Committee Meeting

of

ASSEMBLY TRANSPORTATION AND INDEPENDENT AUTHORITIES COMMITTEE

ASSEMBLY SCIENCE, INNOVATION, AND TECHNOLOGY COMMITTEE

"The Committees will receive testimony from invited guests concerning the development of autonomous vehicles and the regulation of autonomous vehicles operating in New Jersey"

The following Bill will be considered:

AJR-164

LOCATION: Committee Room 11
State House Annex
Trenton, New Jersey

DATE: October 22, 2018
10:00 a.m.

MEMBERS OF COMMITTEES PRESENT:

Assemblyman Daniel R. Benson, Chair
Assemblyman Andrew Zwicker, Chair
Assemblywoman Patricia Egan Jones, Vice Chair
Assemblyman James J. Kennedy, Vice Chair
Assemblywoman Linda S. Carter
Assemblyman Nicholas Chiaravalloti
Assemblyman Herb Conaway, Jr.
Assemblyman Roy Freiman
Assemblyman Thomas P. Giblin
Assemblywoman Yvonne Lopez
Assemblywoman Britnee N. Timberlake
Assemblyman Benjie E. Wimberly
Assemblyman Anthony M. Bucco
Assemblywoman BettyLou DeCroce
Assemblyman Christopher P. DePhillips

ALSO PRESENT:

Tara Howley
Phillip Mersinger
Andrew Ward
Office of Legislative Services
Committee Aides

Shannon Natale
Catherine Tung
Assembly Majority
Committee Aides

Glen Beebe
Assembly Republican
Committee Aide

Meeting Recorded and Transcribed by
The Office of Legislative Services, Public Information Office,
Hearing Unit, State House Annex, PO 068, Trenton, New Jersey

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New Jersey State Legislature

ASSEMBLY TRANSPORTATION AND INDEPENDENT AUTHORITIES COMMITTEE

STATE HOUSE ANNEX
PO BOX 068
TRENTON NJ 08625-0068

COMMITTEE NOTICE

TO: MEMBERS OF THE ASSEMBLY TRANSPORTATION AND INDEPENDENT AUTHORITIES COMMITTEE

FROM: ASSEMBLYMAN DANIEL R. BENSON, CHAIRMAN

SUBJECT: **COMMITTEE MEETING - OCTOBER 22, 2018**

The public may address comments and questions to Philip M. Mersinger, Committee Aide, or make bill status and scheduling inquiries to Melinda Chance, Secretary, at (609)847-3840, fax (609)292-0561, or e-mail: OLSAideATR@njleg.org. Written and electronic comments, questions and testimony submitted to the committee by the public, as well as recordings and transcripts, if any, of oral testimony, are government records and will be available to the public upon request.

The Assembly Transportation and Independent Authorities Committee and the Assembly Science, Innovation and Technology Committee will meet jointly on Monday, October 22, 2018 at 10:00 AM in Committee Room 11, 4th Floor, State House Annex, Trenton, New Jersey.

The committees will receive testimony from invited guests concerning the development of autonomous vehicles and the regulation of autonomous vehicles operating in New Jersey.

The following bill(s) will be considered:

AJR-164 Benson/Zwicker/Lampitt	Establishes "New Jersey Advanced Autonomous Vehicle Task Force."

FOR DISCUSSION ONLY:

A-1853 Lampitt/Benson	Permits testing and use of autonomous vehicles on State roadways under certain circumstances.

(OVER)

A-4541 Zwicker/Benson/Lampitt	Directs MVC to establish driver's license endorsement for autonomous vehicles.
A-4573 Zwicker/Benson	Establishes fully autonomous vehicle pilot program.

Issued 10/17/18

For reasonable accommodation of a disability call the telephone number or fax number above, or for persons with hearing loss dial 711 for NJ Relay. The provision of assistive listening devices requires 24 hours' notice. CART or sign language interpretation requires 5 days' notice.

For changes in schedule due to snow or other emergencies, see website http://www.njleg.state.nj.us or call 800-792-8630 (toll-free in NJ) or 609-847-3905.

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New Jersey State Legislature

ASSEMBLY SCIENCE, INNOVATION AND TECHNOLOGY COMMITTEE

STATE HOUSE ANNEX
PO BOX 068
TRENTON NJ 08625-0068

COMMITTEE NOTICE

TO: MEMBERS OF THE ASSEMBLY SCIENCE, INNOVATION AND TECHNOLOGY COMMITTEE

FROM: ASSEMBLYMAN ANDREW ZWICKER, CHAIRMAN

SUBJECT: **COMMITTEE MEETING - OCTOBER 22, 2018**

The public may address comments and questions to Tara Howley, Andrew Ward, Committee Aides, or make bill status and scheduling inquiries to Kimberly Johnson, Secretary, at (609)847-3840, fax (609)292-0561, or e-mail: OLSAideAST@njleg.org. Written and electronic comments, questions and testimony submitted to the committee by the public, as well as recordings and transcripts, if any, of oral testimony, are government records and will be available to the public upon request.

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ASSEMBLY JOINT RESOLUTION
No. 164

STATE OF NEW JERSEY
218th LEGISLATURE

INTRODUCED OCTOBER 15, 2018

Sponsored by:
Assemblyman DANIEL R. BENSON
District 14 (Mercer and Middlesex)
Assemblyman ANDREW ZWICKER
District 16 (Hunterdon, Mercer, Middlesex and Somerset)
Assemblywoman PAMELA R. LAMPITT
District 6 (Burlington and Camden)

SYNOPSIS
Establishes "New Jersey Advanced Autonomous Vehicle Task Force."

CURRENT VERSION OF TEXT
As introduced.

A JOINT RESOLUTION establishing the "New Jersey Advanced Autonomous Vehicle Task Force."

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. a. There is established a task force to be known as "New Jersey Advanced Autonomous Vehicle Task Force." The purpose of the task force shall be to conduct a study of advanced autonomous vehicles and to make recommendations on laws, rules, and regulations that this State may enact to safely integrate advanced autonomous vehicles on the State's highways, streets, and roads.

b. The task force shall consist of 7 members as follows:

(1) the Commissioner of Transportation, who shall serve ex officio, or the commissioner's designee;

(2) the Chief Administrator of the Motor Vehicle Commission, who shall serve ex officio, or the chief administrator's designee;

(3) the Director of the Division of Highway Traffic Safety in the Department of Law and Public Safety, who shall serve ex officio, or the director's designee;

(4) two public members, who shall be appointed by the Governor, one with an expertise in highway transportation safety and one with an expertise in autonomous vehicle technology;

(5) one public member appointed by the Governor upon the recommendation of the President of the Senate, with an expertise in highway transportation safety; and

(6) one public member appointed by the Governor upon the recommendation of the Speaker of the General Assembly, with an expertise in autonomous vehicle technology;

c. Within 90 days after the effective date of P.L. , c. (C.) (pending before the Legislature as this bill), a majority of the task force's authorized membership shall be appointed and the task force shall hold its initial meeting. The task force shall organize upon the appointment of a majority of its authorized membership and shall elect a chair from among its members. The members of the task force shall serve for the duration of the existence of the task force. Any vacancy shall be filled in the same manner as the original appointment. The task force members shall serve without compensation, but shall be reimbursed for necessary expenses incurred in the performance of their duties to the extent that funds are available for that purpose.

d. Not later than 180 days after the initial meeting of the task force, the task force shall issue a report to the Governor and, pursuant to section 2 of P.L.1991, c.164 (C.52:14-19.1), to the Legislature, which shall include, but not be limited to, an evaluation of the National Highway Transportation Safety Administration's safety standards for advanced autonomous vehicles and whether this State may enact stricter safety standards, an evaluation of existing

state and federal law concerning advanced autonomous vehicles with a focus on safety standards, an evaluation of existing legislation and regulations in other states concerning advanced autonomous vehicles with a focus on safety standards, recommendations on how this State could safely integrate advanced autonomous vehicles on its highways, streets, and roads, any other information relevant to the subject of the report, and any draft legislation the task force deems appropriate to implement the purposes of P.L. , c. (C.) (pending before the Legislature as this bill).

e. The task force shall be entitled to the assistance and services of the employees of any State board, bureau, commission, or agency as it may require, and as may be available to it for these purposes including, but not limited to, stenographic and clerical assistants within the limits of funds appropriated or otherwise made available to it for its purposes.

f. The New Jersey Motor Vehicle Commission and the Department of Transportation shall assist the task force in the performance of its duties and provide the task force with studies, data, or other materials in the possession of those entities, to the extent that such are relevant to the purposes of the task force.

g. As used in P.L. , c. (C.) (pending before the Legislature as this bill):

"Advanced autonomous vehicle" means a motor vehicle equipped with autonomous technology that has a driving automation level of three, four, or five, as defined in the SAE J3016, which is an information report related to automated driving systems issued by the Society of Automotive Engineers International and is used by the United States Department of Transportation for autonomous vehicle policy guidance.

2. This act shall take effect immediately and shall expire upon the issuance of the report submitted by the task force pursuant to section 1 of P.L. , c. (C.) (pending before the Legislature as this bill).

STATEMENT

This joint resolution establishes the "New Jersey Advanced Autonomous Vehicle Task Force" (task force). The task force is to conduct a study of advanced autonomous vehicles and to make recommendations on laws, rules, and regulations that this State may enact to safely integrate advanced autonomous vehicles on the State's highways, streets, and roads. In this bill, an advanced autonomous vehicle means a motor vehicle equipped with autonomous technology that has a driving automation level of three, four, or five, as defined in the SAE J3016, which is an information

report related to automated driving systems issued by the Society of Automotive Engineers International and is used by the United States Department of Transportation for autonomous vehicle policy guidance.

The bill requires the task force to issue a report to the Governor and Legislature, which is to include, but not be limited to, an evaluation of the National Highway Transportation Safety Administration's safety standards for advanced autonomous vehicles and whether this State may enact stricter safety standards, an evaluation of existing state and federal law concerning advanced autonomous vehicles with a focus on safety standards, an evaluation of existing legislation and regulations in other states concerning advanced autonomous vehicles with a focus on safety standards, recommendations on how New Jersey could safely integrate advanced autonomous vehicles on the highways, streets, and roads of this State, any other information relevant to the subject of the report, and any draft legislation the task force deems appropriate to implement the purposes of this bill.

The bill states that the task force is to expire upon the issuance of the report to the Governor and to the Legislature.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

pnf:1-90

ASSEMBLYMAN DANIEL R. BENSON (Chair): We'd like to welcome everyone here today.

We have our joint hearing, along with Chairman Andrew Zwicker of the Science, Technology, and Innovation Committee.

Do you want to say a word before we stand for the flag salute?

ASSEMBLYMAN ANDREW ZWICKER (Chair): Sure.

I just wanted to thank everybody for coming. I want to thank both Committees for coming together today to talk about autonomous vehicles in New Jersey.

There's a lot of really interesting issues to talk about; certainly, we read quite a bit in the papers all the time. But, you know, I really want start to hear not just about the different perspectives, but about what this legislative body and these Committees can do to further autonomous vehicle development in New Jersey

So thank you to the Chairman for this joint hearing. I am very much looking forward to everyone's testimony today.

ASSEMBLYMAN BENSON: If everyone could rise for the salute. (all recite Pledge of Allegiance)

And given the format that we have today, with a few Bills, what we're going to do is just ask -- we're going to call up individual folks who we have asked to testify in general on the state of autonomous vehicles in the world, in the U.S., and in New Jersey, particularly; and the state of the market.

But also, while you're up here, if you have some testimony on the task force particularly, since that will be voted out today; but on the Bills that are hearing only, feel free to give your testimony for that too.

And then if there are just some folks who still want to testify on the Bills themselves solely, we'll call those folks up separately with those Bills.

With that, Chairman, do you want to invite the first guest up?

Oh, roll call first.

MR. MERSINGER (Committee Aide): Assemblyman Clifton. (no response)

Assemblyman Bucco. (no response)

Assemblywoman DeCroce.

ASSEMBLYWOMAN DeCROCE: Here.

MR. MERSINGER: Assemblyman McGuckin. (no response)

Assemblyman Wimberly. (no response)

Assemblywoman Lopez.

ASSEMBLYWOMAN LOPEZ: Here.

MR. MERSINGER: Assemblywoman Lampitt. (no response)

Assemblyman Kennedy.

ASSEMBLYMAN JAMES J. KENNEDY (Vice Chair): Here.

MR. MERSINGER: Assemblyman Giblin. (no response)

Assemblyman Freiman.

ASSEMBLYMAN FREIMAN: Here.

MR. MERSINGER: Assemblyman Chiaravalloti.

ASSEMBLYMAN CHIARAVALLOTI: Here.

MR. MERSINGER: Vice Chairwoman Jones.

ASSEMBLYWOMAN PATRICIA EGAN JONES (Vice Chair): Here.

MR. MERSINGER: Chairman Benson.

ASSEMBLYMAN BENSON: Present.

MR. MERSINGER: There's a quorum for Assembly Transportation.

Assemblywoman DeCroce is here for both Committees; Assemblyman DePhillips.

ASSEMBLYMAN BENSON: He's at another Committee; he'll be here shortly.

ASSEMBLYMAN ZWICKER: He's on his way.

MR. MERSINGER: Assemblywoman Timberlake.

ASSEMBLYWOMAN TIMBERLAKE: Here.

MR. MERSINGER: Assemblyman Conaway. (no response)

Assemblywoman Carter. (no response)

Vice Chairman Kennedy is here.

And Chairman Zwicker.

ASSEMBLYMAN ZWICKER: Here.

So let's start this hearing.

I'd like to call up Professor Alain Kornhauser, from Princeton University.

A L A I N L. K O R N H A U S E R, Ph.D.: Thank you, Assemblymen Zwicker and Benson.

It's a very great pleasure for me to be here to talk to you about the thing that I am laser-focused on and have been for quite some time.

I've distributed some remarks; I shan't read them, you can read them at your pleasure and your leisure.

I do want to begin a little bit -- basically, give you a feeling as to where I come from.

I'm Professor of Operations, Research, and Financial Engineering at Princeton, in my 47th year on the faculty. I've been there for a while.

I'm the Director of the Transportation Program; I'm also a Board Chair of something called the *Advanced Transit Association*. By the word *Transit,* that should imply something to you. And also I've been, sort of, dealing with automation in transportation at least since 1971. I was a big researcher and proponent of something called *Personal Rapid Transit* systems that were going to save the cities. We were going to build 10,000 stations, interconnected by 10,000 miles of guideway throughout New Jersey; provide mobility to everybody in New Jersey. Unfortunately, the cost for such a thing would be about a quarter-trillion, and it seemed as if nobody wanted to put out that kind of money.

I then participated in automated highway studies in the 1970s, 1980s, and 1990s. And where that was, was that we were going to automate vehicles; but then build roads that were exclusive to those automated vehicles and would only serve those automated vehicles. And it became clear that, in fact, that wasn't the way to go because, of course, New Jersey DOT would never build an automated highway unless GM built and sold a lot of automated cars. And GM wouldn't build and sell a lot of automated cars unless there were automated roadways. And so, for that chicken and egg, it never got anywhere.

