability insurance come into play, the consumer must be made whole immediately while the various business entities battle over responsibility.

How will the price of insurance be moderated in the face of very expensive technology? Even today, the sensing devices placed in inexpensive plastic bumpers are significantly increasing the cost of even the simple low-speed fender bender. What will happen when the entire vehicle is covered in critically important sensing devices? Will the manufacturers of these devices ensure that they contain proprietary technology so that there will be no competitive marketplace for repair parts? If so, insurers will be forced to increase their prices while the monopolistic manufacturers line their pockets with overpriced repair parts.

The pricing of insurance is overseen by state laws, and, to varying degrees, insurers have to get pricing approval from state regulators. Theoretically, that is based in part on demonstrable costs associated with various vehicle features. Will car companies share critically important performance data with the insurers so they can price insurance based on protective performance? Will that information be made available to the public? Will the public then be able to comparatively assess the different technologies? Will insurance companies base pricing on the effectiveness of different technologies?

It is too early to know the full financial, economic or social impacts of AVs, but insurance coverage will remain an essential protection in the era of driverless vehicles. For consumers, the pricing of insurance, always a significant concern, could change dramatically with the AV. As such we appreciate this Subcommittee's opening the door to addressing the future of AV insurance. Our expectation is that the insurance costs paid directly by consumers will go down as the liability shifts, from auto insurance to the manufacturer's/software developer's

product liability insurance or other commercial insurance. In addition, as the fleets become safer and accident rates go down, additional savings should occur.

We also need to consider the role of the federal government. Elsewhere in Congress members are considering what is called the AV START Act (S. 1885). This bill has some serious shortcomings that, if passed as is, will have a dramatic impact on auto insurance. For example, right now the bill allows potentially millions of vehicles to be sold that are exempt from safety standards; there are no provisions that insure the maintenance of occupant protection levels; minimum performance levels have not been established for the various safety features; strong protections against cybersecurity threats are absent; and, the full disclosure of post-accident performance data is not being made available to the public (including insurers). Without these basic safety considerations, insurers will just be guessing at the risk levels associated with the introduction of AVs—or be solely dependent on manufacturer performance claims.

Most importantly, at both the federal and state level, significant investments must be made in the regulator’s ability to test and evaluate AV performance. The voluntary standards that the current administration is favoring simply won’t work as a means of regulating one of the most sophisticated products in history.

We also need to be aware of the potential of a new form of “redlining,” which would favor motorists who can afford more expensive cars with expensive technology and discriminate against those who cannot by refusing to sell them insurance, or adding surcharges to the price of insurance. For insurance to work, it must be made available to all.

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

Finally, while we have asked more questions than we have answers for, what is clear is that robust, thoughtfully regulated, and fairly administered insurance markets will be absolutely critical to the introduction of the autonomous vehicle. We look forward to developing answers to these questions and helping insure that the autonomous vehicle will live up to its enormous life-saving potential.



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United States House of Representatives  
Committee of Financial Services  
Housing and Insurance Subcommittee

Statement of the American Insurance Association

**“The Impact of Autonomous Vehicles on the Future of Insurance”**

May 23, 2018

Dear Chairman Duffy and Ranking Member Cleaver and Members of the Committee:

The American Insurance Association (AIA) writes to express our appreciation for holding the hearing entitled “The Impact of Autonomous Vehicles on the Future of Insurance.” The American Insurance Association (AIA) is the trade association for today’s leaders in the property-casualty insurance industry. Now more than 150 years old, AIA has an unparalleled record of advocating on state, federal and international issues for insurers and their customers. Our membership is comprised of more than 330 companies, collectively writing more than \$134 billion in premiums each year. As the development of autonomous technology continues, it is important that policymakers examine its integration into the existing roadways and associated markets. Autonomous vehicles represent a significant opportunity to improve safety and mobility for millions of Americans, and we thank the Housing and Insurance subcommittee for reflecting on how liability and insurance frameworks will be affected in the future.

AIA and our members’ main focus is on the increased safety for our customers on the roadways. As noted, we acknowledge the immense promise that autonomous vehicle technology can have on any number of challenges society faces from legacy transportation, including saving lives; reducing crashes; improving traffic congestion, fuel consumption, and pollution; increasing mobility for the disabled; and improving land use. But it is important to also acknowledge that this technology and its introduction are in its early stages and that it would be prudent to assess what potential issues may arise during the transition from human-driven vehicles to driverless vehicles.

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#### **DATA-DRIVEN KNOWLEDGE IS A LINCHPIN TO RISK MANAGEMENT**

At the outset, it is important to remember that insurance in automobile markets has developed over more than a century and is based on experiential data and knowledge. Regardless of how vehicles operate in the future, insurance for them will necessarily continue to rely on experiential data to evaluate the safety and potential liability of vehicles. Therefore, we must emphasize that improved and increased data will play a key role in risk assessment and pricing, allowing insurance to fill our role of underwriting and spreading risk more effectively. We have a strong motivation to be able to assess the performance and, therefore, safety of autonomous technology. The more data that is available to insurance companies the better we will be able to help assess whether new technologies are actually effective in producing safer results for citizens.

Knowledge and experience derived from data and information is important to safety. Such information is equally important to insurers as it allows us to understand the risks associated with vehicles, their technology, their features, and their differences with greater precision so we may price our insurance products as accurately as we can. Accurate pricing will avoid cross subsidies that harm better, safer technology while benefitting weaker, less safe technology.

For insurers, access to the broadest operational data for AVs will aid us in our job of identifying, pricing, and mitigating risk. Having access to vehicle data, and not merely after crashes, will enhance our products and prices. Knowing when systems disengage, warn drivers, have lapses, identify hazards, fail to identify hazards, and more will improve knowledge, insurance pricing, and safety. Insurers will certainly get data as claims arise but if we are able to advance our understanding in an earlier, broader, and less piecemeal way, we will be able to more effectively price and shape coverage up front, thereby encouraging capital formation and deployment for insuring AVs.

We urge policymakers to work with stakeholders to design means to share data with appropriate privacy safeguards so we can all do our jobs more effectively.

#### **THE CURRENT AUTOMOBILE LIABILITY INSURANCE SYSTEM WORKS WELL**

Roles and responsibilities under today's automobile liability insurance system are clear: vehicle owners are required to maintain insurance; insurers must pay insurance claims promptly; where fault is litigated, courts have developed substantial bodies of case law; injured parties are free to pursue product liability claims against auto manufacturers if they believe a product defect played a role in an accident; and insurance companies can subrogate against manufacturers to recover losses paid as a result of a product defect. These rights and remedies already exist. Policymakers should approach any changes to this system with great caution and carefully weigh the pros and cons of any proposed alternative.

#### **LIABILITY ISSUES WILL PERSIST WITH AUTONOMOUS VEHICLES**

While we see the many potential benefits that a shift from human-operated to computer-driven vehicles may bring, many of the same liability issues will persist into the future or indefinitely. For example, there are approximately 270 million human operated vehicles currently on the roads

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and that will not change quickly. Similarly, autonomous vehicle operation and technology are only now being meaningfully developed and they will fail and evolve over an extended period. AIA and our member companies are expending significant effort identifying and examining a broad array of topics to be considered in a transition to an autonomous vehicle future. For purposes of the hearing, we share the following important consideration with the Committee.

• **AV owner/operator negligence will continue to be a liability concern.**

Defective design and manufacturing errors will not be the only sources of potential liability when an autonomous vehicle is involved in an accident. Even in a potential driving environment populated with fully autonomous (Level 5) vehicles – an unlikely outcome for quite some time, if ever – owners and operators would still need to perform regular vehicle maintenance to ensure that their vehicle remains in a safe, roadworthy condition. In addition to routine maintenance of brakes, tires and mechanical systems, AV owners/operators will need to ensure installation of all AV software updates on a timely basis. Failure to perform such maintenance could result in liability for the owner/operator if an accident results. When the option exists, even choosing when to operate autonomously versus manually could result in owner/operator liability.

• **AV technology will introduce new and sometimes unpredictable risks.**

While driver error can and should decrease substantially, the introduction of new technologies into vehicles will introduce new risks. For example, cybersecurity will be a critical issue for internet-connected vehicles, whether connected while driving or when downloading software updates. There also is a potential for new types of accidents unique to AVs – e.g., software glitches, incidents at pedestrian crossings where a human driver might have signaled intentions to a pedestrian, intentionally altered street signs, malicious devices that send false images or signals to vehicle guidance systems, vehicle breakdowns that strand unaccompanied minors or disabled persons, etc. Furthermore, competing AV operating systems may present different risks based on divergent design decisions.

• **Driver-controlled vehicles will remain on American roads for the foreseeable future.**

There are approximately 270 million driver-controlled vehicles on U.S. roads today. Based on recent studies, a significant portion of American consumers are not interested in owning an autonomous vehicle. And, as the rate of adoption of current safety features has proven, it can take decades for new safety technologies to be deployed across the American vehicle fleet. Furthermore, early AV technologies may not be adapted for certain vehicles, such as motorcycles, or for certain vehicle uses, such as frequent off-road driving and the towing of boats or large trailers. When combined with our unique American car culture – e.g., love of muscle cars, antique and collectible vehicles, etc. – these factors suggest that driver-controlled cars will remain on American roads well into the future. A continuation of driver control means driver error is destined to remain a factor in future accidents.

• **Product liability lawsuits can be complex and extraordinarily difficult to litigate.**

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Because the “driver” of an autonomous vehicle will be a software-guided computer, it is reasonable to expect that accidents allegedly caused by an AV will result in lawsuits against auto manufacturers claiming design or manufacturing defects in either AV software or hardware. Such product liability lawsuits can be extremely difficult, time-consuming and expensive to litigate – e.g., requiring expert witnesses in vehicle design, crashworthiness and road safety – and therefore are unlikely to compensate victims on a timely basis for their medical costs, damage to their vehicle and other damages. Such litigation can be especially daunting when attempting to collect from a large manufacturer whose vehicles might be subject to a recall if a court finds that a defect exists.

For these reasons, manufacturer product liability alone would not be an effective or efficient source of accident compensation. By comparison, the existing automobile liability insurance system compensates accident victims promptly and fairly for vehicle damages and medical bills while also preserving the right of victims and insurers to pursue product liability actions against vehicle manufacturers for any alleged defects.

• **Existing no-fault insurance systems are expensive and subject to fraud.**

The introduction of AVs to our roadways may complicate accident liability determinations, especially with regard to accidents involving AVs and non-AVs. Liability determinations could result in protracted disputes with manufacturers, producing expensive and time-consuming litigation as parties attempt to determine whether an accident resulted from human error or a product failure. The obvious concern is that compensation of accident victims could be delayed and costly to the litigants and the court system.

Some have suggested that a no-fault insurance system could effectively address injuries and damages suffered in AV accidents. While the potential benefits of a no-fault or no-liability system may merit some exploration, it is important to recognize that the experience in many states with existing no-fault automobile liability insurance systems has been unfavorable for consumers. According to the National Association of Insurance Commissioners (NAIC), three states with no-fault insurance systems – New Jersey, Michigan and New York – had the highest average automobile insurance premiums in the nation in 2014 (the latest available from the NAIC). No-fault automobile accident compensation systems also have been prone to fraud and abuse. For example, a study of New York’s no-fault system by the Insurance Research Council (IRC) found that, over the period 2007 to 2010, about one in every five claims settled in the New York City area appeared to include some element of fraud and as many as one in three claims were inflated.

Most states do not have no-fault automobile insurance systems, and their existing tort-based systems generally function well. Roles and responsibilities under these tort-based systems are clear: vehicle owners are required to maintain insurance; insurers must pay claims fairly and promptly; where fault is litigated, courts have developed substantial bodies of case law; injured parties are free to pursue product liability claims against auto manufacturers if they believe a product defect played a role in an accident; and insurance companies can subrogate against manufacturers to recover losses paid as a result of a defect. These rights and remedies already exist. Policy makers should think long and hard before discarding the time-tested benefits of these liability insurance systems in favor of a new experimental alternative. Furthermore, any consideration of a no-fault or no-liability insurance alternative for AVs would require a radical

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restructuring and reformation of existing no fault automobile insurance laws in order to avoid the costly issues associated with current no-fault liability systems – if such problems can be avoided.

• **Vehicle owners/operators will continue to purchase non-liability insurance products.**

Many non-liability automobile insurance coverages will remain important purchases for consumers, including comprehensive coverage for vehicle damage from fire, flood, theft, vandalism and cracked windshields and medical payments coverage for non-collision accidents such as injuries suffered when entering or alighting from a vehicle. These coverages will be needed for both AVs and driver-controlled vehicles and, for efficiency and ease of purchase, it is reasonable to expect that most consumers will continue to insure all of their vehicle risks under one insurance policy.

• **The existing automobile insurance market is highly competitive.**

As anyone who watches television knows, automobile insurance is widely available in every state and car owners have a multitude of choices when it comes to buying coverage. These choices include options to shop for insurance through numerous insurers – local, regional and national insurers – through various distribution channels – independent agents or direct from an insurer via voice, internet or digital communications – as well as a variety of product options – e.g., usage based insurance (pay by mile), new car replacement, antique automobile insurance, assorted limits of liability, different deductibles, etc. Competition – the cornerstone of a market-based economy – should be preserved as AVs are deployed into the American fleet, and AV owners shopping for accident protection should not be locked into a single manufacturer, exclusive insurance program, government risk pool or other non-competitive option.

### CONCLUSION

Autonomous vehicles hold tremendous promise but are now only developing. Insurers are helping developers reduce their risks now and insurance will play a crucial role in reducing the risk and speeding the deployment and adoption of autonomous vehicles going forward. It is essential that public policy decision makers deliberate carefully and with full stakeholder participation before taking decisions that could upset the auto insurance liability system.

We greatly appreciate the consideration of our comments. We would be happy to answer any question you may have to the best of our ability.



## **Autonomous Vehicle (AV) Liability Insurance Principles**

**Principle No. 1 – AIA and its member companies support the introduction of safe and tested autonomous vehicle technologies.**

The promised social and safety benefits of autonomous vehicles – fewer accidents, increased mobility, greater traffic efficiency, additional productive/free time – are likely to far outweigh the disadvantages, such as cybersecurity issues. Therefore, AIA and its member insurance companies support the introduction of AV technologies that are tested and proven to provide enhanced safety for drivers, passengers and pedestrians.

**Principle No. 2 – Accident victims must be compensated fairly and promptly.**

Accident victims must be compensated fairly for their medical costs, vehicle repairs and other damages in a reasonable and prompt amount of time, without regard to whether they are injured in an accident with an autonomous or driver-controlled vehicle.

**Principle No. 3 – Consumers should have competitive options for their insurance.**

Consumers should continue to be able to shop around among competing companies for their automobile insurance and should retain the freedom to select the amount and type of coverage they wish to purchase. AV owners should not be locked into a single source of accident compensation, exclusive insurance program, risk pool or other non-competitive option.

**Principle No. 4 – There should not be different insurance requirements for driver-controlled versus autonomous vehicles.**

Maintaining two automobile insurance systems would be prohibitively expensive, create confusion in the market place and be difficult for the states to regulate, administer and enforce. Furthermore, many consumers likely will own both driver-controlled and autonomous vehicles, or maybe vehicles equipped with both options. Consumers should be able to insure all of their vehicles under one policy.





**Principle No. 5 – Manufacturer product liability alone should not be relied upon as an efficient accident compensation system.**

While automobile manufacturers should remain liable for any design defects, manufacturing errors or issues of crashworthiness, product liability lawsuits are ill suited for resolving routine matters of vehicular accident fault. Such suits can be lengthy, complex and expensive to litigate; therefore, product liability is not an efficient mechanism to promptly pay routine medical bills, repair or replace damaged vehicles and compensate auto accident victims.

**Principle No. 6 – The addition of autonomous vehicles to the fleet should not introduce uncertainty or insurance coverage gaps into the accident compensation system.**

The launch of transportation network insurance (TNC) companies initially created gaps in insurance coverage for drivers using their personal vehicles for commercial purposes. Any proposed changes to the automobile accident compensation system must avoid repeating this error. Consumer education also should be a critical element of AV introduction, including education about any changes to vehicle owner financial responsibility requirements.