Then, almost 15 years ago, the Defense Advanced Research Projects Administration created some challenges, some grand challenges for folks to basically develop vehicles that could control themselves and not crash on existing streets without requiring infrastructure improvements.

And I was -- I had the total joy of heading the Princeton entries in the 2005 Grand Challenge and 2007 Urban Challenge. And basically that sort of changed the mindset. The thought, then, became, "Oh, my goodness, we might be able to put enough intelligence in individual vehicles so that they could actually go out there, automatically, and participate in the use of the existing roadways without bothering anybody." And, in fact, possibly do it even safer than we do it ourselves.

And basically that revelation became, "Oh, my goodness, we could, then, maybe do this on a single vehicle; focus all of our intelligence, our creativity, our money to basically get a single vehicle to do it." With that single vehicle, then have its software, which, at the cost of replication, was essentially zero. And it requires hardware that scales very well; that, in fact, in volume, its costs go to zero. And my goodness, viral adoption might occur.

And, of course, that revelation is really what brings us here today. And, in fact, that viral application is somewhat underway. If we look at Waymo -- which some of us consider to be the leading developer of driverless technology -- Waymo started in 2009 by going down to the Lexus dealer and buying Priuses, and putting in and retrofitting automated hardware in their garage, à la Steve Jobs, and getting it to work.

And then, two years later, they go down, back to the dealer, and get 20; and then two years later, they build 200 of their own Fireflies without a steering wheel, without gas pedals. And then, two years later, they buy 2,000 Pacificas from Chrysler and begin to move people around driverlessly in Chandler, Arizona.

And then, in March of this year, they go out and they purchase 20,000 more vehicles. And my goodness, in May they purchase 62,000. And what this is, is a very nice linear relationship on a (indiscernible) semi-live chart, which means there's exponential growth in this thing. This suggests that maybe, in two years, they're going to go out and get 200,000 vehicles and then, in 2022, get 2 million. They have to put these to work. And, in fact, what I would love to see is that they, or GM Cruise, or any of them, come to New Jersey and put these vehicles to work to provide mobility to, in the first place, the mobility disadvantaged.

It turns out that, in New Jersey, we have a number -- even though we have the best statewide mass transportation system in the nation -- it turns out we have transit deserts all over the place. And there are people who can't get to jobs, who can't get to health care, who can't get to educational facilities, who can't get to recreation, because they're poor, they don't have a job because they don't have a car or access to a car, they're old. My goodness, the opportunity to, basically, have these driverless vehicles provide them mobility to enormously enhance their quality of life is something we should all be working towards. Not only does it enhance the quality of life of those who, in some sense, we've neglected; but in another sense, these vehicles can also be used for all of us to improve our quality of life. So there is a way for us to get started.

The way I think for us to get started is to really create an atmosphere here in New Jersey which is a welcoming atmosphere to this technology. Because this technology can, in fact, provide affordable, high quality, on-demand, 24/7 mobility to anybody, very inexpensively; 25 cents a person-mile type of thing, less than half of what AAA suggests it costs you

to operate your automobile. And this opportunity to really improve the quality of life to a certain sector of our economy is extremely important.

To do this I think we have to create this welcoming environment. That in fact, if a fleet operator were to come here, in a geofenced area, to operate over certified streets where these vehicles could operate absolutely safely -- safety is an absolute necessity; a necessary condition to all this -- and afford this mobility 24/7 to the folks who live in that geofenced area, it would be wonderful for New Jersey. And so that's where I see this going -- to create that.

In return for the opportunity for that entity to provide that mobility on our public streets, then I think it's important that there be a common-carriage type of obligation on that operator. The common-carriage, the quid pro quo in that win-win partnership, would be that that operator has to, of course, provide this safely, effectively, focused on what we all think is best for New Jersey first. Have the opportunity to utilize excess capacity for their own interests, of course; but to really -- and provide the reporting requirements, and the clearness, and vision so that, in fact, this does deliver its intended benefits.

So that is the primary thing. Of course, there are some things that we can do with the technology, short of getting to driverless; and by *driverless,* I mean these things, at times, drive around on our streets with nobody in it -- okay? -- with a repositioning themselves to go to your house to pick you up; or after they drop me off, to go pick you up. Of course, they have to do that. That's the driverless.

Short of that, we have what I call *safe-driving cars*, which have some of that technology that basically improves safety of the cars that we

own and that we drive today. I think to make that happen, we need to incentivize the insurance industry in this state to really be able to price properly the safety benefits that some of this interim technology can provide, so that the market capture of that technology is greater. It would allow the insurance companies to -- because these technologies keep you from crashing, their loss should go down, they should become more profitable, and the premiums should go down.

And that is -- again, it seems like, my goodness, what else could one ask for?

On the self-driving -- that is, the vehicles that allow us, every once in a while, to take our hands off the wheel and feet off the brakes that we own -- well, for those, it's nice. The automobile companies really love it because it helps them sell cars. I like to say, you know, it's the new chrome and fins of the auto industry. I mean, I can't wait to buy them. But they need to promote that and sell it the right way. None of those vehicles can be driverless; and you can't even think about this thing actually taking you from the watering hole back to home; because they can't. And, in fact, you have to have a legitimate driver watching over these things. It needs adult supervision; otherwise, because whenever these encounter a difficult situation, they ask you to take over, grab the wheel, and save the day. And if you're not prepared to do that then, of course, bad things happen.

So the requirement that, in fact, there be someone in the driver seat; that, in fact, they be awake, that they be alert, and they be prepared to take over in case something happens, is something that should be really hard and fast within our enforcement of the traffic laws.

But the real benefit to New Jersey comes when the technology becomes good enough that, in fact, we can offer this driverless service to all; first, as I like to say, the most mobility disadvantaged folks in our community; and to the rest of us. And this will improve the environmental conditions, the energy conditions, the mobility conditions, the quality of life, and the economy of New Jersey.

Thank you.

ASSEMBLYMAN BENSON: That was great.

ASSEMBLYMAN ZWICKER: Thank you.

Any questions from the Committee?

ASSEMBLYWOMAN DeCROCE: I have one.

I'm sorry; just real quick.

When you talk about a driverless vehicle that could possibly go and pick up seniors--

DR. KORNHAUSER: Absolutely; of course.

ASSEMBLYWOMAN DeCROCE: --what do you do in a case like-- Municipalities and cities have senior busing, buses that will go pick up individuals and take them to the doctors. But a lot of them are in wheelchairs. So how do you deal with somebody not being there to assist a senior who is not capable of just stepping on -- stepping in and getting out; they need help?

DR. KORNHAUSER: I think that one has to have a range of services. And, in fact, for those who need the assistance to get in and get out, that there is assistance available at the origin and destination that allows them to do that.

If they also need assistance during the ride, then, in fact, this can't-- It might be driverless, but there's an attendant on board to take care of the person.

But if one looks at the numbers, the number of people who are mobility-disadvantaged because of economics, accessibility to an automobile, or don't live near a bus stop -- believe it or not, in New Jersey, don't live near a bus stop -- those are at least 10 times, if not 100 times the number of people who need the assistance. So it's not only to provide those to the physically disabled, but also to the economically challenged individuals.

ASSEMBLYWOMAN DeCROCE: I do represent an area of the state up in West Milford; that's in Passaic County.

DR. KORNHAUSER: Yes

ASSEMBLYWOMAN DeCROCE: And Uber doesn't even go up there. So, you know, how would this fit into a community like that?

DR. KORNHAUSER: The beauty about this is that it's not -- it's Uber- and Lyft-like in the service that it offers, but without requiring the management of the gig worker to actually provide that service. If you actually look at what the biggest capabilities and trouble of Uber and Lyft is, is to manage the drivers to do what they're supposed to do. One has two objectives: one wants to make sure that the driver earns a living wage and can feed their families; and the other is to provide the mobility.

The interesting thing is, is that once you replace the driver with an algorithm, you get to do what you want to do with the vehicle. It gets-- You want to provide somebody a ride at 3 a.m. in the morning? No problem. Want to talk about sharing rides and having the opportunity

because people happen to be going from the same place, to the same place, and share rides? No problem. It's the algorithm; and that's one of the parts of the common carrier obligation -- that we, you, would set what the objectives are to provide the greatest benefit for New Jersey; and then it's up to the operator to -- you know, a couple lines of code and you make it happen.

ASSEMBLYWOMAN DeCROCE: Thank you.

ASSEMBLYMAN ZWICKER: Assemblyman Freiman.

ASSEMBLYMAN FREIMAN: Dr. Kornhauser, you had indicated -- and thank you for your testimony today.

DR. KORNHAUSER: Thank you.

ASSEMBLYMAN FREIMAN: You had indicated that there would be significant reduction in the cost per mile to operate these vehicles. Is your economic analysis based upon the fact that these vehicles will be utilized on a 24/7 basis, versus having an individual's car sitting in the garage?

DR. KORNHAUSER: That's part of it.

You know, our cars are used like 5 percent of the time. On the seat-mile utilization, it's like 1 percent. I mean, we don't make worse use of any asset than our personal cars. If it's a fleet operator -- of course, whenever there's demand-- The golden eggs that the goose is laying are the rides that are provided, and the objective from the operator is to provide as many rides as possible. And not only provide individual rides, but I always like to use the elevator analogy. I took an elevator from the first floor to the fourth floor here; there were three other people in that elevator with me.

"Oh, my goodness; I didn't get to ride alone. I thought I'd come down to the State House, and I'd get a personalized--"

No; I mean -- so, in fact, there are all sorts of demand situations in which people are essentially coming from the same place, going to the same place, at about the same time, who could ride together. I know some of us, at times, say, "Hey, maybe not." But I think we've been--Madison Avenue has told us to do that, as opposed to, "Hey, we may not mind it. And, in fact, because the person has gone from where I'm coming from to where I'm going, we probably have a lot in common that we might even chit-chat about."

So the real opportunity, the energy-saving opportunity, the pollution-saving opportunity, and the financial-saving opportunity comes from the sharing. And that's going to have to -- we're going to have to evolve from this. It doesn't mean we all have to get into a 50-passenger bus, or wait until we have enough of us in a 50-passenger bus, or a 400-passenger train. Going to New York, sure; but going from Ewing to a job in Robbinsville at the Amazon facility that -- be able to be paid 15 bucks an hour-- Right now, it's somebody -- to make a 7 a.m. punch-in, has to leave and catch a bus in Ewing at 5:30 in the morning, you know?

So the opportunity for people to get to these jobs and really enhance their quality of life. It enhances everybody's quality of life by making this available. And if it's driverless, it's an algorithm that does it. "Oh, my goodness," you know? Of course.

ASSEMBLYMAN BENSON: Thank you, Professor.

Assemblywoman, you had a question?

DR. KORNHAUSER: Sorry for the long answer.

ASSEMBLYMAN BENSON: Assemblywoman Lopez has a question.

ASSEMBLYWOMAN LOPEZ: Good morning.

DR. KORNHAUSER: Hi.

ASSEMBLYWOMAN LOPEZ: Thank you for your testimony as well.

Do you have any data on collisions and other such incidents that you could share with us?

DR. KORNHAUSER: Well, the -- one of the things that California, when they developed their regulation -- and I strongly suggest that we partner with California, in terms of taking the best of what they've done to evolve, as far as-- My opinion is that they've done the best job-- They've worked at it and spent an enormous amount of effort.

They require those who operate these vehicles to report on not only collisions, but also disengagements. With respect to Waymo, I believe that in 10 million miles that they claim that they have driven, basically, with hands off, feet off, automatically -- they may have been responsible for one crash -- and that's a *may* -- which was a tap with a bus at an impact speed of 2 miles an hour. Else all the other crashes were people running into them.

In Chandler, Arizona, a car jumped the median and, you know, in those situations, physics doesn't help you, okay? None of us could have avoided that one. That's the other folks' fault.

So in a sense, if one put -- is the technology at fault with respect to the 10 million miles that Waymo has driven? It's essentially zero. Now, of course, one would like to have-- And they have run, of

course, simulations and whatever; and so has GM and so on. They're not at fault. There are collisions; cars run into them. People claim, "Oh, they're not behaving like we behave." Although we never -- not all of us behave. I complain about the driver in front of me all the time not doing the right thing, you know? Sometimes I even run into them; I don't know, maybe I think I might have done-- (laughter) No, I don't know if I did that. I won't admit to it. (laughter)

But you can see where I'm going.

ASSEMBLYWOMAN LOPEZ: So in Arizona, you're saying that there was one collision -- one accident?

DR. KORNHAUSER: That was in California; that wasn't in Arizona. In Arizona there have been--

ASSEMBLYWOMAN LOPEZ: How many in Arizona?

DR. KORNHAUSER: --zero collisions for which the fault of the collision could be attributed to the automatic driving system, okay? Now, somebody T-bones you coming out of nowhere, you know--

ASSEMBLYMAN BENSON: Vice Chairwoman Jones, you had a question?

ASSEMBLYWOMAN JONES: Yes, I--

ASSEMBLYMAN BENSON: And then--

ASSEMBLYWOMAN JONES: Thank you.

I wrote down three things: safe-driving cars, driverless cars, and self-driving cars.

DR. KORNHAUSER: Yes, thank you. That's my terminology, because I think everybody else's is bad. (laughter)

But go ahead.

ASSEMBLYWOMAN JONES: I would like you to, briefly, tell me what each one means.

DR. KORNHAUSER: *Safe* is safe; it means that the technology is focused on -- if you get yourself between a rock and a hard place, bailing you out and helping you, okay? Should you, you know, get confused, I know you won't misbehave. But sometimes, I misbehave; you know, it doesn't let me do that. It doesn't let me go 110 miles an hour on the New Jersey Turnpike; it shouldn't, okay? And if in fact there is something, then it keeps me from colliding; that's safe.

ASSEMBLYWOMAN JONES: That's today. Subaru has a vehicle that will brake for you.

DR. KORNHAUSER: Yes, EyeSight; yes.

And now, EyeSight does one more thing. It allows you to take your hands off the wheel and feet off the pedals and basically drives itself. If the paint is good enough, and if the weather conditions are good enough, and the road is straight enough, it does quite well. Should there not be good paint out there, should the lens disappear, it goes and says, "Whoa, take over."

And so that's why you have to be there yourself, ready to take over. You can't be in the back seat; you can't be at your home sending this to who knows whom to pick up somebody. That's not it.

The driverless is, is that the technology has gotten to be so good that in fact you can do that, and it does it safely, and in such a safe manner that we're all satisfied to say, "Yes, go ahead. Share our public streets. Use it to provide mobility to everybody on an equal footing, and let's see how we improve the economy."

ASSEMBLYWOMAN JONES: Thank you.

DR. KORNHAUSER: Thank you for the question.

ASSEMBLYMAN BENSON: The next question was Assemblyman Giblin.

ASSEMBLYMAN GIBLIN: Good morning, Doctor.

Are these vehicles manufactured in the United States?

DR. KORNHAUSER: The vehicles, so far, that Waymo, and GM, and almost everybody that I know of in the United States, are manufactured in the United States. In fact, the vehicle is almost a commodity, okay? What is the real sauce is the technology package that gets placed on top of that vehicle; and the redundancy in the steering, and the braking, and the throttle system, and the sensors, and the software, and the communications, and all the things that go behind it. And in some sense, you can -- as I think Waymo has demonstrated, and others are demonstrating -- you can retrofit this on many vehicles, and certainly vehicles produced in the United States; absolutely.

ASSEMBLYMAN GIBLIN: What's the cost?

DR. KORNHAUSER: The cost today is unknown, okay? Roughly the cost-- I don't know if we were to ask Waymo, "What does it cost you for the technology package to install it on a vehicle?" I would suspect they might say $100,000, okay? That's today's price at a volume of 10,000. At a volume of 100,000, it probably goes to $10,000; a volume of a million, it probably goes to $1,000.

GPS receivers -- those that are on your phones -- used to cost $80,000. I had a company -- we wanted to buy every one that we could at

$100 a piece in 1997. Today, what it is it? Eighty cents is the cost of what Apple pays to put a GPS receiver on your phone.

The beauty about the technology that is surrounding this is that it's sort of *Moore's Law.* My goodness -- boom. So the expectation is that what's important now is to make sure that it works. And once it works, sit there and continue to improve it; and replicate, replicate, replicate.

ASSEMBLYMAN GIBLIN: You know, you mentioned about employees working, for example, at Amazon. As you realize, you know, they're not overpaid. So if you're trying to engage them into buying a vehicle like this, they won't have the means.

DR. KORNHAUSER: Okay; so let me see if I can make my--

These vehicles will not be bought by individuals. And, in fact, in my testimony I even suggest that it should be forbidden that they be purchased by individuals. These vehicles are mobility-producing machines. If I were to buy one, it would waste the opportunity to provide mobility with this by me letting it sit in my driveway, or sit in the parking lot right now waiting for me; which my car is. That vehicle should be utilized to provide mobility to others.

ASSEMBLYMAN GIBLIN: Twenty-four/seven?

DR. KORNHAUSER: Twenty-four/seven, okay?

Now, much of the time not much is going on. And I didn't even say anything about moving goods. If you look at the opportunity for these to, basically, bring goods to our homes between 1 a.m. and 5 a.m. in the morning, when the roads are totally unutilized; when there are no

children chasing any balls out there in the roadway -- my goodness, hey, free shipping.

ASSEMBLYMAN GIBLIN: What about the issue of insurance? I'm sure you'll weigh that in.

DR. KORNHAUSER: The issue of insurance is -- since these are fleets, it will be a fleet operator who purchases the liability insurance associated with that. And, in fact, many of them -- if you look at the way trucking companies, and bus companies, and so on -- a lot of it ends up being self-insured. But they go out and they go to re-insurance companies, like muni green, to basically cover the tail of the distribution, and so on, and protect themselves. So it would probably be something like that.

With respect to safety, I just-- I'll make one comment.

The people who are doing this -- the Alphabets, Waymo, GM Cruise, Apple, even Amazon -- who knows what they're doing; these are extremely big entities that have their reputation at stake when they're doing this. You know, Elaine Herzberg was killed by an Uber vehicle in Arizona earlier this year. And if one looks at Uber and Waymo a year ago, they were both valued by Wall Street at about $70 billion to $75 billion. Today, Uber might still be valued at $75 billion. Adam Jonas has put Waymo's valuation at $175 billion. What's the difference between those two companies that were, essentially, a lot of people thought, side-by-side a year ago was that one killed somebody and the other one didn't. And the implication that Wall Street-- What Wall Street did to them, which is -- which you don't have the hope of doing to them -- they penalized Uber possibly as much as $100 billion in valuation. Now, my goodness, if that doesn't get the attention of the board members in each one of these

corporations that are doing this thing, to be absolutely serious about the safety implications, I don't know what else to suggest.

So at least in the beginning, where we are now, they've all bet -- they're betting the ranch on these things. And the betting of the ranch is not that, in fact, they will come if we build it; that we will do it safely.

And so it is -- I guess, it's close to a guarantee that, in fact, this industry is really prepared to actually deliver the mobility safely, and meet that necessary requirement, and allow us to, then, capture the benefits of it.

ASSEMBLYMAN GIBLIN: Is there any fuel used with these vehicles?

DR. KORNHAUSER: Is there any *what*?

ASSEMBLYMAN GIBLIN: Fuel?

DR. KORNHAUSER: Fuel?

ASSEMBLYMAN GIBLIN: Any type of fuel.

DR. KORNHAUSER: Well--

ASSEMBLYMAN GIBLIN: I'm looking at the issue--

DR. KORNHAUSER: Okay; so right now -- right now, the vehicle--

ASSEMBLYMAN GIBLIN: Well, I'm getting at the issue of transportation.

DR. KORNHAUSER: Right.

ASSEMBLYMAN GIBLIN: You know, the roads. You know, last year we went through a situation where we had to raise the tax on fuels to cover the costs of the infrastructure and repair the roads. Are we going to generate any revenue -- talking about the State -- from these vehicles? I mean, that's why I asked you is there a type of fuel used.

DR. KORNHAUSER: Well, first of all, the vehicles that are used, both use internal combustion engines and electric motors, depending on the variety. Also, to be completely honest with you, a fleet operator, trying to do the return on investment as to what power plant they want to put in these vehicles, electric vehicles are going to look very, very attractive, one, because of their low maintenance; and two, because, if all of a sudden you're able to use it all day long, you know, electric vehicles are really great. Because you know what the electric charge is, and you're doing the allocation of the vehicles. You have no range anxiety, you have no fuel anxiety. All the problems associated to getting you and I to buy an electric vehicle isn't there.

Now the issue is--

ASSEMBLYMAN GIBLIN: So it's going to be electric then.

DR. KORNHAUSER: --how do we pay for the roads, which is your question.

ASSEMBLYMAN GIBLIN: Okay; I just want to confirm--

DR. KORNHAUSER: And the issue will be how do we wish to impose prices on that. Maybe taxes; maybe we get so much public benefit out of this that, in fact, we want to pay for it.

One of the-- If you're building a tall building, you'll get no rent on the 14th floor if you don't provide mobility, right?

We've built an environment out here in New Jersey. Maybe those who wish to have visitors -- wish to participate in the economy, see that, "My goodness, we should be chipping in to provide this, because then we won't have to provide the parking, we won't have to do all the other things that we've had to do with people accommodating themselves."

So I think there will be an opportunity to pay for the roads; and, in fact, the operators, realizing that they need the roads to be able to deliver, will pay for them.

ASSEMBLYMAN GIBLIN: You mentioned California--

DR. KORNHAUSER: Yes.

ASSEMBLYMAN BENSON: We have to--

ASSEMBLYMAN GIBLIN: --how many vehicles are in California, ballpark?

ASSEMBLYMAN BENSON: And I'm going to ask that to be the last question, because we have a number of other folks.

ASSEMBLYMAN GIBLIN: Okay.

DR. KORNHAUSER: Yes, vehicles of this variety? I think there are something like 50 different companies that are testing--

ASSEMBLYMAN GIBLIN: No, I'm talking about actual vehicles.

DR. KORNHAUSER: Vehicles on the ground in California? I'll say 10 million. There are about 200-and-some million licensed vehicles in the United States, so I figure they must have at least 5 percent of them.

We can look it up; thank you.

ASSEMBLYMAN BENSON: Great; again, thank you, Professor.

We're going to bring up the next group of folks to speak.

DR. KORNHAUSER: Thank you for inviting me.

ASSEMBLYMAN BENSON: We appreciate that broad overview.

DR. KORNHAUSER: It was a pleasure for me to be here; thank you.

ASSEMBLYMAN BENSON: Next up, we'd like to bring up Josh Fisher, from Global Automakers; and Wayne Weikel, from the Alliance of Automobile Manufacturers.

And if you have somebody else with you, you can bring them up too.

J O S H F I S H E R, Esq.: Good morning.

I'm Josh Fisher with the Association of Global Automakers.

Thank you for the opportunity to speak here today.

Global Automakers represents the U.S. operations of international motor vehicle manufacturers, technology companies, original equipment suppliers, and other automotive-related trade associations.

In New Jersey, our members have made a significant investment and presence, most notably the North American headquarters of Subaru and Ferrari.

Our members represent 51 percent of the new vehicle market, and 60 percent of the green vehicles sold in the state.

Now, there are too many traffic fatalities on public roads in the U.S. today, and too many in New Jersey. The overwhelming number of these deaths is due to human driving error. Automated and connected vehicle technologies offer New Jersey and the U.S. the ability to significantly reduce traffic fatalities, as well as other public mobility and environmental benefits.

It's important to remember that automated and connected vehicle technology is not new. It's been deployed in cars and trucks for

decades, including electronic stability control and anti-lock braking. In the last few decades, more advanced systems have assisted the driver in avoiding crashes, including adaptive cruise control, lane keep assist, and automatic emergency braking.

Vehicle safety is our highest priority. We have made, and will continue to make significant investments in automated and connected vehicle technology. More vehicles today, and more in the future, will be equipped with the AV technologies previously described, and others in the research and development phase.

Now, states must play a critical role in the acceleration of these life-saving benefits. This is best done by limiting regulatory barriers to innovation. Barriers include burdensome obstacles to testing and deployment on public roads, such as extensive permitting processes; lack of coordination between state agencies with the responsibility for registration, licensing, insurance, or transportation infrastructure management; and most importantly, rules that affect the design and performance of automated systems, Federal safety standards, or require automotive manufacturers to build state-specific vehicles that only operate intrastate.

The Bills under consideration today cross the line and threaten the progress that has been made. Policymakers and the public understandably have some level of fear and anxiety about self-driving cars. But once they understand the technology and, better still, use the technology, the concerns rapidly fall.

States have limited the scope of new laws to regulate automated vehicles, and many have taken no action at all, recognizing that public policy cannot keep pace with the deployment of technology; and, more

importantly, recognize that the state already has the regulatory tools in place to ensure public safety, transparency, and promote innovation.

We recommend that New Jersey look to the state of Ohio, which is a national leader on this issue. New Jersey should focus on coordinating across State agencies to accelerate connected vehicle technology. Why connected vehicle technology? We still have a mixed fleet on public roads for many years; the ability for cars to talk to each other, and public transportation, and emergency response infrastructure will exponentially increase the life-saving benefits of automated vehicle technology.

Look at long-term transportation infrastructure priorities and make sure connected and automated vehicle technologies are included.

Look at municipal and local public transportation so that these mobility networks are seamlessly integrated in the changing mobility platform preferences.

Thank you for your time today, and I'll turn it over to Wayne.

W A Y N E W E I K E L: Thank you.

Good morning, Chairs; members of the Committee.

My name is Wayne Weikel; I'm with the Alliance of Automobile Manufactures.

The Alliance is a trade association representing 12 of the world's leading manufacturers who combine to sell 70 percent of the new cars on the road each year.

I'm here today to support Assembly Joint Resolution 164; but also to highlight a few concerns we have with the language, as drafted.

I have provided written testimony, so I will try to be brief.

For years, safety in the automotive world meant developing technologies so that occupants could survive a crash; things like air bags, crumple zones. But with automated vehicle technology, what we're talking about now is avoiding crashes all together. And why that's important is, in New Jersey, 624 people lost their lives on New Jersey roadways in 2017. And that wasn't an outlier. For the last 10 years, New Jersey has averaged 583 deaths on its roads every year.

U.S. DOT statistics indicate that 94 percent of roadway accidents are caused by human error; 94 percent. Getting more automated driving technologies on our roadways as quickly as possible is the single-most important factor to improve long-term roadway safety. Think of all this Legislature has done to curb drunk driving. The deployment of automated vehicle technologies will severely minimize that problem.

But there is more to automated vehicles than just fatalities. How many here have had discussions with elderly relatives, "Maybe it's time to stop driving." The deployment of automated vehicle technologies gives those people their mobility back.

The State spends a lot of money to make sure that the disabled community has equal access to public transportation. The deployment of automated vehicle technologies give these people their autonomy.

New Jersey is a hub of transportation and trade; but with that comes infrastructure costs. The deployment of automated vehicle technology will help maximize existing roadway capacity and lessen the need to add additional lanes.

The Legislature has taken time to consider the hazards to air quality in New Jersey. The deployment of automated vehicle technologies

can help reduce congestion and, thereby, increase fuel efficiency and lower emissions.

I say all of this because when we talk about this new and emerging technology, often, for policymakers, the first instinct is to have concern for public safety; that it's a natural, sort of, reaction. And that well-intentioned reaction can manifest itself as burdensome regulations and limitations on testing.

But there are a lot more issues involved here. And really, our roadways are not safe enough today. We accept it because it's the norm and it's what we're used to; but it's not okay. To change the status quo, auto makers have invested billions of dollars to develop these technologies solely for the purpose of bringing to our customers and your constituents a new level of safety.

That is why we want to commend the Chairs and Chairwoman Lampitt for forming this task force to study automated vehicle technology in this state. While the task force won't have the answer to every question, it's important for the State to start identifying the right questions to ask.

With the benefit of thoughtful examination of the elements around this issue, we think the Legislature will be better positioned to consider any public policy changes that are necessary in the future.

As for concerns, the Bill, as drafted, seemingly could run counter to the relationship between the National Highway Traffic Safety Administration and state regulatory bodies. NHTSA is authorized, under the National Traffic and Motor Vehicle Safety Act, to issue safety standards on new motor vehicles. The Safety Act also makes clear that the Federal safety standards have preemptive authority over state-issued standards.

NHTSA has made it clear that they intend to closely regulate automated vehicle technologies. They have the authority to identify safety defects and to have manufacturers issue recalls for any unreasonable risk. They have also said that they have the ability to do so even without a violation of existing Federal motor vehicle safety standards. They are up to the task of managing safety.

We also think the charge given to the task force could focus inward on two fronts. First, the task force should consider all existing regulations and laws that New Jersey has on its books, and consider which ones of those may be an impediment to the deployment of automated vehicle technologies. Essentially, everywhere your statute says, "A driver shall--" someone needs to think about, what does that mean if the vehicle *is* the driver.

On the second point why we think the Legislature, and this task force, should look more inward is on the front of economic development. You have some of the best universities in the whole country here; how are they positioned to participate in this automated future? Where can the public and private sector work together to develop these technologies within your state?

We think the task force is a good idea; we just think there are few ways it could be improved.

Also to the extent Alliance members can be a resource, we are happy to provide an industry perspective to the task force.

In closing, I'll repeat something I said earlier. The most important factor to long-term roadway safety is to get more automated

vehicle technology on our roadways as quickly as possible. And I think that's something on which all our interests align.

ASSEMBLYMAN ZWICKER: Thank you, to you both, for your testimony.