**Principle No. 7 – The existing tort law automobile system should not be discarded lightly.**

The current automobile liability insurance system works well. Roles and responsibilities under today's system are clear: vehicle owners are required to maintain insurance; insurers must pay insurance claims promptly; where fault is litigated, courts have developed substantial bodies of case law; injured parties are free to pursue product liability claims against auto manufacturers if they believe a product defect played a role in an accident; and insurance companies can subrogate against manufacturers to recover losses paid as a result of a product defect. These rights and remedies already exist. The pros and cons of any proposed alternative insurance system must be weighed carefully, and policy makers should think long and hard about whether the problems with no-fault type systems can be remedied before implementing any such option.

**Principle No. 8 – Insurers should have flexibility in providing coverage for AVs.**

Autonomous vehicles remain untested as mass-market products. To foster private market product development for AV insurance, insurers should be permitted maximum freedom in rating, underwriting and insuring AV exposures.

**Principle No. 9 – Manufacturers must provide liability protection for AVs tested on public roads.**

Manufacturers should have to meet all financial responsibility law requirements imposed on other commercial vehicle or livery fleets. Furthermore, given the high risk nature of driving and the strict standards for vehicle crashworthiness that consumers expect, immunity from liability for the failures of developers or manufacturers of this emergent technology would be inappropriate as well as disruptive of long-established liability and injury compensation principles related to automobiles and product manufacturing.



## Autonomous Vehicle (AV) Liability Insurance Principles

### Background: AV Insurance Issues

#### **AV owner/operator negligence will continue to be a liability concern.**

Defective design and manufacturing errors will not be the only sources of potential liability when an autonomous vehicle is involved in an accident. Even in a potential driving environment populated with fully autonomous (Level 5) vehicles – an unlikely outcome for quite some time, if ever – owners and operators would still need to perform regular vehicle maintenance to ensure that their vehicle remains in a safe, roadworthy condition. In addition to routine maintenance of brakes, tires and mechanical systems, AV owners/operators will need to ensure installation of all AV software updates on a timely basis. Failure to perform such maintenance could result in liability for the owner/operator if an accident results. When the option exists, even choosing when to operate autonomously versus manually could result in owner/operator liability.

#### **AV technology will introduce new and sometimes unpredictable risks.**

While driver error can and should decrease substantially, the introduction of new technologies into vehicles will introduce new risks. For example, cybersecurity will be a critical issue for internet-connected vehicles, whether connected while driving or when downloading software updates. There also is a potential for new types of accidents unique to AVs – e.g., software glitches, incidents at pedestrian crossings where a human driver might have signaled intentions to a pedestrian, intentionally altered street signs, malicious devices that send false images or signals to vehicle guidance systems, vehicle breakdowns that strand unaccompanied minors or disabled persons, etc. Furthermore, competing AV operating systems may present different risks based on divergent design decisions.

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There are approximately 270 million driver-controlled vehicles on U.S. roads today. Based on recent studies, a significant portion of American consumers are not interested in owning an autonomous vehicle. And, as the rate of adoption of current safety features has proven, it can take decades for new safety technologies to be deployed across the American vehicle fleet. Furthermore, early AV technologies may not be adapted for certain vehicles, such as motorcycles, or for certain vehicle uses, such as frequent off-road driving and the towing of boats or large trailers. When combined with our unique American car culture – e.g., love of muscle cars, antique and collectible vehicles, etc. – these factors suggest that driver-controlled



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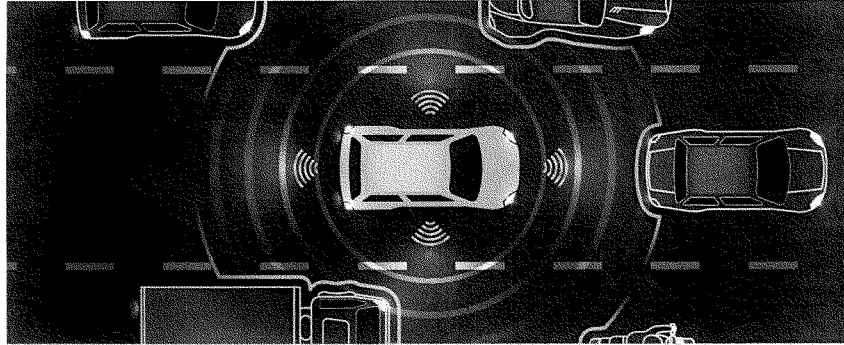
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Statement  
of the  
National Association of Mutual Insurance Companies  
to the  
United States House of Representatives  
Committee on Financial Services Subcommittee on  
Housing and Insurance  
Hearing on  
The Impact of Autonomous Vehicles on the Future of  
Insurance  
2128 Rayburn House Office Building  
May 23, 2018

## NAMIC ISSUE ANALYSIS



### VALIDATING SAFETY: THE NEXT PHASE IN DEVELOPING AUTOMATED DRIVING SYSTEMS

**Tom Karol**  
General Counsel – Federal  
National Association Of Mutual Insurance Companies



#### TOM KAROL

Tom Karol serves as General Counsel – Federal in NAMIC's Washington, D.C., office. Tom represents NAMIC on issues impacting property/casualty insurance companies and has primary management of NAMIC's response to federal legislation and regulation. Tom has extensive legal, regulatory, and operations experience with major financial services companies, law firms, regulatory agencies, and Congress, having served as legal counsel in federal agencies and with the U.S. Senate Committee on Governmental Affairs.

Acknowledged as a leader in the insurance industry on autonomous vehicles, Tom is on the Board of Directors of both the Highway Loss Data Institute and Advocates for Highway Safety and Auto Safety, and is an Observer on the Uniform Law Commission Committee on Highly Automated Vehicles. Tom has worked directly with National Highway Transportation Safety Administration officials and has provided testimony to Congressional committees on automated driving systems. Tom leads NAMIC's Autonomous Vehicles Council and has been a featured speaker at insurance, actuary and legal conferences. He served on NHTSA panels relating to state jurisdiction and pre-market approval, has worked with the Insurance Institute for Highway Safety supporting the Virginia Tech Transportation Institute as part of the National Cooperative Highway Research Program, and is a stakeholder in the NHTSA Federal Motor Vehicle Safety Standards Considerations for Automated Driving Systems peer review.

For more information about NAMIC Issue Analyses, please visit [namic.org/issues/our-positions](http://namic.org/issues/our-positions) or contact:

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*NAMIC is the largest property/casualty insurance trade association in the country, with more than 1,400 member companies. NAMIC supports regional and local mutual insurance companies on main streets across America and many of the country's largest national insurers. NAMIC members represent 39 percent of the total property/casualty insurance market, serve more than 170 million policyholders, and write more than \$230 billion in annual premiums.*

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## NAMIC ISSUE ANALYSIS

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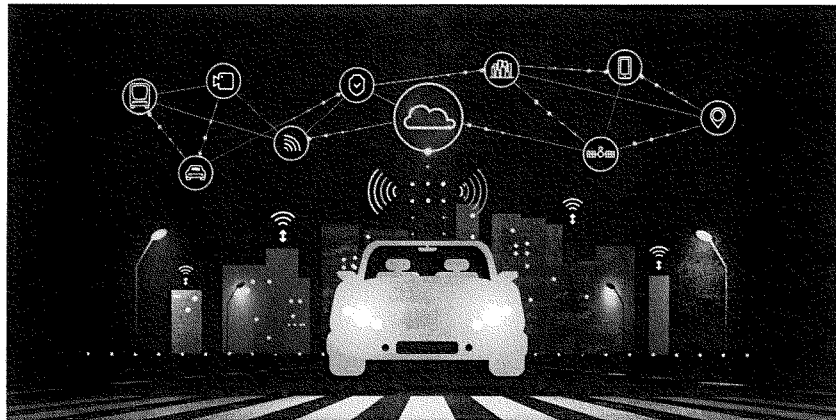
### INTRODUCTION

The development of Automated Driving Systems (ADS) may be the most consequential transportation issue of our time. New technology and novel service strategies promise faster and better mobility that will be less expensive, and more environmentally friendly. Spring boarding from existing and widely accepted "assisted driving" systems such as cruise control, ADS developers promise a wider array of functions from greater driver assistance to vehicles that will perform every driving operation with no human intervention.