I want to follow up on something you said.

So we hear on many different topics about problems with patchwork legislation; different issues from state to state. And we're certainly sensitive to that. But the question is one of, in this particular case -- your opinion, then, for why haven't the Federal agencies that are responsible taken action? Why are we seeing other states already doing this? As we heard from our previous testimony, the exponential growth of the number of vehicles that are on the roads nationally looks like it's going to continue. So when are we going to see Federal action? I mean, because what I'm hearing you say is, you know, "Slow down; it's not your purview."

MR. WEIKEL: I wouldn't -- I would not summarize my comments as that.

But to answer your question more broadly -- I mean, we do have a bill that's supposed to be moving through Congress now; it seems to be stuck. But Congress, as wont to do, does not typically move in a straight line. But they are considering legislation.

But more importantly, DOT has issued three rounds of guidelines on this area to provide some guidance in this area. And they have gone forward with guidance, as opposed to regulations, because for DOT to come up with a regulation it takes them 8, 10 years. And they realize that this technology is moving too quickly to do so, so they are

issuing voluntary guidelines by which they will measure auto manufacture and other performance.

But we do think there are areas that states can, and it's completely appropriate to, take action. We just think that when you get into the area of what is in the vehicle -- the hardware and software in the vehicle -- that's where it becomes a complication, if you have different states conducting different -- having different requirements.

In the context of-- You know, there's a natural relationship that states and the Federal government have had for years, that states handle things pertaining to the drivers; so, insurance, rules of the road, registration of such vehicles -- you know, all those things are still within the states' responsibility. And how one were to test within the state -- you know, that's still there. For us, it's the concern over the actual vehicle itself.

ASSEMBLYMAN ZWICKER: Okay; thank you.

I mean, it certainly sounds like you just contradicted yourself; at least, in my mind, a little bit.

Because what's in the vehicle is just hardware, is just sensors; is just computer programs, right? And so we're talking here about safety issues; we're talking here about licensure agreements; we're talking about insurance and things like that. None of which I'm aware of has anything to do with the actual hardware in the car.

MR. WEIKEL: I'm nodding my head in agreement with you.

ASSEMBLYMAN ZWICKER: Okay; thank you.

ASSEMBLYMAN BENSON: Assemblyman Conaway.

ASSEMBLYMAN CONAWAY: You mentioned that there's a lot of technology in the cars. I presume these cars are all going to be

connected or linked by a network, particularly delivery services and transportation services for senior citizens and others.

What can you say about the protection of these vehicles from hacking? I mean, it seems that everything, including the Pentagon, the White House, gets hacked. It seems like a ripe target for an international terrorist organization to come in and knock out a number of these cars and cause havoc. Is that something that can happen? I mean, I presume it *can* happen; but what are the protections against it; what is the likelihood?

MR. FISHER: Thank you for your question; and I will respond that the automotive industry has already acted to protect cyber security in these vehicles.

There are three industries which have what we call an *ISAC*, an *Information Sharing and Analysis Center*: the aviation industry, the financial industry, and the auto industry. So manufacturers participate in this auto ISAC, where they share potential vulnerabilities and threats in order to act before there is any instance of a leak or a hack, if you will. So I think the auto industry is being very proactive in terms of addressing these issues before they actually happen.

MR. WEIKEL: If I can expand on that.

This ISAC that we talk about -- it's really a room; it's like what you see on TV. For antitrust reasons, manufacturers--

ASSEMBLYMAN CONAWAY: I'm sorry; is ISAC, I-S-A-C?

MR. WEIKEL: Correct.

ASSEMBLYMAN CONAWAY: And it stands for what? I'm sorry?

MR. WEIKEL: Oh, I wish you didn't ask me that. (laughter)

MR. FISHER: Information Sharing and Analysis Center.

MR. WEIKEL: Thank you.

MR. FISHER: You're welcome.

MR. WEIKEL: For antitrust reasons, manufacturers can't share information directly with one another; for a host of reasons. So they need this, sort of, protective bubble in which they can share information. In this case, it's sharing information around cyber security; and it's a way that as one manufacturer sees a potential threat -- or they refer to it as someone going in and *exploring their network* -- they immediately let everyone else know that, "Hey, we're seeing this; this is what they're targeting. Here are the steps we took." And cybersecurity is paramount. The only way any of this works is that consumers trust the vehicles; that there's safety; that they feel comfortable riding in them.

ASSEMBLYMAN CONAWAY: One more question, through the Chair, if I may. .

This raises the question of insurance. We're a densely populated state. And I-- New Jersey is often -- we often call ourselves *unique;* and I suppose we are. We do have (indiscernible) of density here which, I don't know, perhaps it's a good thing. People can't drive so fast. Maybe algorithms will keep us safer, certainly, than our current situation. I believe that to be true.

How will the insurance in our fault system work? If two drivers are involved in an accident, or two cars -- I should say, automated cars involved in an accident -- will that liability rest with the manufacturer, or will that go to the individual? And if it's going to the manufacturer, would the-- Who pays the insurance in that case? Will individuals actually see

their insurance rates go down because they're driving a safer vehicle? And if there's an issue between two of these cars, it's going to be worked out, sort of, among the insurers and their companies?

MR. WEIKEL: Sure. There are a lot of angles in the insurance space that need to get worked out. And I think it's helpful to think of it in sort of two different ways.

As the Professor referenced, fleets are largely going to be the leading edge of this; somewhere where, in a specific geographic area, someone is offering -- putting fleet cars on the road; someone is in a positon that if it's snowing out or there's a situation where a fleet wouldn't be able to operate safely, they are in control to be able to pull them back, and there is someone actually in control.

But the advantage of it being a fleet is that you're talking about a commercial policy. In a commercial policy, there are a lot less regulations; something they can work out with the insurance company as to what they're paying, rates. So that as that's the leading edge, the sort of information we learn from how these fleets operate will then be able to help, sort of, private passenger pricing so that they know, "These safety benefits yield this sort of savings."

So I think everyone believes that there will be savings to the consumer, just based on -- we're already seeing data that just these beginning technologies are already showing that they're reducing costs.

As for actually what happens when an accident happens? Our manufacturers have already come on and said when their technology has been installed from the factory, and working as it's supposed to, and being utilized the way it's supposed to, they expect to take responsibility. As the

Professor pointed out, their entire bottom line of their company rests on the ability to produce these cars in a safe manner. So they are standing behind that.

ASSEMBLYMAN CONAWAY: I would just follow up on that.

So you say a commercial policy; and one wonders -- and I'm sorry; I would be pleased to hear what you have to say as well, sir -- I worry when, as you mentioned, it's a fleet or commercial policy, and less regulation. We're very concerned here that if someone is in accident and hurt, that they're made whole; that their health insurance is not covering that, their auto insurance does. And there are-- You know, that a person can be restored to their health; or, if they cannot be restored to their health, there's adequate compensation to deal with their ongoing heath issues.

Commercial policies, generally, have those attributes, or not? I'm--

MR. WEIKEL: Yes, I think I was meaning more on the pricing of fleet policies and commercial policies are a little different. You don't have such a litany of what points you have to price on it, and how you price them. There is much more of a competitive marketplace.

But for actually what's covered -- that would still rely on State law and what's required. Some states, as they move forward with the testing -- some sort of pilot program to test within the state -- they have included a minimum insurance level for anyone testing, just to make sure that there aren't those out there that don't have the financial capability to pay claims. It's something we support. I mean, our manufacturers stand behind our products; the last thing we want to see is some collection of

engineers, working in a garage, and out there on the roadway, causing a problem that ends up impacting everyone.

ASSEMBLYMAN CONAWAY: Thank you, Mr. Chair.

ASSEMBLYMAN BENSON: Assemblyman Freiman.

ASSEMBLYMAN FREIMAN: Thank you.

You had mentioned that, regarding the death rates on the roads, you see a great opportunity to reduce this with the implementation of the autonomous vehicles.

In New Jersey, we have approximately 600 deaths per year; it's been fairly consistent. And 94 percent of all these accidents are based upon human error. What has been the trending? So we've had -- some of this level of technology has been available for a few years on some of the manufacturers. Has there been any trending data that's been showing up that is indicating that there has been a reduction in deaths because of this technology that's been implemented?

MR. WEIKEL: In aggregate numbers, not really.

One thing we are seeing, though, is people are still driving more miles. And I have data we can show on this that while they're driving more miles, the number of fatalities, per mile, is going down; but the aggregate number is still remaining high. And we have had two years--

ASSEMBLYMAN FREIMAN: Well, can you correlate that fact to the technology that's implemented? Because you can isolate it to the technology within the manufacturers. So this is actually a very unique time period associated with this, so we can correlate it back and do some analysis.

MR. WEIKEL: What's interesting-- I mean, we still have problems with distracted driving, and other things, that probably have been growing.

ASSEMBLYMAN FREIMAN: Well, now you're getting into my next question on this.

MR. WEIKEL: But we do have -- and we can pull together a couple of small -- they're not great examples, but a couple of manufacturers have worked with insurers and have compared vehicles that have a certain technology, versus vehicles that don't have a certain technology. And they can show, in that small population, that there are fewer accidents; the accidents that happen are less severe. But there's no wide-scale data yet.

MR. FISHER: Yes-- I'm sorry.

ASSEMBLYMAN FREIMAN: Do we-- So we can clearly see a vision of -- if we can blink our eyes and go to autonomous vehicles on the roads where everyone has it there, where -- the value of this, and the accident rates could drop off. But there's going to be a significant time period of hybrid scenario on the roads, where there are going to be with and without, and various different levels; and you just mentioned distracted.

So what is the risk scenario, and how do we mitigate that? And thinking through it -- so we're having a future conversation of, we're there and we see it there. But we're going to have to transition to get there. And should we anticipate that -- you know something? There may actually be a bump in, perhaps, accidents, because we're in a hybrid scenario. And it would help us set some expectations along the way.

MR. FISHER: Sure; and I address this in my written comments, which have more detail.

But that's why I mention in my oral testimony *connectivity*. That's the key that combines the benefits of the automated vehicle technology, and will also allow -- if you want to call them *dumb cars* -- cars that have been on the road for several years that don't have advanced automated features, but can still become connected, not only to other vehicles, but to infrastructure and to pedestrians.

And that's why it's critically important that states look to invest and promote connected vehicle technology. Because you're right; there's going to be a mixed fleet for, probably, decades. The average age of a vehicle, I think, is around 12 years right now. People are keeping cars longer, because they're better made; they last longer. So connectivity is going to be the piece that keeps it all together.

And when there's more automated vehicle technology on the roads, it will enhance the benefits of that technology. It's not going to be-- Sensors aren't going to do it all; cameras aren't going to do it all. It's going to be a web of technology that ties it all together; and connectivity will connect the vehicles to people, to infrastructure.

MR. WEIKEL: If I can expand on that.

Think of it-- Autonomous vehicles now -- or automated vehicles now are being designed to recognize someone riding a bike, recognize a pedestrian, recognize a car, a dog running out in front of them. Some testers in Boston have had to program specifically to teach it what a *flock* of seagulls is, as opposed to just *a* seagull. So they're being designed to identify things that aren't communicating with them, and plot the direction that they're going, and say, "Oh, I need to stop, because this is going to be in my way." I mean, that's how they're being developed now. I think we're

actually at a point-- You know, people always talk about this *interim period*. I think it's something that just slopes down as more vehicles come on. But there's no reason that it would go up. I mean, right now we're essentially at the worst possible place, where all the cars are, as Josh said, *dumb cars.*

ASSEMBLYMAN FREIMAN: Well, the distracted element within the car might be a reason. The technology is just getting overwhelming with individuals. So I'm asking--

MR. FISHER: Sure.

ASSEMBLYMAN FREIMAN: --not hypothesizing.

MR. FISHER: Yes; and if I can answer your earlier question about the total numbers.

It's just too early to have that view -- enough data. And I mentioned electronic stability control in my testimony. I think that's a good example as an automated technology that was put into the market, that was tested, data was collected. Electronic stability control, I think, first came on the market in the early 1980s. It wasn't mandated to be in vehicles until 2012, because it takes time, it takes integration to the system; and then it takes several years to create a Federal Motor Vehicle Safety Standard.

But, over time, you see how the technology works. You collect the data, and it's credited with saving almost 10,000 lives a year. So it's going to take time until we can answer that question.

ASSEMBLYMAN FREIMAN: Thank you.

ASSEMBLYMAN ZWICKER: Assemblywoman Timberlake.

ASSEMBLYWOMAN TIMBERLAKE: Thank you.

My question was mainly centered around-- I actually have two questions; one was centered around jobs. And I heard the previous speaker, Dr. Kornhauser, speak about how Amazon and Uber -- this has been mainly used for -- not for private use, but for major companies.

But I think one of the things most people love about Amazon and Uber is that they do employ. So how would that affect employment? Would employment be shifted into other areas of the company or business? How does it work?

And the other question is regarding human driving error. So people driving and being distracted now is an issue. So let's see; the technology goes off and says, "Okay, we need you to take over, something's happening." It has to be a judgement call. But the human is still distracted. What is going to be the big push to make sure that the population is educated enough not to do that? I mean, currently, cars aren't self-driving, yet people are texting and doing other things while driving. So imagine how much more that will occur whenever a car is assumed to be autonomous.

MR. WEIKEL: Sure.

So this question of the car passing responsibility back to the driver at some point is what's called *Level 3 technologies*. The vehicles that are on the road now that can, sort of, steer themselves as long as you have one hand on the wheel -- Subaru was mentioned; GM has a product that's along-- That's *Level 2 technology*. Level 3 technology -- the car is incapable of driving itself completely. All situations-- It's moving along. But if it does get to a situation where it can't understand, it will ask you to get in the situation. It might be that there's construction up ahead or something

like that. And manufacturers have gone through all sorts of testing as to how do we get the driver's attention, and how long does it take the driver to stop whatever they were doing and--

ASSEMBLYWOMAN TIMBERLAKE: Exactly.

MR. WEIKEL: It is absolutely one of the things that is getting the most research all around the country. I've seen some videos -- a dashboard lights up, the seats rumble; there are all sorts of things.

And then most employ-- If the driver doesn't take responsibility and take over, it just slows down. It doesn't -- it wants to avoid the dangerous situation, so it will take maneuvers. "Hey, you haven't stepped in; I'm not going to negotiate this," to get your attention. There's been a lot of research into this.

As to jobs-- You know, I'm certainly not the first person who's figured this is a societal-changing type of technology. We don't know all of the ramifications of how this plays out, and interactions throughout. One thing some people point to is, there was this thought that when ATMs came out that banks were going to go out of business. And they found that no, even with the proliferation of ATMs, that there were just as many banks. But now, when you go into a bank, they do different things.

You know, UPS and others I know of have been looking at this technology as a way to cut costs. But there's still a reality; there is probably someone going to be in the truck who's taking it and making it from the truck to the door.

So I think it's changing responsibilities more than, necessarily, jobs going away. But, in large part, it's societal changing. There are a lot of changes that will come with this.

ASSEMBLYWOMAN TIMBERLAKE: Thank you.

ASSEMBLYMAN ZWICKER: Assemblywoman, do you have a question?

ASSEMBLYWOMAN DeCROCE: Just a quick question.

When you're talking about alerting -- when somebody's behind the wheel, but doing something distracting, or maybe falling asleep -- and they're taking a look at the technology, what about the technology that's used in autopilots on an airplane -- when a plane goes on autopilot, and you have a pilot behind there sitting, and he falls asleep. I mean, there has to be something besides the co-pilot, if something was wrong with the co-pilot, to alert. So wouldn't it, kind of, coincide with it? I mean, that may be -- I may be scared to hear the answer, so maybe I won't get on a plane again (laughter); but let's see what happens here.

MR. WEIKEL: I'm happy to say that people a lot smarter than me have been working on this for a number of years. I'm sure there are things of that nature that they follow, and I don't know how co-pilots do it now, but--

MR. FISHER: Yes, I'm not going to speak to the aviation industry. (laughter)

ASSEMBLYWOMAN DeCROCE: But I'm saying, it plays a part in--

MR. FISHER: No, absolutely; and that I think the takeaway should be -- there are a lot of questions, and that's why testing is so important.

I know we've heard that, "Oh, automated vehicles are here, they're here." In a sense, that's accurate; but I think we're getting way far

ahead of where the technology is, and that's why testing is critical. And that's why New Jersey can play a critical role in testing.

And I want to go back to a point earlier about safety standards that Chairman Zwicker made. When we hear *safety standards,* we hear *design and performance* of the vehicle. So it might be a misunderstanding of what the language in the study means by *safety standards,* and what we hear. But that's our concern with that language.

ASSEMBLYMAN ZWICKER: Sure.

MR. FISHER: But you're right; licensing, insurance, and promoting pilot programs for testing are all within the State's purview; but not how the vehicle actually operates.

ASSEMBLYMAN ZWICKER: Right; sure. And I understand that.

MR. WEIKEL: That's a common--

ASSEMBLYMAN ZWICKER: We're thinking, obviously, of safety of the residents of New Jersey.

MR. WEIKEL: It's all about safety; yes.

ASSEMBLYMAN ZWICKER: Thank you to you both very much.

ASSEMBLYWOMAN CARTER: I have a question.

ASSEMBLYMAN ZWICKER: Oh; I'm sorry.

Two more questions; Assemblywoman Carter and Assemblyman Giblin.

ASSEMBLYWOMAN CARTER: Thank you.

I just have a really quick question about minors in the vehicles.

Is there an age limit; do they have to be accompanied by an adult; and are there any stipulations in that realm?

MR. FISHER: I think that's a great area for the State to study. I know in North Carolina -- the legislation addressed unaccompanied minors. I think that's a rules-of-the-road issue that's well within the State's purview, and an excellent area for debate.

ASSEMBLYWOMAN CARTER: And if there is a person who is in the vehicle who is, for whatever reason, unlicensed, how does that happen if they have to take over the vehicle?

MR. FISHER: Well, it would-- If it's a highly automated vehicle with no controls, the system would perform all the operations, including achieving a safe stopping place. If there are -- if it's a Level 3 vehicle or a Level 2 vehicle with a steering wheel, and brake pedals, and gas pedals, and they're a licensed driver, it would be the same. They would have to operate accordingly, as they would in a vehicle without automated features, and achieving a safe condition.

ASSEMBLYWOMAN CARTER: Okay, thank you.

ASSEMBLYMAN ZWICKER: Assemblyman Giblin.

ASSEMBLYMAN GIBLIN: Will there be such a thing down the road as speeding tickets? (laughter) Because aren't all the vehicles kind of programmed?

MR. FISHER: That would be the expectation. It's about improving mobility, improving safety, improving environmental effects of the transportation network. So you're absolutely right; why would you want to program a vehicle to break the law?

ASSEMBLYMAN GIBLIN: No, I'm looking at the revenue side.

MR. FISHER: Oh, I know; I know why you're asking. (laughter) I've never seen a state that hasn't been able to find another revenue stream though.

ASSEMBLYMAN GIBLIN: I just wondered if -- have you sat down with the Division, or the Motor Vehicles Commission, I guess, about this whole issue? Because you get involved with inspections, correct?

MR. FISHER: Absolutely. And I think what we've seen in other states -- states have put together a stakeholder working group that involves the legislature, state agencies like the Commission -- whether it's a DMV -- and all private sector stakeholders to start to talk about these issues, to identify what could potentially change, and what may need to change in state statute or law to facilitate the technology.

So I--

ASSEMBLYMAN GIBLIN: So a new teen driver now, if they wanted to-- What are you going to introduce them to, the traditional vehicles first, and then, maybe, the autonomous vehicles? I mean, it seems to me they need a combination of both if they're going to have a career as a driver. What would they learn in high school or drivers' ed?

MR. FISHER: I guess, how far out are we looking, right?

ASSEMBLYMAN GIBLIN: Well, no; short-term, long-term.

MR. FISHER: Well, short-term -- as other people have said, when these vehicles are first deployed, in the highly automated sense -- without steering wheels, and pedals, and all that -- they are going to be very limited, commercial deployment -- right? -- in the ridesharing mobility-type

of format. So building off of that, I don't think anybody can tell you when there's going to be widespread acceptance, because there are cost concerns, there's consumer acceptance, concerns, right? We have to do a great job of educating consumers of the benefits and how to use the technology.

So, over time, that answer will evolve. Right now, I'm not going to even dare put a timeframe on when a person who's just 16 or 18 -- whatever the driving age is -- starts to learn on which type of vehicle.

ASSEMBLYMAN GIBLIN: Would there be a down side in terms of decreasing employment in the industry, because it sounds to me like the vehicles will be fairly maintenance-free. So I'm thinking about automotive repair shops; or I'm wondering how NJ CAR, for example -- which is the trade association for dealers -- feels about this. I mean, am I interpreting--

ASSEMBLYMAN BENSON: Assemblyman, New Jersey CAR is actually going to be speaking in a little bit.

ASSEMBLYMAN GIBLIN: Okay; but what about the issue of repair? I'm looking at, you know, are you going to wind up losing jobs?

MR. WEIKEL: There's no doubt, on the collision side, that collision frequency will go down. But what you'll have counter to that is severity; and the expertise, the training that it will actually take to repair these vehicles will go up. So, you know, they will find a balance there--

ASSEMBLYMAN GIBLIN: It will be a different type of mechanic, then, to--

MR. WEIKEL: Yes, that's something they're struggling with now -- I'm sure NJ CAR will speak to it -- of finding the computer

programmer-types to get in there for repairs; as opposed to turning a wrench, which is sort of the traditional--

ASSEMBLYMAN GIBLIN: What's the life expectancy of these vehicles; 10, 12 years? More?

MR. FISHER: Oh, I think if they're being used 24/7, it's going to be dramatically reduced. And that would be in a commercial sense -- right? -- because more wear and tear on the vehicle. But we don't know yet, because, again, we're -- they haven't been commercially deployed. We're still in the testing phase. And these are all issues that a lot of people are asking, but I would imagine that, just on average, the lifespan would decrease the more the vehicle is used.

ASSEMBLYMAN GIBLIN: Okay, thank you.

ASSEMBLYMAN ZWICKER: Assemblyman Chiaravalloti.

ASSEMBLYMAN CHIARAVALLOTI: I'll reserve my questions for after the next testimony.

ASSEMBLYMAN ZWICKER: Okay.

Thank you very much.

MR. WEIKEL: Thank you.

MR. FISHER: Thank you.

ASSEMBLYMAN DePHILLIPS: Mr. Chairman, I do have one.

ASSEMBLYMAN ZWICKER: Sorry.

ASSEMBLYMAN DePHILLIPS: I'm trying to get my arms around how we would deal with situations when there are occupants in these vehicles -- whether they are young people, senior citizens, whomever -- who may be abusing alcohol, or marijuana, or drugs; and in the situation,

where they might have to take over control of the vehicle, what are we going to do if they're impaired?

MR. WEIKEL: No one is suggesting that. So we're talking about Level 3 vehicles here. Level 3 vehicles are the ones that would ask the driver to take control if they can't figure it out. No one is suggesting that anything other than existing rules of the road -- age, license -- would be able to operate those.

When you talk Level 4 and 5 vehicles-- Now, these are vehicles that will never ask the human to take a role again. I think that's where-- There are some more public policy decisions -- as to minors, those who have been drinking -- that, yes, you probably could explore that. It would be in everyone's best interest if they could take them without -- with maybe not having a license, and maybe not knowing how to drive, because the car will never ask them to take over. If the car runs into trouble, it will pull over and stop.

ASSEMBLYMAN DePHILLIPS: Okay, but there are-- Some of the vehicles you're talking about -- there could be the possibility where--

MR. WEIKEL: A Level 3 vehicle.

ASSEMBLYMAN DePHILLIPS: Right. Where someone in the vehicle would have to take over control--

MR. WEIKEL: Potentially--

ASSEMBLYMAN DePHILLIPS: --and have--

MR. WEIKEL: --so you would never want to change any current rule of the road of operating under the influence, or licensing requirements for a Level 3 vehicle.

ASSEMBLYMAN DePHILLIPS: So have here been any studies on this particular issue? Or has anyone investigated this or looked into it? But is it your position that whatever the law is, as pertains to the normal transportation of vehicles, with people operating vehicles -- those laws would apply here as well?

MR. WEIKEL: Absolutely for a Level 3.

ASSEMBLYMAN DePHILLIPS: Thank you.

ASSEMBLYMAN ZWICKER: Thank you.

MR. WEIKEL: Thank you.

ASSEMBLYMAN ZWICKER: Okay, next I'd like to call up representatives from Honda and Tesla; Craig Orlan from Honda, Eric Williams from Tesla.

You can both come up.

And there have obviously been a tremendous number of questions from the Committee, and really important information.

I like to see competitors shake hands. (laughter)

But I would ask that you focus your testimony on things that we haven't heard yet, as opposed to things that we've already been discussing, so we can push this conversation forward. We still have a large number of people, and a limit on how long we have this hearing.

Rock, paper, scissors. (laughter)

C R A I G O R L A N: So I'll go first.

Thank you again.

My name is Craig Orlan; I'm here with Honda. I'm happy to be here to testify and to talk about autonomous vehicles.

For Honda, this issue is primarily related to safety. As the Association folks alluded to before, there are a lot of fatalities on the road today. NHTSA just estimated that 37,000 people died on the roads nationwide last year alone. And to put that number in perspective, that's almost double the size of the Prudential Center; that's almost the capacity of Citi Field; and to us, that number is completely unacceptable.

As Josh mentioned, 94 percent of these accidents are the result of driver impairment, driver distraction, or some sort of driver error.

So it's easy to see the benefits of the automation. We also feel that this technology can improve fuel efficiency, personal mobility, traffic congestion, etc.

So we're very excited about this technology. We just launched a partnership with GM Cruise for $2 billion. So we're really kind of putting our money where our mouth is when it comes to this technology.

While the technology will undoubtedly change the way consumers use automobiles, we don't necessarily believe that it needs to change the way that government regulates vehicles. As Josh alluded to before, there's a shared responsibility between the state and the Federal government when it comes to how motor vehicles are regulated. The national level, at NHTSA, they kind of handle motor vehicle safety performance and safety standards; and the state handles things like licensing, registration, insurance, etc. We feel that relationship should remain fairly consistent.

We do fear that kind of patchwork of state legislation. If you see, you know, states and localities regulating this technology from a performance and safety standpoint, that's really kind of one of the biggest

impediments. We need the ability to design and build a vehicle that can operate and be sold in all 50 states, just because of the nature of the vehicles as a kind of transportation thing.

Ohio has been a great partner for Honda, and they've taken a really good approach to it. We think this legislation is well-intended, but New Jersey doesn't need to reinvent the wheel.

ASSEMBLYMAN ZWICKER: Can I just stop you right there--

MR. ORLAN: Yes.

ASSEMBLYMAN ZWICKER: --and ask you a question?

MR. ORLAN: Sure.

ASSEMBLYMAN ZWICKER: Be specific; and by that I mean, the bills that are under consideration -- a task force that will be voted on, and then the other Bills that are for discussion only -- I don't see-- And I'm one of the prime sponsors of those -- I don't see anything in there that is moving to areas of concern from a car manufacturer, right? These are about licensure; this is about enabling vehicles to be on the road. So where do you specifically feel that we are, in your opinion, moving into what should be handled at the Federal level?

MR. ORLAN: Sure.

So the task force-- I can begin by saying first we have a concern that -- we would like to see some industry representation on that task force as well. Just because, as I was going to say, about with Ohio -- we've had a very kind of close and intimate relationship with the Ohio government; and they've put together a task force that includes DOT, DMV, Public Safety, Transportation, etc. And they've allowed us to have, kind of, one point of contact and kind of get the state on one page. As one member alluded to

before, you know, some people see the safety benefits; others are kind of concerned about what this is going to do to revenue in terms of roads. So bringing them together is kind of something we're concerned with.

In terms of, specifically, kind of overstepping and getting into Federal language, the task force in Section 6-d authorizes them to kind of look at establishing safety standards that would be stricter than NHTSA's. And again, that would kind of create a standard that we couldn't necessarily build a car for New Jersey, and then we would have to build a car for California. We couldn't build a 50-state vehicle that we could sell nationwide. So that language, specifically, is something we're concerned with. But in general, we share the positon of our associations; we're in support of a task force. We would just like to see some small amendments to that task force, in terms of scope and in terms of participation.

Does that answer the question?

ASSEMBLYMAN ZWICKER: Yes.

MR. ORLAN: Okay.

So in Ohio, we're doing a lot of really great things; and I've kind of mentioned that in my written testimony, so I won't go into that in great depth because I know we have time concerns.

But we've been able to partner with the state on a couple of projects, including the Columbus Smart City project, the US-33 Smart Corridor, and the Marysville Smart Community. And these projects have allowed us to, kind of, work with the state to build up the infrastructure we need to do a lot of the testing that comes before we're going to deploy this technology wide.

So as I kind of mentioned before, those are our concerns. We don't necessarily think New Jersey needs to reinvent the wheel here. Ohio has provided a great model, where they've taken a hands-off approach in terms of regulating the performance and design standards, but they're still engaged in terms of how vehicles should operate, setting testing parameters, and just kind of working with the state. Because it is -- there are a lot of players working in this space, and all of them kind of have different needs. And it's important for the DMV to kind of have flexibility as they bring this technology forward.

ASSEMBLYMAN ZWICKER: Thank you.

E R I C W I L L I A MS, Esq.: Great; thank you, guys.

So my name is Eric Williams. I'm the Senior Regulatory Counsel for Tesla.

Thank you for inviting me here today.

I was asked to speak a little bit about the safety of automated vehicle technology in general.

For those of you who aren't familiar with Tesla, we are a manufacturer based in California. We develop full electric vehicles; so there's no internal combustion engine. They are entirely battery operated.