The single most important reason to support the development of highly automated driving systems is the potential for ADS to enhance safety and save lives. While the idea of working, napping, or watching a movie while the car drives itself may be enticing to many, enhanced safety must always be the primary focus of ADS development. ADS that are proven safer than existing drivers will have innumerable benefits to society.

The development and deployment of proven, safe ADS will require significant technological advances, revisions to the regulatory paradigm, and the active participation of far more than just the auto manufacturers and technology companies. The potential of technology to move the needle on crash statistics is extraordinary; however, there will still be crashes, especially in an environment where autonomous vehicles continue to share the road with human drivers. It is important to note that ADS, in and of themselves, do not fundamentally change the legal theories of liability associated with motor vehicle crashes. Insurance will still play a crucial role for manufacturers, suppliers, owners, operators, and passengers.

The critical issues related to passenger safety, liability, and compensation after a crash require that insurance companies are included in the development, deployment, regulation, and use of ADS. Consumers will continue to look to property/casualty insurers to provide them with the protections they have come to expect as this new frontier of automotive products and services evolves.



## VALIDATING SAFETY: THE NEXT PHASE IN DEVELOPING AUTOMATED DRIVING SYSTEMS

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### EYES ON THE PRIZE: IN A SHIFTING REGULATORY PARADIGM FOCUS MUST REMAIN ON POTENTIAL TO ENHANCE SAFETY AND SAVE LIVES

Safety must be the primary goal for ADS development, but defining and proving what “improved safety” means for ADS are not simple. Currently, federal auto safety regulations focus more on the structure and design of vehicles and less on the driving operations that are subject to human control. With ADS, the vehicle will assume driving operations formerly performed by the human driver. Thus, the safety responsibilities of the vehicle will expand and will continue to expand until the vehicle assumes all driving operations without any human control.

On the one hand, most car crashes involve driver error<sup>1</sup> and ADS promises computer systems that will not replicate the conditions that lead to those errors – i.e. sleeping, intoxication, distraction, speeding. According to the [National Highway Traffic Safety Administration](#) (NHTSA) “Fully automated vehicles that can see more and act faster than human drivers could greatly reduce errors, the resulting crashes, and their toll.” On the other hand, the elimination of certain human errors does not tell us anything about the introduction of computer, sensor, or software error.

Safe ADS will require a substantial amount of specialized software, sensors, controllers, and actuators to collectively perform without error the large universe of operations that human drivers already perform, or at least as well as those human drivers. The bar for performance has been set high: human drivers average 3.4 million vehicle hours (390 years of non-stop driving) between fatal crashes and 61,400 vehicle hours (7 years of non-stop driving) between injury crashes.

### POST-“DRIVER” SAFETY REGULATION

There is a growing recognition that some change to the regulatory environment may be needed to foster the development of ADS. As Secretary of the U.S. Department of Transportation (DOT) Elaine Chao has [stated](#), “What we are trying to do is to reduce the number of regulations that are hampering the growth of technology in this area. We do not know best what is happening [with self-driving vehicles]. So, we want to partner with the sector. We want to ensure that we are not doing things that hamper [progress].”

Under the existing regulatory structure, defining and validating the overall safety of the vehicles have been the focus of NHTSA, a division of the DOT, which has the mission to “Save lives, prevent injuries, reduce vehicle-related crashes.” Congress empowers NHTSA to write and enforce [Federal Motor Vehicle Safety Standards](#) (FMVSS). Under current law, auto manufacturers bear the responsibility to self-certify that all the vehicles they manufacture comply with all applicable FMVSS. If the self-certified vehicle is not compliant with the FMVSS, manufacturers are subject to NHTSA’s defects, recall, and enforcement authority. NHTSA does not certify vehicle safety or require pre-market verification but, instead, relies on the manufacturers’ self-certification.

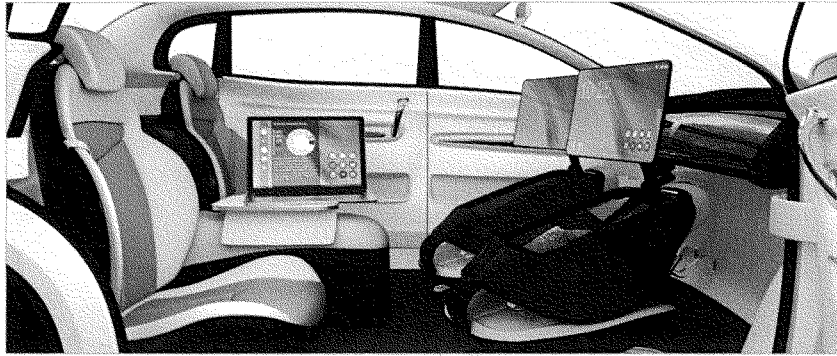
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<sup>1</sup> A 2015 NHTSA survey that concluded “driver” error was a critical reason for 94 percent of crashes is often misquoted as concluding that “human” error is the reason. ADS may not fall asleep or be drunk like humans, but ADS can be as susceptible, if not more susceptible, to driving recognition errors, decision errors, performance errors, and non-performance errors. The absence of some errors does not establish the absence of all errors.

## NAMIC ISSUE ANALYSIS

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The development of ADS will require a new way to look at the fundamental nature of driving, and that development should not be hindered by requiring outdated safety requirements that do not apply to new technologies. At the extreme end of the spectrum, the development of ADS with no driver controls will mean that vehicle features that are now required for human operation may not be necessary or practical. Sound policy should include a review of which requirements would no longer be relevant for a fully autonomous vehicle. The FMVSS are the U.S. federal regulations specifying nationwide design, construction, performance, and durability requirements for auto-safety-related components, systems, and design features. FMVSS focus mostly on crash avoidance, crashworthiness, and crash survivability. Existing FMVSS specify that controls and displays must be located where they are visible to or within the reach of a person sitting in the driver's seat. If the occupants have limited or no control of an ADS, there may not be a "driver's seat" or the relevant controls or displays of driving operations may vary with the driving operations that the human retains. In various iterations of ADS, auto parts subject to FMVSS such as rearview mirrors may be superfluous for driving operations. Similarly, controls for turn signals, lights, or wipers may not be required and may not be subject to safety standards.



With respect to ADS, in 2016, NHTSA issued a 116-page [Federal Automated Vehicles Policy](#), which was updated in 2017 with a 36-page automated driving systems policy [document](#). The NHTSA ADS policy detailed in these documents outlines ADS Vehicle Performance Guidance and requests that manufacturers provide Voluntary Safety Assessment Letters to NHTSA on ADS development and deployment. However, entities are not required to submit an assessment letter, nor is there any mechanism to compel entities to do so. NHTSA does not require that entities provide disclosures nor are they required to delay testing or deployment. Assessments are also not subject to federal approval.

Under the existing system, with the DOT establishing national safety standards for automobiles, the states are generally prohibited from requiring additional safety features. States have retained the responsibilities of: licensing human drivers and registering motor vehicles in their jurisdictions; enacting and enforcing traffic laws and regulations; conducting safety inspections; and regulating motor vehicle insurance. State law also governs liability issues surrounding auto accidents. For vehicles in which increasing numbers of autonomous driving functions have replaced the human driver, it makes sense for the existing NHTSA and state roles and responsibilities to be closely reexamined. However, the current federal/state dichotomy is likely to lead to the most efficient development and deployment of ADS on the nation's roadways.

## VALIDATING SAFETY: THE NEXT PHASE IN DEVELOPING AUTOMATED DRIVING SYSTEMS

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The focus must remain on ensuring that critical safety aspects are examined and validated and that any safety assurance gaps that may be created by the introduction of ADS onto the roads are identified and addressed. This is far more complicated than it may seem. While many human-driver-focused FMVSS do not make sense for ADS, perhaps ADS-specific safety tests should accompany broad exemptions. Pre-market approval has many downsides, but some level of independent ADS safety review could supplement self-certification. Existing self-certification should be supplemented by governmentally defined and publicly disclosed standards and then supplemented by third-party validation of design and testing.