Our facilities are in Palo Alto and Fremont, California. They are 100 percent made in the U.S. at our factory in Fremont. And we also have the Gigafactory, which develops our batteries, in Sparks, Nevada, which is outside of Reno.

One of the things that sets our vehicles apart -- other than the fact that they are fully electric -- is that we make use of over-the-air software updates. We want to continually improve the capabilities of our vehicles;

and so, on a fairly reoccurring basis -- every few weeks, a month or so -- we beam out over-the-air updates to our entire fleet. And some of those updates allow for new features. These include automatic emergency braking, blind spot monitoring, forward collision warning, lane departure warning.

A lot of these features make up the basis of what's called *Tesla Auto Pilot*, which is an SAE Level 2 system of automation. That's a driver-assistance level. So none of our vehicles are automated vehicles today; they are regular vehicles that all of us drive today. But the intent is that with continued updates, after features are fully developed, fully validated, and they acquire any of the certifications necessary, those vehicles can eventually become capable of driving autonomously.

Why does Tesla care about automated vehicles? A lot of the same reasons that you've heard today. The bottom line is safety. We've heard a lot of numbers thrown around: 37,000 deaths last year on U.S. roads. If you look back over the last 50 years, that hasn't changed dramatically. Mid-1960s, the fatality rate was in excess of 50,000 a year; and now we're still hovering around 37,000. In that time, we've introduced a lot of critical safety features: airbags, anti-lock brakes, electronic stability control, crumple zones. And so, during that time, the number of miles driven has increased exponentially. Americans drive a lot more today than they did 50 years ago. The fatality rate, per mile, has dropped; but the overall number of fatalities remains stubbornly high.

And like we've seen discussed today, it really gets back to driver negligence. The best way to reduce the overall number of fatalities on U.S. roads is to just reduce the number of crashes on U.S. roads. And we believe

that automated vehicle technology is the answer, is the solution to reducing the crash frequency on U.S. roads.

The other thing you want to consider, though, is that once manufacturers are able to develop a fully automated vehicle and deliver it to customers, the solution is like -- it's not done, right? There's a challenge called *the rate of adoption.* So anytime you introduce a feature into the market, it takes approximately 30 years for that feature to fully penetrate the fleet. In the mid-1980s, manufacturers started introducing airbags -- frontal airbags on vehicles in a meaningful way. And it wasn't until 2016 that 95 percent of all registered vehicles in the U.S. actually had frontal airbags.

And so that's going to be a challenge that all manufacturers are going need to face going forward. The first step is to get an automated vehicle out there; the next step is to penetrate the fleet as quickly as possible, so that we can get as many consumers using automated vehicles in hopes of reducing that crash frequency.

So I think we all have the collective goal here to promote this technology. I want to just, sort of, point out a couple of ideas of what smart legislation could look like. Because there's a notion called *innovation before regulation* -- that was discussed earlier by Global and the Auto Alliance -- that we don't want to prematurely stifle a technology. Airbags, anti-lock brakes, electronic stability control -- all of these safety features that we have on our vehicles today, they enjoyed a rather unfettered period of innovation where they could develop organically in the fleet; and then once it was established that they were a critical safety feature, then regulators came in and started mandating them as a required safety technology. We'd like to

see something like that for automated vehicle technology, but we understand that there is a need to pass legislation, or a desire to pass legislation. So what are some common characteristics that would make a legislation valuable for both the State, for its consumers, and for manufacturers?

Definitions are really important. I like seeing bills that use the SAE levels of automation, because it's consistent terminology and it's used widely, both here in the U.S. as well as abroad. So it's something that we -- and by *we,* I mean manufacturers, legislatures, regulators -- we can all speak the same language when we're talking about the SAE levels of automation.

I like seeing bills that focus on higher levels of autonomy; specifically, Levels 3 through 5, or ideally, Levels 4 through 5. Because Level 2 is what we already have on the road today. Those are Tesla vehicles, some Honda vehicles, some Mercedes, BMWs. I don't want to see those vehicles being regulated, because those are strictly driver-assistance features that we're talking about at Level 2.

I'd like to see more focus on SAE Levels 4 through 5, which are true driverless vehicles. They're self-driving vehicles; whatever you want to call them, these are vehicles that are designed to operate with a minimal risk condition. So if they run into a situation that they cannot successfully negotiate -- a construction zone, a weather-related issue -- they are designed to safely operate themselves off to a breakdown lane, or to some safe area.

I'd like to see-- Probably one of the -- a couple of more points. Insurance -- insurance is aligned with the same vehicle class. So whether it's a Level 3 vehicle, Level 4 vehicle, Level 5 vehicle, those vehicles are treated in the same class of insurance that their counterpart would be today. So

when we're talking about a Model S with Level 4 capability -- this is farther down the road -- they would be insured in the same way that a current Model S would be insured.

And then, probably, the last thing I would just point out: avoiding excessive registration requirements or performance standards, disengagement reporting, and event data reporting requirements. The last one speaks of hardware, and that's really designed for Federal legislation. The former -- you know, licensing requirements, certification requirements -- it's important that we keep in mind that drivers operating automated vehicle should be treated the same way as drivers operating traditional vehicles today. I want to see a lot of parity between how vehicles are treated today, and to sort of frame it, especially, about how we want to treat automated vehicles down the road.

So I just tried to piece out a few things that I wanted -- for you guys to consider. There's a lot more that I want to discuss, but in the interest of time, I'd be happy to answer some questions now, if you have any.

ASSEMBLYMAN CONAWAY: You mentioned this *SAE* protocols, or standards.

MR. WILLIAMS: Yes.

ASSEMBLYMAN CONAWAY: What's it mean?

MR. WILLIAMS: Society of Automotive Engineers.

ASSEMBLYMAN CONAWAY: Okay.

MR. WILLIAMS: It's a consortium of automotive engineers that develop levels of automation. These are fairly established five levels of automation, in fact.

ASSEMBLYMAN ZWICKER: And I'll just point out that--

MR. WILLIAMS: Yes.

ASSEMBLYMAN ZWICKER: --one of the pieces of legislation that's under consideration for discussion is very explicit that it's a pilot program for Level 4 and 5.

MR. WILLIAMS: Okay; I apologize.

I wanted to speak just generally about automated vehicles. I understand that the Bills that are at issue today probably cover a lot of the issues that I mentioned. I appreciate that.

ASSEMBLYMAN ZWICKER: I have one question.

MR. WILLIAMS: Yes.

ASSEMBLYMAN ZWICKER: And it's actually following up a question that Assemblyman Conaway asked before.

So Tesla did something remarkable; it made a lot of headlines when your Model 3 car came out and received negative scores, when it came to braking; and then you fixed that over the air--

MR. WILLIAMS: That's correct.

ASSEMBLYMAN ZWICKER: --as you mentioned, right? So you knew that it wasn't a hardware issue; it was a software issue. You sent an update to your cars; your cars were retested, and then received a satisfactory braking rating.

And my question to you relates to what Assemblyman Conaway said before -- is how is Tesla currently dealing with the fact that that also means these cars are hackable? And how is this going to become more and more of an issue in the future, as the assumption is that an autonomous

vehicle will, of course, want to be able to have over-the-air updates? Because hardware changes much slower than software.

MR. WILLIAMS: That's true. And, you know, the cybersecurity issue is a much bigger topic than for purposes here.

It's an issue that I can say Tesla takes very seriously; and devotes a very large division to addressing cybersecurity threats. We follow all of the industry -- the standard industry practices that are discussed at the auto ISACs, both here in the U.S. and abroad. We speak almost regularly with regulators here and abroad on what their concerns are with cybersecurity and how we can bring that back to the team to address it.

I think it's fair to say that, you know, we operate off the assumption that no vehicle is impenetrable; and we want to try to develop a product that gets as close to that as possible. And until we feel comfortable that we have addressed all security threats, we don't send out an over-the-air update.

ASSEMBLYMAN ZWICKER: Thank you very much.

Assemblywoman.

ASSEMBLYWOMAN DeCROCE: I have a question.

Earlier in your testimony you talked about statistics--

MR. WILLIAMS: Yes.

ASSEMBLYWOMAN DeCROCE: --about accidents, fatalities. So I would expect that Tesla did a study on this. And is that study available, that you could share with the members, to show how that came about, and the numbers that you're talking about throughout New Jersey and across the country?

MR. WILLIAMS: Sure; yes.

So the numbers that I cited are actually Federal numbers, either from NHTSA-- I'm happy to share that report with you, and also some research that was done by the Insurance Institute for Highway Safety on rates of adoption and fleet penetration.

For Tesla's purposes, though, I can share a little bit of tidbit. We recently came out with a vehicle safety report for the third quarter. We were getting a lot of inquiries about the rate -- the success rate of using autopilot, versus not using autopilot. And again, this is a driver-assistance level, so we're still talking about features that rely heavily -- or expect the drivers' attention at all times.

But we just realized that, in the third quarter, when our vehicles have autopilot engaged, they experience one crash or crash-like event -- which is considered like a near-miss -- every 3.34 million miles travelled with autopilot engaged. Compare that to when they are driving without autopilot engaged; that rate goes down to 1 crash or crash-like event every 1.92 million miles. So what that is showing is that with autopilot engaged you have a lower probability of experiencing a crash or crash-like event.

For comparison, when we're talking about all vehicles across U.S. roads, I believe NHTSA has recently reported that there is 1 crash every 492,000 miles.

ASSEMBLYWOMAN DeCROCE: Okay. So here in New Jersey, just boiling down to our roadways--

MR. WILLIAMS: Yes.

ASSEMBLYWOMAN DeCROCE: --we're a corridor state; so we're an import-export state. Our highways are highly travelled. On a daily basis, it's bumper-to-bumper.

So when we talk about autonomous cars and having them on the roadway -- versus, say, small minibuses or whatever -- it is going to be a concern. I mean, you talked about the number of -- somebody did go on about less lanes needed. But I don't believe that will be the case here in New Jersey. I believe -- according to our Transportation Trust Fund and the infrastructure that we require here in the state for trucks to travel ingress and egress through the state, and in and out, are going to be of great concern too.

So in this overall picture, I think New Jersey is unique in the sense that even if we have autonomous vehicles, we're still going to have traffic problems. And we have to make that a part of our overall view on how we move forward.

MR. WILLIAMS: I don't think I disagree with you. I think that's a very salient point, and I'm going to defer to the State on--

ASSEMBLYWOMAN DeCROCE: Thank you; I appreciate that.

MR. WILLIAMS: They probably understand.

ASSEMBLYWOMAN DeCROCE: But just so--

MR. WILLIAMS: Yes; yes, thank you.

ASSEMBLYMAN CHIARAVALLOTI: Chairman?

MR. ORLAN: And just to build on that.

Every state has very unique infrastructure needs and requirements. And I think that's one of the big reasons why states should

kind of take a look in assembling these kinds of task forces and bringing all the parties together to kind of really understand what's very unique to their state that they need to address.

ASSEMBLYWOMAN DeCROCE: I agree. Governor Kasich did sign and implement in Ohio-- And I certainly would like to take a look at what they're looking at. Because Ohio -- of course, the roadways are different than compared here in New Jersey.

MR. ORLAN: Yes.

ASSEMBLYWOMAN DeCROCE: So thank you very much.

ASSEMBLYMAN ZWICKER: Assemblyman Chiaravalloti.

ASSEMBLYMAN CHIARAVALLOTI: Okay; thank you, Chairman.

And I appreciate you hosting this hearing. So far it's been enlightening, interesting, a little bit scary. (laughter) That's just the truth.

We are hearing a lot today about safety, mobility, environmental benefits. And I just have two, really, comments, through the Chair, that maybe staff can follow up; and I'm going to ask you guys one question.

One is, if the staff or OLS can put together a comparison between Ohio and California; because we hear both of them discussed. It seems the industry prefers Ohio; so if the staff could do that research.

ASSEMBLYMAN ZWICKER: That's the "leave us alone" regulation. (laughter)

ASSEMBLYMAN CHIARAVALLOTI: Thank you.

I am concerned about the cybersecurity, because-- And I understand your response on ISAC, and I don't want to, sort of, go back to

that. But my understanding is that in order to get to Level 4 and Level 5, these vehicles are going to need to be in constant communication, correct?

MR. WILLIAMS: How are you defining *communication*?

ASSEMBLYMAN CHIARAVALLOTI: Communication with each other; communication with the roadway.

MR. WILLIAMS: So that's more of a vehicle-to-vehicle connectivity, or a vehicle-to-infrastructure connectivity. That's sort of a separate tangent to automated vehicles.

ASSEMBLYMAN CHIARAVALLOTI: So when we talk about the infrastructure connectivity-- In doing some research for this hearing, our roads in New Jersey may not particularly be ready, correct? -- because you need-- Some of the things, you know, I've read about is reinforced pavement, right? Because once you have a Level 5 vehicle, they're going to pretty much follow the same track, right? So there's going to be an increase in costs. And I think this goes a little bit to what Assemblyman Giblin was talking about -- there could be an increase in cost with the Transportation Trust Fund in maintaining our roads.

There was referencing to striping, right? There's referencing to creating signs that the machines can read; to creating data collection points through Bluetooth. Not extremely expensive, but when you have the number of roadways we have-- These are all costs. And the one thing -- I guess my question to you is, all the safety elements that have been referred to didn't cost the State funds; it cost the consumer and the industry funds: safety bags, electric brakes, etc.

My concern is, have you done a cost analysis, in any location, on what the actual cost for these road improvements, this maintenance --

that will be borne by the State taxpayer? Have you done a cost analysis on what that number would be? Because I don't see -- in the current market, in the current way we tax vehicles, and all the mechanisms we have -- us finding, us recouping that cost.

MR. WILLIAMS: I'm really glad you asked that question.

ASSEMBLYMAN DePHILLIPS: That's a great question.

MR. WILLIAMS: I just want to make sure -- we're really talking about two different things here.

ASSEMBLYMAN CHIARAVALLOTI: Okay.

MR. WILLIAMS: Tesla is not an ardent supporter of vehicle-to-vehicle connectivity, and that's not what we're here to talk about today. We're here to talk about AV technology.

And the answer to your question is no, we have not done a cost-benefit analysis, because -- and again, I'm speaking for Tesla, not for other manufacturers -- the fact remains that -- you can relate to this -- it's always easier to drive on a road with clearly painted roads, clear signage, no potholes. But that's kind of a dream world, right? The reality is that a lot of roads aren't like that. And we approach AV technology in the same way. While we would love to have great infrastructure, we have to operate off the assumption that it may not ever happen; or it may not happen for some time. So we're developing our technology to operate on the current infrastructure. And if we get anything above that, that's a bonus.

ASSEMBLYMAN CHIARAVALLOTI: I appreciate your comment.

Chair, I would request that the Committee -- the task force, take into account some of these potential hidden costs.

ASSEMBLYMAN BENSON: Absolutely.

MR. ORLAN: And if I could add, kind of, one part to that.

ASSEMBLYMAN CHIARAVALLOTI: Oh, yes; I'm sorry. You can jump in. (laughter) We're free-form here. You didn't jump in; I thought you didn't have anything to add.

Go ahead.

MR. ORLAN: So as you kind of mentioned, there's autonomy and vehicle connectivity. But even in the vehicle connectivity space, there are, kind of, different things. There's vehicle-to-vehicle communication, which has the vehicles talking to each other. And that doesn't necessarily have the same kind of State costs as vehicle-to-infrastructure, where the vehicles can communicate with traffic lights and other sorts of infrastructure.

So we have partnered-- In a lot of localities in Ohio we've, kind of, partnered with some of the local governments to help share the cost of those infrastructure costs; and we're starting to study the results of that, and we hope to share them shortly.

ASSEMBLYMAN CHIARAVALLOTI: Thank you.

MR. WILLIAMS: So when you hear things like people coming to you saying, "You need different kinds of signage or stronger stripage," we don't necessarily support that, to be clear.

ASSEMBLYMAN CHIARAVALLOTI: Thank you.

ASSEMBLYMAN ZWICKER: Thank you.

Assemblyman Freiman, did you have a question?

ASSEMBLYMAN FREIMAN: I do; thank you.

You mentioned before you were trying to give us -- the Committee some cautionary guidance around, "Be careful about regulating; allow this to grow, allow the industry to grow organically."

MR. WILLIAMS: Yes.

ASSEMBLYMAN FREIMAN: And I appreciate that advice and that input.

I can foresee, perhaps, a natural attrition point coming out of this; and that deals with the reporting of data, and when the industry would rather report out performance data to a regulatory body, versus when the regulatory body would like that information. Because you're going to have information going forward almost on a real-time basis; whereas, when we're hardware-oriented -- when there's a failure, when a manufacturer detects failure, it takes a longer period of time to detect that, perhaps, they have a problem with a particular component. And they start to build up trending information, and then they decide, "Wait a minute. We need to, perhaps, have a recall," or there's an issue. And they start working with the regulatory oversight and say, "You know, perhaps we need to pull in these cars."

When is it appropriate to do a voluntary versus an involuntary recall? Because that deals with confidence factors; and there are implications -- financial implications for a manufacturer. Now we're getting into something much bigger; now we're getting into not only hardware, we're getting into connectivity issues; we're getting all sorts of things. And that information becomes real-time.

When a regulatory body would like to have that information, start seeing trending, and perhaps the confidence factor and the

implications of that -- not only for a particular manufacturer, perhaps the industry gets involved -- that potentially could be a real friction point between where we sit, versus where you sit. And that may be something we have significant conversations going forward; whereas, we're trying to look at the interests from your interests, and how we work together and partner with.

So I was just wondering, your thoughts on this.

MR. WILLIAMS: I don't disagree with you. I think there needs to be a dialogue, moving forward, between both Federal and state regulators, and manufacturers, on what is the best way to learn from the information that's being collected and how can that information be shared in a way that doesn't infringe upon customers' privacy, doesn't infringe upon proprietary information; but that meets the goals that the state would want to achieve in learning how to improve their own infrastructure.

So we would agree.

ASSEMBLYMAN BENSON: Assemblyman Giblin, go ahead.

ASSEMBLYMAN GIBLIN: I keep going back to law enforcement.

Stolen vehicles -- would that be a thing of the past with the autonomous vehicles? It seems to me you would be able to find their whereabouts, and maybe even develop some type of lockout to prevent their operation. Is that wishful thinking?

MR. WILLIAMS: Probably not; but it's not as easy as just turning on a switch. You're still dealing with a customer's vehicle. I'm not aware of how--

ASSEMBLYMAN GIBLIN: You'd be able to find their whereabouts -- wouldn't you be able to monitor that, I would think?

MR. WILLIAMS: So we don't monitor our *customers*; we can monitor the *vehicles.* We can't necessarily identify who's driving the vehicle or the owner of that vehicle.

ASSEMBLYMAN GIBLIN: No, I'm thinking more about the vehicle, not necessarily the operator. Like, in other words, you'll be able--

MR. WILLIAMS: Yes; you're asking can the manufacturer remotely disable the vehicle if it's confirmed that it's stolen. I suppose with close collaboration with law enforcement that is possible.

ASSEMBLYMAN GIBLIN: Okay.

The second thing is, the information that you derive, as far as the operation of these vehicles -- is it far-fetched, down the road, you get into some type of situation where law enforcement can subpoena the records to see where a passenger or an operator -- what their pattern was on a certain day if they're trying to solve a crime? Is that something that you envision? You're going to have a lot of information; it seems to me that you can get patterns of people on a daily basis in New Jersey.

MR. WILLIAMS: I suppose if the law enforcement met the legal standard to obtain a subpoena, we would address it in kind.

ASSEMBLYMAN GIBLIN: I'm looking at the-- You know, I mentioned law enforcement, but I'm thinking about the flip side. Maybe with some of this information you can talk to employers about changing work shifts, or maybe making things more efficient because of traffic patterns; or, you know, there are a certain number of people coming from

Toms River to Newark every day, where they change their work schedules a half--

ASSEMBLYMAN BENSON: Those are great points.

ASSEMBLYMAN GIBLIN: You know, maybe you can make things more efficient as far as their on-time arrival, and things of that nature, or reduce congestion by giving them a head's up.

MR. ORLAN: So you've raised a great point about the amount of data and information that these vehicles can collect; and that's something that the industry takes very seriously.

A couple of years ago we entered into a voluntary set of consumer privacy principles that basically said, "We're going to treat this data in a fair and responsible manner. We're going to be upfront with consumers about what we're collecting, how we're using it, and what we're going to do with it." Those are FTC enforceable, so we kind of have some obligations about how we share that data. But if law enforcement were to come with a subpoena or something, that's kind of one thing. But in terms of just kind of disseminating information about our customers to outside sources, with or without consent, is an issue we would have to look at.

MR. WILLIAMS: Yes; agreed.

ASSEMBLYMAN GIBLIN: Thank you.

ASSEMBLYMAN ZWICKER: Thank you very much to you both.

MR. WILLIAMS: If anyone is interested, we have a Model X outside. You're welcome to stop by after this hearing and--

ASSEMBLYMAN ZWICKER: Is it autonomous? What level?

MR. WILLIAMS: It's a Level 2, so it's not autonomous; it's--

ASSEMBLYMAN DePHILLIPS: Can we test drive it? (laughter)

UNIDENTIFIED MEMBER OF COMMITTEE: Do we get the keys? (laughter)

ASSEMBLYMAN ZWICKER: You don't get to put your hands on it. (laughter)

MR. WILLIAMS: If any of you want a test drive, I'm happy to take you up on it.

ASSEMBLYMAN ZWICKER: Well, there you go.

Thank you very much.

MR. ORLAN: And if I could just bring up one other point, to one of the questions that was asked earlier of the Association, about kind of making sure that as these technologies, kind of, come out there-- It's essential, from our standpoint, that consumers be educated about the capabilities and limitations of all of these vehicles at the different levels; that they know that, "I'm in a Level 3 vehicle; I shouldn't be operating drunk," or, "I may need to step in." And it's important for consumers and testers to kind of understand that from the get-go.

ASSEMBLYMAN ZWICKER: No doubt, no doubt.

ASSEMBLYMAN BENSON: Good point.

ASSEMBLYMAN ZWICKER: Thank you.

I'd like call up Jim Appleton from NJ CAR; and Fred Potter, from the International Brotherhood of Teamsters -- to both come on up.

ASSEMBLYMAN BENSON: And Jim, as soon as you're ready, you can get started.

J A M E S B. A P P L E T O N: Okay; I don't want to jump in front of the Teamsters.

F R E D P O T T E R: I appreciate that.

ASSEMBLYMAN BENSON: It's whoever would like to go first.

MR. POTTER: That's totally up to you, sir.

MR. APPLETON: If the mike is on, I'll take it.

I do have prepared comments, which I'll distribute. I'll try to be brief.

Thank you, Chairman Benson, Chairman Zwicker, for giving us the opportunity to testify.

And thank you to the members of the Assembly Science, Innovation, and Technology; and Transportation and Independent Authorities Committees for your time and attention this morning.

We were asked to speak briefly about the autonomous vehicles, and the impact that this emerging technology, and other emerging mobility trends, would have on the new car business; and particularly, the role of the neighborhood new car dealer in this new future.

Again, my name is Jim Appleton; I'm President of the New Jersey Coalition of Automotive Retailers. I think most of you know that we're the statewide trade association that represents New Jersey's 500 franchised new car and truck dealers. That's a $35 billion -- with a *B* -- $35 billion a year business here in the State of New Jersey, which employs 38,000 men and women all across the Garden State, many of whom -- most of whom, when you're in the northern part of the state, are union members.

These are good, local jobs with great pay and benefits; jobs that can't be outsourced to the Sunbelt or shipped overseas.

I think as you've heard this morning, auto retailers are part of a dynamic and ever-changing, ever-evolving industry. Since that first Model T rolled off the assembly line in Detroit, auto retailers have operated in an environment of constant change and technological innovation. Indeed, from my experience over the last 20-plus years, the only constant in the car business is change.

Auto retailers embrace change and have adapted their business to meet consumer demands and accommodate all kinds of technologies, disruptive business models, and an ever-changing legal and regulatory environment. Dealers are nothing if not adaptable; and it's why, after more than 100 years of selling and servicing cars, auto retailers remain the economic engine on Main Street in just about every community across this great State of New Jersey.

In this era of advanced technology vehicles and new mobility choices, many have questioned the role of auto retailers. Some, like Tesla -- who you heard from earlier -- have attempted to go to market without dealers, demanding special treatment under the law and an exemption from the requirement to operate through locally owned and operated franchisees. They say the franchise model won't work for them; but frankly, they ignore the fact that the franchise system works well for automakers whose products account for 99.8 percent of the new car market. And far more importantly, the franchise system works for new car consumers, because it promotes important public policy goals like competition, like consumer protection and highway safety.

We hear that the growing trend toward ridesharing and new autonomous vehicle technologies will put an end to personal vehicle ownership and, therefore, the neighborhood new car dealer. But a recent National Automobile Dealers Association survey of 1,200 consumers found that 81 percent of all millennials and 93 percent of older drivers, age 35 and older, want to keep a personal vehicle. We've been told by ridesharing enthusiasts that it is cheaper than owning a car and, over time, this would cause fewer people to purchase a new car or truck. But a study by the AAA Foundation for Traffic Safety found it costs half as much to own your own vehicle as it does to rely solely on a ridesharing service.

I mention Tesla and ridesharing as examples of the overblown predictions about the massive disruption which is forecast for the automobile sector. And I caution you about accepting similar bold predictions about autonomous vehicles. The integration of new technology and consumer acceptance is a gradual process, not the big bang AV enthusiasts and Wall Street investors are hoping for. Automatic braking, collision avoidance, and lane centering are just a few of the autonomous safety systems that have already become standard equipment in many vehicles. These technologies are saving lives and are becoming part of more and more vehicles every year. And there is no doubt that these technologies, and others yet to be introduced, are only going to get better and more sophisticated over time.

But does this mean that consumers will be willing to give up their steering wheels, brake pedals, and human decision-making, and rely solely on a fully autonomous vehicle? In the NADA study I referred to earlier, only 45 percent of millennials have a favorable view of AVs, versus

19 percent unfavorable. And for drivers 35 and older, only 29 percent had a favorable view of AVs.

So if consumers are getting the autonomy they want in cars today, and they are not clamoring for full autonomy, what's driving the AV discussion? We know what's driving the push for AVs on Wall Street, but what's driving the discussion here on State Street? It is, or at least should be, a discussion about public and highway safety. And so it falls to public policymakers like all of you to examine these safety claims carefully.

Autonomous vehicle advocates assert that deployment of this emerging technology will eliminate traffic fatalities. Right now, there is not nearly enough data to support this claim. And, in fact, there is plenty of anecdotal evidence that undermines this assertion.

I laugh about it -- in an August 2018 article about self-driving cars, Bloomberg quoted a machine learning expert who said, "The problem isn't that self-driving cars don't work; it's that people act unpredictably." His point, of course, was that if people acted less erratically, the safety record for AVs would improve. Ah, yeah; you think? If humans acted less erratically, frankly there would be no highway safety issue in the first place.

As we heard, last year, approximately 37,000 people died in auto-related accidents in the U.S. Every one of those deaths is a tragedy, and we should do everything we can to lower that number. But it is important to consider how many vehicles are on the road and how many miles are driven in order to put that number in some sort of perspective, and to really understand the true potential of AV technology to reduce traffic fatalities.

For example, Americans drove more than 32 trillion miles last year alone; that's a 3 and a 2, followed by 11 zeros. That means there was 1 auto related death for every 90 million miles driven. Let's compare that to the 54,589 traffic deaths which occurred in 1972, the highest number of fatalities recorded in any single year over the past 100 years of driving, according to data published by NHTSA. Americans drove approximately 1.3 trillion miles in that year, which equates to 1 auto-related death for every 24 million miles driven.

So you can see that driving is becoming safer and safer every year; a three-fold decrease in highway fatalities over the past few decades.

If the safety promise of autonomous vehicles is dependent upon reprogramming the behavior of people, why don't we just reprogram drivers to always wear seatbelts, not to speed, not to drive drunk, not to text or get distracted? It is inconceivable that AV technology will eliminate every traffic death; not when the external human element is still present, even when it's entirely removed from the cabin itself.

I don't think there's any question but that AVs will play a role in the future of personal mobility choices available to consumers. And I have no doubt that new car dealers can and will add value to the system for deploying AVs, for servicing AVs, and for remarketing AVs. But I don't see AVs as a dominant force in the marketplace or even a major disruptor of the personal motor vehicle market. Autonomous vehicles may disrupt the mass transit system in the U.S., and will, most likely, as you heard Dr. Kornhauser discuss, find their way to the market through fleet operators, rather than privately owned personal motor vehicles. And from where I sit, that's probably a good thing. Fleet deployment of AVs will allow the State

to put in place rigorous safety inspection and maintenance protocols, and substantial property and casualty insurance requirements that will mitigate the risk that AV technology will present on the highway. These requirements will likely be out of reach for many individuals, which are why fleet operators and mass transit providers are likely to see a much higher rate of deployment with autonomous vehicles, compared to individual consumers.

AV technology is here and now, and it's saving lives on New Jersey's roads every single day. And more and better AV technology is on the way, and making driving safer by the mile. How much safer can complete autonomy make our highways is really the big question, especially since the overwhelming majority of drivers don't really appear ready to give up their cars or driving for an autonomous future.

My advice to these Committees, as public policymakers, is to go slow. Question the hype; demand proof. Ask for information to back up bold claims about the safety and reliability of the AV systems. Separate the investor frenzy and myth from the true technological advancement, innovation, and safety benefits of autonomous vehicles.

As I said, I have copies of my prepared statement, and I'd be happy to answer any questions that you have.