In many ways, ADS is a game changer for a vast number of issues and challenges that are still being developed and explored.

### THE TECHNOLOGICAL CHALLENGES: WE'RE NOT THERE ... YET

Replacing a human driver with an amalgamation of integrated software, sensors, actuators, controllers, and other hardware is no simple task. Human errors may contribute to most accidents, but human drivers have proven to be capable of performing millions of miles of complex and demanding driving operations without crashes. Robotic, automated systems have achieved incredible progress, but in many ways they still lag basic human operations. In the high-level [Defense Advanced Research Projects Agency Robotics Challenge](#), which has been focusing on humanoid robotics executing complex task underway since 2012, there was great celebration in 2018 when the robot finally was able to ... open a door.

ADS mishaps, crashes, and tragedies have and will happen, and they will continue to make headlines. These highly publicized ADS problems, many resulting from the complexity of driving tasks, diminish the confidence of the public that ADS will be safe. The ADS-related fatalities in Florida, Arizona, and California have seriously challenged many people's beliefs in the current progress of ADS technology. The National Transportation Safety Board review of those fatalities shine a bright light on potential safety concerns for ADS.

Unfortunately, the list of ADS problems does not end with the recent tragedies. In January 2018 alone:

- General Motors was [sued](#) in federal court in the Northern District of California by a motorcyclist alleging that a Chevy Bolt utilizing ADS injured the cyclist by negligent self-driving.
- In Pittsburgh, an automated test vehicle with Argo AI, a startup backed by Ford, was [reportedly](#) involved in an accident that sent two people to the hospital.
- Waymo [announced](#) that it would acquire thousands of Fiat Chrysler Pacifica minivans for its driverless ride-hailing service to the public, but Fiat Chrysler Automobiles [issued](#) a recall of more than 162,000 Chrysler Pacifica minivans due to a potential software glitch that may cause the vehicle to stall.
- A Tesla Model S slammed into the back of a stopped fire truck on the 405 freeway in Los Angeles County. [Reportedly](#), Tesla acknowledged that the driver assistance system ignored the stationary vehicle and instead accelerated to the cruise speed the driver punched in. The driver was required to intervene and apply the brakes.

## NAMIC ISSUE ANALYSIS

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Other recent events include:

- A [driverless shuttle bus](#) operating in Las Vegas did not move and was struck by a truck that was backing into a driveway.
- [Uber](#) grounded its fleet of self-driving cars in Pittsburgh as the company investigated a crash involving one of its vehicles. Uber grounded its fleet nationwide in March after a self-driving Uber vehicle was involved in a fatal crash in Tempe, Arizona.
- GM tried to show off its automated GM Cruise to reporters in San Francisco, but the vehicle was [reported](#) to have issues with traffic cones and double-parked vehicles.

These and other incidents have led to the public remaining unconvinced and skeptical of ADS technology. One respected 2017 [survey](#) concluded that 40 percent of respondents anticipate ADS will reduce the number of people killed or injured in traffic accidents. But the remaining 60 percent are evenly split between those who think traffic fatalities will increase with ADS and those who expect fatalities will neither increase nor decrease.

By a 2:1 margin, Californians say driverless cars should not be allowed on the streets “where I live,” [a recent survey](#) found. When asked “Who should be ultimately responsible for deciding where driverless cars are allowed and where they are not allowed” only 4 percent of respondents said the car manufacturer. Roughly half the respondents thought that state and local authorities were best suited to make such decisions. Fifty-eight percent said they did not believe the cars should be allowed on their neighborhood streets, while 57 percent said they would feel “unsafe” or “very unsafe” riding in such a vehicle.

The public belief in improving ADS safety is critical to any long-term development and acceptance of ADS. Government approval and technical development will mean little if people do not accept ADS as directly reducing the number of people killed or injured in traffic accidents.

That requisite public/market acceptance of safety improvement through ADS is far from certain:

- The [2018 AAA Vehicle Technology Survey](#) reveals that 63 percent of U.S. drivers report feeling afraid to ride in a fully self-driving vehicle. It also found that 46 percent of U.S. drivers report that they would feel less safe sharing the road with a self-driving vehicle.
- A [2018 CARAVAN Public Opinion Poll](#) found that 64 percent of respondents expressed concern about sharing the road with driverless cars and 80 percent support minimum performance requirements for computers that operate driverless cars. More than eight in 10 respondents support uniform DOT rules to ensure that the human driver is alert to safely take control from the computer and 73 percent support DOT developing safety standards for new features related to the operation of driverless cars.
- A [2017 MIT white paper](#) on consumer interest in automation found that while the percentage of respondents favoring automation that helps the driver perform increased by 50 percent from 2016 to 2017, the percentage of people who were comfortable with features relieving the driver of control for extended periods or the entire drive dropped. Roughly half of all respondents said they would never buy a car that completely drives itself.
- A [2018 study](#) by Morning Consult concluded almost half of Americans don’t believe that ADS will ever fully replace human drivers. The same study found that while 58 percent of Americans do not trust ADS, their opinions could change as the technology evolves.

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- Pew Research in 2017 reported that 54 percent of Americans expressed worry compared to only 40 percent who expressed enthusiasm about the development of driverless vehicles. More than half reported they would not want to ride in a driverless vehicle if given the opportunity.
- Seventy-five percent of persons surveyed by AIG in 2017 said they think there is a threat that hackers would take control of automated vehicles.

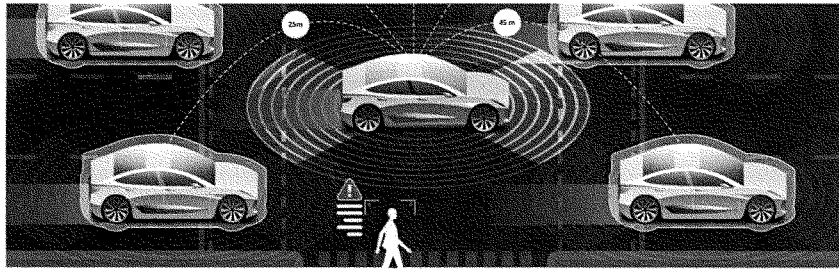
These events and statistics strongly favor an appropriately robust, tailored regulatory environment, without which more accidents will likely occur. Without a strong regulatory environment, there is an increasing risk that the public trust both in ADS and the government institutions that approve and regulate them may erode.

### CHAMPIONS OF SAFETY: PROPERTY/CASUALTY INSURANCE COMPANIES LEADING ADVOCATES FOR AUTO PASSENGER SAFETY

Insurers have long championed auto and highway safety issues and have helped raise public awareness through the creation of auto safety research organizations such as the Insurance Institute for Highway Safety. The IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses – deaths, injuries, and property damage – from motor vehicle crashes. Insurers have allied with safety groups such as the Advocates for Highway and Auto Safety to work together to make America's roads safer.

The business of insurance demands that it applies hard data and institutes actuarial science to assess and mitigate risk. It was more than 30 years ago that coalitions of insurance companies together with consumer groups first favored state requirements for seat belts and air bags and opposed the auto makers reluctance to provide such safety features. Insurers have a long and proven history of working hand-in-glove with regulators and auto manufacturers to facilitate developments that save lives and prevent injuries and damage.

The revolutionary replacement of the human driver with ADS will require auto insurers to understand each vehicle's design and operation. Ultimately, drivers may not be comfortable with no control whatsoever, which means that the insurer of that human driver must understand the planned automated driving operations as well as any possible human operation of the vehicle under any circumstances.



## NAMIC ISSUE ANALYSIS

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The insurance industry understands that new and different data will be needed for insurers to write ADS-related insurance policies. The extensive history and level of human driving data that insurers have developed must now be supplemented by increasingly complex data on the automated driving systems that assist or replace the human drivers. Insurers have a proven track record of assessing driving risks and communicating to auto owners the methods to mitigate that risk.

The types of objective and verifiable data that will be required to provide insurance for ADS – data on frequency, severity, repairs – are the same types of data that can authoritatively validate safety levels of ADS to the public and regulators.

Auto insurance rates and coverage are established by insurance companies using vast amounts of historical data and established actuarial science, analyzing years of relevant data on frequency and severity of incidents. The rates determined by insurance companies are then frequently subject to a review by the state insurance regulators to ensure that they are fair and supported by data.

### WHEN MORE IS BETTER: VALID AND UNDERSTANDABLE DATA ON ADS IS CRITICAL TO SAFETY

The development and deployment of ADS – particularly the proposed ADS with no controls for a human driver – is a game changer. It will entail a fundamental change in transportation, mobility, infrastructure, and myriad other areas. The adoption of ADS on a wide scale will impact millions of people and will require adaptation by governments, industries, and the culture in general.

The precondition to this development is an accepted belief that ADS improve safety, which will itself require sufficient data and information upon which to validate that belief. To date, information about ADS development in general and safety specifically has been limited.

NHTSA's Federal Automated Vehicles Policy encourages entities to disclose Voluntary Safety Self-Assessments demonstrating their varied approaches to achieving safety in the testing and deployment of ADS. NHTSA suggestions for the voluntary ADS disclosure advocates brevity and confidentiality. For instance, the [2017 update](#) to the Federal Automated Vehicles Policy asks only for "concise information" and specifically not "an exhaustive recount of every action the entity took to address a particular safety element." In addition to NHTSA's one-page [Voluntary Safety Self-Assessment Template](#) related to crashworthiness, only two companies, [Waymo](#) and [GM](#), have published ADS "safety reports."

At the state level, the California Department of Motor Vehicles requires all companies testing ADS to obtain a permit, file crash reports within 10 days of an incident, and complete annual "disengagement reports" explaining when autonomous technology has failed. Forty-nine companies have permits to test in California, and as of January 29, 2018, the DMV has received [55 Autonomous Vehicle Accident Reports](#).

ADS development is still in the early stages and myriad business, design, technical, and other issues are still only being discussed. In the competition to bring ADS to market, there should be a requisite level of confidentiality; premature disclosure of technical issues can have disastrous financial and developmental effects and potentially stifle innovation. Basic ADS design decisions such as whether to utilize vehicle-to-vehicle communication systems or to include an "emergency stop control" remain subject to internal corporate debate, technical questions, and related business considerations. Insurance companies

## VALIDATING SAFETY: THE NEXT PHASE IN DEVELOPING AUTOMATED DRIVING SYSTEMS

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understand confidential information and have a long history of working with auto companies to obtain and use available data. Similarly, insurance companies have deep experience in data security and the wide scope of data privacy requirements.

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**Basic ADS design decisions such as whether to utilize vehicle-to-vehicle communication systems or to include an “emergency stop control” remain subject to internal corporate debate, technical questions, and related business considerations. Insurance companies understand confidential information and have a long history of working with auto companies to obtain and use available data.**

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At the same time, there is a significant level of concern that this system of voluntary self-certification by manufacturers of the safety of ADS may not be adequate to enable the development and public acceptance of safe ADS. Having defined and transparent government standards will result in more and better data and information on ADS that will help its development, the understanding and acceptance by the public of ADS, and the development of related businesses like insurance that will be critical to ADS use. Countries outside the U.S. have developed ideas to address data access, and ADS companies in those countries may be getting an acceptance advantage over U.S. companies. German companies and legislators are developing readouts of data in self-driving cars that will be simple and as standardized as possible. And in Japan, the government plans to make onboard data recorders compulsory for ADS vehicles.

The market acceptance critical to ADS development will be greatly facilitated by publicly available data that clearly states what the ADS is supposed to do and not do. This could be further enhanced with real-time data that provides the public with a clearer understanding regarding the performance capabilities, or limitations, of ADS. With access to such data, consumers, regulators, DMVs, and other entities could readily understand what aspects of the steering, acceleration, and braking of a specific ADS model are or can be partially or fully automated.

For ADS where a human has some level of control of driving operations, the ADS features, abilities, and limitations could be – absent aftermarket alterations – set and built for that make and model on the factory floor. Every Company X, Model Y built in month Z in Kentucky will have the same ADS features. It is extremely doubtful that auto manufacturers will build each car to custom orders; the assembly line will produce the same car with the same ADS features in the same way. Providing data on the exact ADS features, abilities, and limitations for those cars may be the same and would not involve any private data. This would allow owners and DMVs to understand, dealers to service, and insurers to write coverage based on the same ADS features, abilities, and limitations.

It would be in the best interests of proponents of safe ADS to coordinate and consider new and improved alternatives to communicate on ADS technology and performance. Somewhere between the extreme poles of “just trust us” and reams of federal regulations requiring submission of millions of certified data points is a system of information and communication that is usable and comprehensible for the public, governments, and other industries. Validation of safe ADS development and a resulting public acceptance can be greatly enhanced by a measurable gauge of ADS safety/risks through recognized analysis of most relevant data.



## NAMIC ISSUE ANALYSIS

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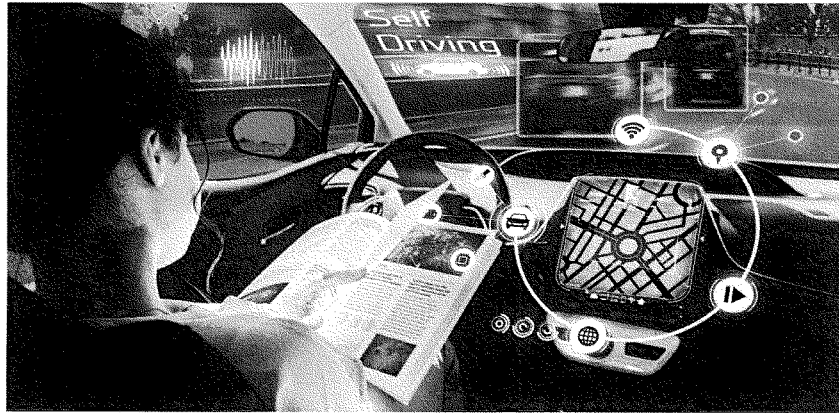
### CONCLUSION

The potential safety benefits of ADS are tremendous, and the insurance industry is committed to supporting the development and deployment of real safety benefits at the earliest time. These benefits are dependent, however, on many and daunting technological, logistical, and regulatory revisions that remain to be designed and successfully implemented.

As noted in this paper, the existing environment of auto safety regulation evolved with a human-driver focus and has not fully considered the many nuances of increased assisted and automated driving systems. As these systems develop and evolve, the risk of regulatory safety gaps increases and the need for a comprehensive reassessment of driving operation safety grows exponentially, starting with the paramount focus on the safety of vehicle occupants, occupants of other vehicles, and the public.

Recent ADS tragedies have clearly illustrated that greater validation of safety features will be necessary to promote the development and deployment of this new world of safe ADS. Like middle school math homework, it may be beneficial to show how we got to the answer; to illustrate the exact steps taken to achieve specific metrics of safety for ADS. Broad assurances of overall safety must be bolstered by facts and data on ADS design and operation. Third-party validation of safety testing will help to develop the requisite public, insurer, and governmental trust to support further ADS deployment.

A prerequisite of that trust, particularly for insurers, is the access to more and better data on the proposed and adopted design and operation of ADS. Through their highly regulated development of rates and coverage, insurers apply many of the objective and independent validations sought for ADS operational safety. Just as with the established and active advocacy of seat belts and air bags, auto insurance companies can work with auto manufacturers and safety advocates to develop and implement commercial standards that can save lives.



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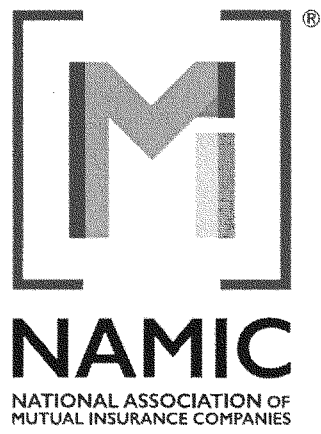
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**STATEMENT OF PROPERTY CASUALTY INSURERS ASSOCIATION OF AMERICA**  
**House Committee on Financial Services**  
**Subcommittee on Housing and Insurance**  
**Hearing on**  
**The Impact of Autonomous Vehicles on the Future of Insurance**  
**May 23, 2018**

The Property Casualty Insurers Association of America (PCI) promotes and protects the viability of a competitive private insurance market for the benefit of consumers and insurers. PCI is composed of approximately 1,000-member companies and 350 insurance groups, representing the broadest cross section of home, auto, and business insurers of any national trade association. PCI members write \$220 billion in annual premium, which is 37 percent of the nation's property casualty insurance marketplace. PCI member companies write 44 percent of the U.S. automobile insurance market.

As the fundamental nature of vehicle transportation changes, so do the risks faced by automotive technology developers, manufacturers, vehicle owners and users. The automotive industry and its customers have long benefited from a highly competitive auto insurance marketplace. Auto insurance helps manufacturers and consumers mitigate risk and provides accurate risk pricing signals to encourage consumers to purchase safer and more advanced cars which requires less expensive coverage. As it has for over a century, the auto insurance industry will continue to play a critical role in meeting society's changing needs by developing new insurance products, pricing methods and claims practices to support innovation in transportation through innovation in insurance.

Today, the automobile insurance industry faces disruption on several fronts. The recent increase in the number of accidents, injuries and deaths on our roads comes at a time when vehicles are safer than ever due to better construction and crash avoidance technology. However, those same improvements that make vehicles safer also significantly increase the cost of repairs. The cost of medical care for auto accident victims is also increasing much faster than the rate of inflation.

While navigating these issues, insurers will be challenged to make fundamental changes in how they assess risk as the focus moves from the human driver towards the technology that operates the vehicle. While vehicle characteristics have always played a role in pricing auto insurance, assessing accident risk has primarily focused on drivers. Going forward, insurers will need to identify vehicles equipped with autonomous technology and have that identification reflected in motor vehicle records and crash reporting to assess the risk of different automated or autonomous driving systems, just as they are able to differentiate between drivers today.

Similarly, when determining liability in an auto accident claims situation, the primary approach today is to interview the drivers. With autonomous vehicles, insurers will need access to recorded vehicle data to provide evidence of how an accident happened. PCI believes that our current state-based system of determining liability for accidents and compensating victims should be able to adapt to the changing nature of the driving risk if vehicle data is accessible and in a form that allows for prompt accident

investigation and resolution of claims.

Access to and sharing of automated or autonomous vehicle data is a critical issue, not only for insurers, but for automotive technology developers, manufacturers, vehicle owners and numerous other stakeholders. Safety, security, privacy and protection of intellectual property are all important, but must be balanced with the need for third parties to access such data. At a minimum, vehicle owners or lessees should have the ability to authorize access to vehicle data to third parties with whom they wish to share data for any reason.

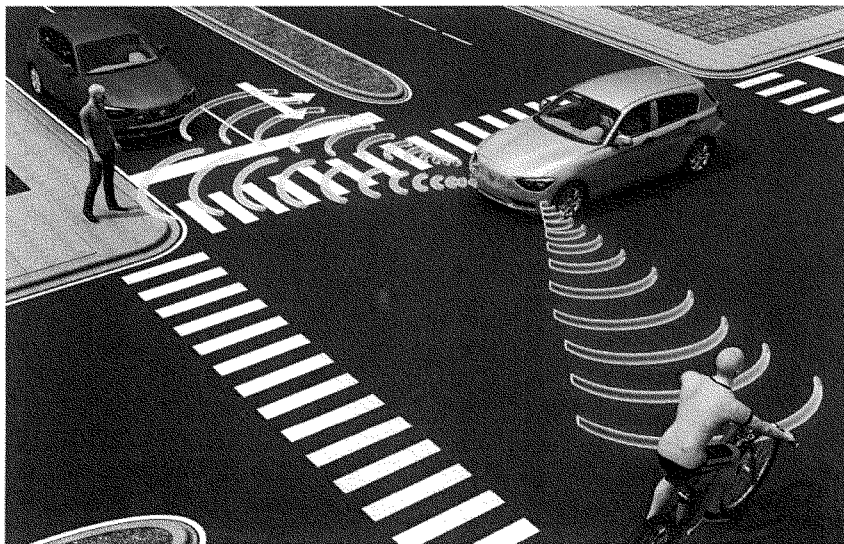
Establishing a single set of rules for data access and sharing at the federal level, and a standardized set of data elements that balances those interests, is critical. For this reason, PCI strongly supports Section 15 of S. 1885, the “American Vision for Safer Transportation through Advancement of Revolutionary Technologies Act,” (“AV START Act”), as reported favorably from the Senate Commerce Committee. Section 15 would establish a federal advisory committee to discuss these issues with a wide range of stakeholders, ensuring all interests are considered, and make recommendations to Congress. We urge that Section 15 – a bipartisan amendment originally authored by Senator Jim Inhofe (R-OK) and incorporated into S. 1885 at the Senate Commerce Committee’s mark-up of S. 1885 by unanimous consent – be included in any highly autonomous vehicle (HAV) legislation.

Automated driving technology holds great promise for the future and we look forward to working with policymakers, automotive technology developers and manufacturers’ insurers to ensure that the auto insurance industry will be able support the changing needs of our motor vehicle transportation industry. Indeed, the insurance industry will be central to providing motorists and policymakers with the confidence needed to propel this new technology forward.

# Self Driving Vehicles

## THE THREAT TO CONSUMERS

BY HARVEY ROSENFELD



 **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;<sup>1</sup> 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.<sup>2</sup> 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."<sup>3</sup>

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.

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

<sup>1</sup> "What Works? A Review of Auto Insurance Rate Regulation in America," Consumer Federation of America, November 12, 2013.

<sup>2</sup> 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

<sup>3</sup> 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.<sup>4</sup> 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,<sup>5</sup> 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.<sup>6</sup> But the duration of testing that would be required in order to match the safety tolerance of commercial airplanes is 114,000 years.<sup>7</sup>

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.

<sup>4</sup> 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>.)

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

<sup>6</sup> See <https://x.company/waymo/> (last visited June 12, 2017).

<sup>7</sup> See B.W. Smith, *Automated Driving & Product Liability*, 2017 Mich. St. L. Rev. 1, at 31 re "at least a billion hours 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.<sup>8</sup> 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<sup>9</sup>); privacy breaches (now endemic in the United States<sup>10</sup>); criminal hacking or even terrorist cyber attacks involving hundreds or thousands of vehicles, as the FBI has warned.<sup>11</sup>

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.<sup>12</sup> 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*.<sup>13</sup>

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

<sup>8</sup> 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](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)).

<sup>9</sup> See Section 2.4.

<sup>10</sup> See Section 2.2.

<sup>11</sup> See Section 2.2.

<sup>12</sup> See Section 2.4.

<sup>13</sup> 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;<sup>14</sup> including property damage, the total estimated economic cost of car crashes was estimated at \$242 billion in 2010.<sup>15</sup> 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.<sup>16</sup> Three of the largest recalls in recent years concern vehicle safety failures – defective GM ignition switches,<sup>17</sup> exploding Takata airbags,<sup>18</sup> and unintended acceleration in Toyota vehicles<sup>19</sup> – 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.<sup>20</sup>

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.<sup>21</sup> 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,

<sup>14</sup> NHTSA, 2015 Motor Vehicle Crashes: Overview (August 2016).

<sup>15</sup> NHTSA, The Economic and Societal Impact Of Motor Vehicle Crashes, 2010 (Revised May 2015).

<sup>16</sup> 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.

<sup>17</sup> “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/>).

<sup>18</sup> “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>).

<sup>19</sup> “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>).

<sup>20</sup> 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>)).

<sup>21</sup> 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.<sup>22</sup>

### 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;<sup>23</sup> it takes a neuron 0.5 milliseconds to transmit a signal<sup>24</sup> and 13 milliseconds for the brain to process an image.<sup>25</sup> 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.

<sup>22</sup> 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.

<sup>23</sup> 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>.)

<sup>24</sup> <http://news.mit.edu/2014/in-the-blink-of-an-eye-0116>

<sup>25</sup> <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.<sup>26</sup>

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.<sup>27</sup> 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

<sup>26</sup> “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/>).

<sup>27</sup> 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](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.”<sup>28</sup>

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.<sup>29</sup> 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.<sup>30</sup> Fiat Chrysler had to recall 1.4 million vehicles to fix the Jeeps’ vulnerabilities.<sup>31</sup> 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.<sup>32</sup>

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.”<sup>33</sup> 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.”<sup>34</sup>

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.

<sup>28</sup> 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>).

<sup>29</sup> K. Sheridan, “Data Breaches Exposed 4.2 Billion Records In 2016,” Information Week, January 25, 2017.

<sup>30</sup> 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>).

<sup>31</sup> “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’>).

<sup>32</sup> 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\\_source=Hackers+News+-+Security+Blog%29&\\_m=3n.009a.1326.en0ao0609g.rxi](http://thehackernews.com/2016/09/hack-tesla-autopilot.html?utm_source=Hackers+News+-+Security+Blog%29&_m=3n.009a.1326.en0ao0609g.rxi)).

<sup>33</sup> “Motor Vehicles Increasingly Vulnerable To Remote Exploits,” Federal Bureau of Investigation, March 17, 2016 (<http://www.ic3.gov/media/2016/160317.aspx#fn1>).

<sup>34</sup> *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.<sup>35</sup>

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.<sup>36</sup> 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.<sup>37</sup>

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.”<sup>38</sup> 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.”<sup>39</sup> “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.”<sup>40</sup>

<sup>35</sup> Committee Report on S. 3005, The Traffic Safety Act of 1966, June 23, 1966, at 274.

<sup>36</sup> “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>).

<sup>37</sup> 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](http://www.consumerwatchdog.org/search/apachesolr_search/NHTSA%20AEB?filters=type%3Anewsrelease)).

<sup>38</sup> Exclusive: U.S., Major Automakers to Announce Safety Accord Friday, David Shepardson, Detroit News, January 11, 2016).

<sup>39</sup> 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>).

<sup>40</sup> *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.”<sup>41</sup>

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.”<sup>42</sup>

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.<sup>43</sup> 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.<sup>44</sup> In the past, the company has said that its robot cars

<sup>41</sup> NHTSA, Preliminary Statement of Policy Concerning Automated Vehicles, May 15, 2013, p. 3.

<sup>42</sup> POLITICO, Pro Transportation Report, Friday January 15, 2016.

<sup>43</sup> NHTSA, Federal Automated Vehicles Policy, September 2016, p. 15-16.

<sup>44</sup> “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.<sup>45</sup> There were also software glitches and instances when the human test driver took over because the robot car made an unwanted maneuver.<sup>46</sup> 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.”<sup>47</sup> 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.<sup>48</sup> Mercedes, which has asserted it will deploy an autonomous vehicle by 2020, reported 336 disengagements in 673 miles.<sup>49</sup>

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.<sup>50</sup> 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.<sup>51</sup> 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.”<sup>52</sup>

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.<sup>53</sup> A lower level of safety – “a level of 80 percent confidence that the robotic vehicle is 90 percent safer than human drivers on the

<sup>45</sup> “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>).

<sup>46</sup> See footnote 44.

<sup>47</sup> 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](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)).

<sup>48</sup> See footnote 44.

<sup>49</sup> *Id.*

<sup>50</sup> 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](https://www.nytimes.com/2016/09/15/business/fatal-tesla-crash-in-china-involved-autopilot-government-tv-says.html?_r=0)).

<sup>51</sup> 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/>).

<sup>52</sup> 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>.

<sup>53</sup> 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.<sup>54</sup>

## 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.<sup>55</sup> 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.<sup>56</sup>

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

<sup>54</sup> S. Collier, “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/>).

<sup>55</sup> 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>).

<sup>56</sup> 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.<sup>57</sup>

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.<sup>58</sup> 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.<sup>59</sup>

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.

<sup>57</sup> 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>).

<sup>58</sup> 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-jhs-average-car-age-20150729-story.html> last accessed Nov. 4, 2015

<sup>59</sup> 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<sup>60</sup> 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

<sup>60</sup> 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),<sup>61</sup> 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.

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<sup>61</sup> "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" 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.<sup>62</sup> 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.<sup>63</sup>

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

<sup>62</sup> 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/>).

<sup>63</sup> “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,<sup>64</sup> Mercedes and Google.<sup>65</sup> But news reports indicate that Mercedes and Google added a salient limitation on their pledge: that "their technology is at fault."<sup>66</sup> 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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<sup>64</sup> 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>).

<sup>65</sup> 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>).

<sup>66</sup> *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.<sup>67</sup>

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.<sup>68</sup>

#### 3.2.1 Insurance and autonomous vehicles.

In 2015, United States-based insurance companies held a total of \$8.4 *trillion* in assets.<sup>69</sup> 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.<sup>70</sup>

<sup>67</sup> 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.

<sup>68</sup> “What Works? A Review of Auto Insurance Rate Regulation in America,” Consumer Federation of America, November 12, 2013.

<sup>69</sup> “Annual Report On The Insurance Industry,” Federal Insurance Office, U.S. Department Of The Treasury (September 2016), p. 12.

<sup>70</sup> 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.<sup>71</sup> 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.

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<sup>71</sup> 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.”<sup>72</sup> 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.<sup>72</sup> 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](http://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.”<sup>73</sup> 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 in 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

<sup>73</sup> 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.<sup>74</sup>

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.<sup>75</sup> 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.<sup>76</sup> 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.<sup>77</sup>

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

<sup>74</sup> "What Works? A Review of Auto Insurance Rate Regulation in America," Consumer Federation of America, November 12, 2013.

<sup>75</sup> 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.

<sup>76</sup> See Section 2.2.

<sup>77</sup> 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.<sup>78</sup> 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.<sup>79</sup>

A different approach, adopted by the George W. Bush Administration although most certainly unconstitutional,<sup>80</sup> called for NHTSA and other federal agencies to override state consumer protection laws.<sup>81</sup> The Obama Administration later reversed it.<sup>82</sup> (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.”<sup>83</sup>)

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.<sup>84</sup> (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.<sup>85</sup>)

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

<sup>79</sup> R. Nader, “Suing for Justice,” Harpers, April 2016.

<sup>80</sup> D. Vladek, “The Emerging Threat of Regulatory Preemption,” The American Constitution Society, January 2008.

<sup>81</sup> 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>).

<sup>82</sup> 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>).

<sup>83</sup> 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>).

<sup>84</sup> 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>).

<sup>85</sup> 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.”<sup>86</sup> It continues: “Where liability exposure poses a threat to an emerging technology, legislators should adopt reasonable constraints on liability.”<sup>87</sup>

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.<sup>88</sup>

#### 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.”<sup>89</sup>

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.<sup>90</sup>

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.<sup>91</sup> Insurance companies placed another “no fault” initiative on the ballot in 1996. It, too, was decisively rejected, with 65% of Californians voting against it.<sup>92</sup> Four states significantly altered or repealed their no-fault systems

<sup>86</sup> 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.

<sup>87</sup> *Id.*, p. 54.

<sup>88</sup> J. Anderson, et al., *Autonomous Vehicle Technology: A Guide for Policymakers*, RAND, 2016, p. 118.

<sup>89</sup> *Id.*, p. 116.

<sup>90</sup> H. Rosenfield, “Auto Insurance: Crisis and Reform,” 29 U. Memphis Law Review 69 (Fall 1998), p. 87-97.

<sup>91</sup> *Id.*, p. 83-84.

<sup>92</sup> See [https://ballotpedia.org/California\\_Proposition\\_200\\_No\\_Fault\\_Automobile\\_Insurance\\_\(1996\)](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.<sup>93</sup> 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.<sup>94</sup> 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.”<sup>95</sup>

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.<sup>96</sup> 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

<sup>93</sup> H. Rosenfield, “Auto Insurance: Crisis and Reform,” 29 U. Memphis Law Review 69 (Fall 1998), p. 87-97.

<sup>94</sup> “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>).

<sup>95</sup> I. Adams, “Does Prop 103 Violate Itself?” Personal Insurance Federation of California, October 21, 2014 (<http://www.pifc.org/prop-103-violate/>).

<sup>96</sup> *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.<sup>97</sup> 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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<sup>97</sup> 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 nor 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.