ASSEMBLYMAN ZWICKER: Thank you so much.

I'd like to ask that we hold any questions until we hear from Mr. Potter.

MR. POTTER: Thank you.

Thank you for the opportunity to be here today.

As you know, this is an important subject for the Teamsters. We represent many truck drivers.

And my focus -- while I'm going to try to be as brief as possible -- is going to talk about the trucking industry, in particular; and the transportation industry, whether it's school bus, public busing, trucking.

First of all, I'm going to address a few things. You know, I heard a lot of testimony about safety. But in the trucking industry, the real discussion is about eliminating drivers; that's really what it's about. It's about taking away jobs. I think that what's secondary is the safety. You know, AAA just did a study, and there have been other studies; same results. The number one reason for accidents is driver fatigue. Whether it's too many hours driving, or whether they have undiagnosed sleep apnea, or other issues, that's the primary cause.

This will address that when there is autonomous vehicle technology in the trucks. But in no way can you have a system that eliminates the drivers. I wonder how a computer is going to pull over to the side of the road when it snows and put those snow chains on in order for that vehicle to be safe.

So I also looked-- Planes and trains have had the technology to be autonomous and eliminate the operator for years. Yet in the trains, we all know -- and we represent train operators -- they have to hit that button when it's on autonomous. Because if that train operator is not awake and monitoring that, the train shuts down; and that's important. If you have a truck with no driver in it, who's going to push that button?

And in the airline industry, you know, in airline transportation, a good place to start by doing this -- these long flights, especially

commercial flights, where there are no people on there. They all have pilots, and there's a reason for that. It's a fail-safe. And we think that any technology that allows a vehicle to operate itself without somebody there as a fail-safe is absolutely wrong. In fact, it's going to make the accident and fatality rates worse.

We all know about the connectivity issues. I have a really good laptop; I used it on Saturday. Yesterday, despite every device in my house connecting to to the Internet, I could not make that connect. What would I do if I had 70,000 pounds going down the highway at 55 miles an hour?

I also am somewhat familiar with this -- we see this -- there's a port in Long Beach that is autonomous. And I will tell you, when the system works, it works great. When it doesn't work, it doesn't work at all. And thank God it shuts down and people don't get run over.

But I don't think we have the technology, right now, to keep our roads fixed, to keep the lines painted, to fix the potholes. I've lost two tires because of potholes in New Jersey. Do I have confidence that we're going to have technology on our roads in order to support this type of technology and autopilot?

And I also-- Talking about autopilot -- I think you ought to Google Tesla's record on autopiloting. It's not what I would call *stellar.* And I'm going to ask you to look on Google; look at it yourself, read some of the articles -- including the deaths, accidents, and injuries -- and make your own decision there, and see if we're ready for this.

So while the technology is moving at a fast pace, you know, I see where different companies are building vehicles that have no cab. And they look at it as savings, because no air conditioning, no heat, no seat for

the driver. You save money making these vehicles. That is not the direction we should be going.

Decreasing labor costs-- For me, it flies in the face of having a safe industry.

And so some of the things I want to talk about is the fact that-- Your task force -- I think it's a great idea. And you have people from the insurance industry, scientists; but you have nobody that -- no driver; the people who are actually going to be in this system. I think the closest way you get there is to have a representative from the Teamsters, who represents the people who do this themselves. I myself started, and still consider myself, a truck driver. And before I went to work directly for the union, I had nine years of operating a truck. The fact is, you need that perspective from the drivers who are going to be on the roads and deal with this.

So a few points before I just move along.

There's no mention in the New Jersey Advanced Autonomous Vehicles Task Force about the workforce impacts, right? And I think that should be considered. What happens if you move towards that? Where do these people have employment, right? And who buys the goods these trucks transport; who buys them if you don't have the jobs to support that?

Any efforts to study the impacts of advanced autonomous vehicles also should seek the understanding of the workforce implications of this technology and how this affects the public going forward.

We would recommend amending the resolution to make studying these workforce concerns a central purpose of the task force, in addition to adding two representatives of the task force who are familiar

with labor concerns and the company information, and general and commercial truck driving in particular.

We also think that A-4573-- You know, we Teamsters looked at this; our International looked at -- feel that New Jersey has done a better job than other states in putting this together. But we would like 2.c.(1) to strike *independent contractor* and require that a CDL or a commercial vehicle driver's license vehicle is tested, and clarify the pilot program is only intended for non-commercial vehicles. We don't think you should be using this to move goods.

With regard to the reporting requirement, we would suggest establishing a reporting requirement similar to those in California. So you have annual or even biennial reporting for total miles driven; and any time the technology is forced to disengage, or where there are accidents involved, that they be reported within 10 days.

New Jersey A-1853 -- we also think this is a great Bill. But we prefer the specificity of the vehicle requirements that is laid out in this Bill to be that of A-4573.

So combining these two items, including the California reporting requirements, will make this a much stronger Bill.

So in regard to the autonomous license endorsement -- again, we think this is actually pretty great. We talked about this in other states, but we haven't seen it actually put in legislative language anywhere. So we would be in favor, with these clarifications: clarifying the endorsement is also required for commercial autonomous vehicles; page 2, line 28, clarifying what is meant by *actually driving.*

So, you know, I have a Verizon cell phone. I can tell you three areas in New Jersey that I go through that my call drops. I would hate to think that's a vehicle -- my grandchildren in the vehicle in front of it.

I was going to touch on this platooning. You know, I think that's a bad idea, especially starting out. Maybe years from now-- As one gentleman reported, you know, it took 30 years to get these airbags into cars. Maybe a time down the road -- this platooning. New Jersey has one of the strongest limits on coupling trailers to trucks. And to think that we would go through caravans with, you know, four to eight trucks, 30 to 50 feet from each other, and not even a driver, or maybe one driver -- is almost scary and laughable in New Jersey.

You know, we have more miles of roads per person than any other state. And I think New Jersey ought to look at this slow; have somebody with experience in truck driving, from a driver's perspective or bus, as part of the task force; and that we look at the records of all these companies that have put vehicles and had these test programs, as we move forward. Because this is a threat to jobs, now and in the future, and it's a threat, I believe, to the public if it's not done right.

Thank you for the time.

ASSEMBLYMAN ZWICKER: Thank you very much, to you both.

Any questions? (no response)

Seeing none, thank you so much for your testimony.

MR. POTTS: Thank you.

MR. APPLETON: Either we were boring, or we were really good. (laughter)

ASSEMBLYMAN BENSON: Fred, we particularly appreciate the specificity, too, in your comments. It's appreciated.

MR. POTTER: Thank you.

ASSEMBLYMAN ZWICKER: Our last panel of speakers -- I'm going to all up Tracy Noble from I'm not sure; Janna Chernetz from Tri-State Transportation Campaign; and David Strickland, from Self-Driving Coalition for Safer Streets.

ASSEMBLYMAN BENSON: And while they're coming up, we have a slip from David Smith on behalf of Allstate New Jersey, in favor, with amendments to AJR 164. And I assume the amendments were sent to the Committee for distribution, or at least to the sponsors.

Thanks.

ASSEMBLYMAN ZWICKER: And before you start, I just wanted to say thank you for your patience. But also know that we are up against a deadline of another Committee coming in shortly.

T R A C Y N O B L E: Thank you to Chairman Zwicker and Chairman Benson for having this conversation.

I'm here representing AAA and the motorists. (laughter)

AAA represents 2 million motorists in New Jersey. So I am not going to pretend to be an engineer or a vehicle manufacturer. But our focus is, and has always been, on safety and being the motorists' advocate.

Autonomous technology does have the potential to improve safety, mobility, and convenience. And AAA has supported the advancement of this technology; and we serve on various task forces in other states: Maryland, Pennsylvania, Ohio, and Connecticut. So we have been involved in this process all along.

As you've heard, more than 90 percent of fatal crashes are attributed to driver error. So the possibility that this technology can eliminate fatalities is very exciting.

But as you know, with technology -- and just from the questions that everyone has posed today -- there are a ton of risks that need to be considered. So while the evolution of autonomous vehicles will be gradual, were going to see the integration of this technology for many years to come. As was mentioned, the average vehicle in the fleet is about 11.5 years old; so it's going to take some time for all of this technology to be integrated.

A recent AAA survey found that three out of four U.S. drivers reported feeling afraid of driving in a fully autonomous vehicle. So we have a lot of work to do before this catches on.

So businesses, government -- we're all going to play a vital role in the acceptance and the interest of autonomous vehicles by maximizing transparency and having these very important conversations.

Recognizing that they have the potential to change our lives dramatically, AAA wants safety to be in the forefront. And we will continue to have those conversations, and pose these questions, and make sure that motorists understand the technology and that everyone will play a part.

Current motor vehicle laws never envisioned a vehicle that could drive itself. So if a vehicle causes a crash in an autonomous vehicle, who is liable? Is it the operator, the vehicle owner, their insurance company, the automaker, or the creator of that automotive technology?

And additionally, driver training and education programs need to continue to keep pace with the vehicle technology, and include the

instruction and the operation of autonomous vehicles. There are so many questions to be asked; and now is absolutely the right time to be having these conversations, so we applaud you for doing so.

Time and transparency will add to the trust and acceptance of autonomous vehicles. And AAA wants you to know that we are happy to be a part of this conversation, to be part of a work group, and to serve on the task force.

And we thank you for your time.

ASSEMBLYMAN ZWICKER: Thank you.

J A N N A C H E R N E T Z, Esq.: Thank you.

My name is Janna Chernetz; I'm the Deputy Director of Tri-State Transportation Campaign

And I'm excited to be a part of this conversation today.

I am new to this discussion; so I am also looking forward to receiving some of the answers that all of you have inquired about during testimony from the previous witnesses.

I just wanted to say that I certainly support the task force. And I would even expand that concept of a task force into a more strategic plan on how to integrate AVs into New Jersey's landscapes.

We need to figure out how New Jersey will embrace the technology, and embrace it in such a way that we really know the answer to why we are looking for AVs. So I would say that that task force needs to answer that question first, before we can start looking at regulations and statutory changes, in order to incorporate it. You know, we're on the level 0 through 5, and how we're going to slowly integrate to fully autonomous vehicles is extremely important.

You know, the framework-- When you're looking at changing regulatory -- making regulatory and statutory changes; looking at barriers and opportunities, are we looking at AVs -- talking just specifically about the personal vehicle; or how AVs will come into play with our last mile solution, Transit -- both in transit-rich environments and in transit deserts, paratransit, freight delivery, home? We need action plans for that implementation, along with-- And that way we know when the statutory and regulatory changes need to be made.

But not only implementing, but also looking at AVs to bring industry to New Jersey, to have a competitive workforce for this emerging technology. While New Jersey is a little bit behind the game with AVs, with other states having dove into this area, there's no rush to get into this. But I think that there's a wonderful opportunity, where we are situated in the country, that we could become not only just an emerging leader in the use of AVs, but the technology as well. In such an instance we would be capitalizing on the economic opportunities that AVs would bring to the state.

As Tracy pointed out, we need a comprehensive review of Title 39 to figure out what needs to be changed. Looking at motor vehicle registrations, driver's ed manuals, education, testing. We were just involved in changes to the driver's ed manual and testing to include bicycle and pedestrian questions. I know how long that took and what a task that was, on all levels, to get that in there. Now we're going to have to go back and change it again.

Liability came up a lot today. Insurance, law enforcement perspective, police reports, ticketing, safety issues, bicycle and pedestrian;

along with security, equity concerns, employment and labor laws, privacy issues, land use and transportation infrastructure, standards for manufacturers; laws and regulations needed for testing, State versus Federal role in AV regulation, data collection and retention processes; and identifying regulatory and statutory barriers and opportunities to move all the aforementioned above.

I think this is a lot of the things that the task force needs to look at, purely, than just statutory and regulatory changes; but a strategic plan as to how this is going to be implemented.

Such a plan would not only be beneficial to the Legislature, but it would be beneficial to advocates, such as myself. I mean, we know AVs are inevitable; and, you know, we have a lot to learn from other states that have progressed. So I look forward to the task force's report and working alongside the Legislature.

ASSEMBLYMAN BENSON: Thank you.

ASSEMBLYMAN ZWICKER: Thanks.

Last but not least-- (laughter)

D A V I D L. S T R I C K L A N D, Esq.: Always good to be the anchorman.

Good afternoon, everyone, and thank you for this opportunity.

My name is David Strickland; I'm the Counsel for the Self-Driving Coalition for Safer Streets.

I'm going to severely abridge my testimony and give the most important aspect. I hope I can provide some answers for you.

Before I took up private practice representing the Coalition, I was the Administrator of the National Highway Traffic Safety

Administration from 2010 to 2014. I issued the first automated vehicle guidance policy in 2012, in addition to the vehicle recall safety pilot with over 2,800 cars in 2012.

A number of my colleagues who have already testified have, frankly, covered what I would talk about in terms of safety and innovation. The one thing I would like to arc very quickly is that, when you think about the safety components in a vehicle, there's only about 60 or 70 -- there are 70 -- actually 72 Federal motor vehicle safety standards, which includes light passenger vehicles and heavy duty vehicles. Most of the technology that you see onboard your vehicle -- which are most effective today -- do not have standards, and they weren't tested in some type of staged way with various levels of permission. It was basically innovators using their own aspects of making sure that it was a proper risk assessment, making sure that it was something that there was a business case for, and that it was an effective technology. When you're talking about lane keep assist, you're talking about crash imminent braking--

So what we're talking about, in terms of an innovation cycle that many have talked about, we really shouldn't be rethinking this in terms of a process, because the process that we have had for over 50 years has been quite successful.

I will officially end my remarks, and I'm happy to take any questions.

ASSEMBLYMAN ZWICKER: Thank you very much.

Questions?

ASSEMBLYWOMAN JONES: I have just a comment.

ASSEMBLYMAN ZWICKER: Assemblywoman.

ASSEMBLYWOMAN JONES: I think it's wonderful to see the enthusiasm for this new technology.

I just want to caution you when you share with us interesting facts that are clearly unproven yet, don't go overboard. Keep it real; and don't tell us we're going to save money on our roads and bridges, quite yet, because we're going to go to autonomous vehicles. I don't see that happening.

And I think the general public isn't on the side of all of this, at this point, because when you talk about platooning trucks down a highway, I see it -- it looks like a railroad train. And we have some trouble with trains, with drivers -- conductors in them.

So be cautious; be enthusiastic. There is no way we're not going to be working towards understanding this technology for the future; none at all. But just be a little cautious on how you sell your idea.

MR. STRICKLAND: Madam Vice Chairman, it's an excellent point.

The members of my Coalition include Waymo, Ford, Uber, Lyft, and Volvo Motor Cars. And you're absolutely right. This isn't about conjecture; this is about proof, and science, and engineering, and good data, and, ultimately, consumer confidence which, frankly, all of us are leaning in to make sure that if we build it, they will come.

And you're absolutely right; we should not be overselling anything; we should base it on truth and data. But I'll say this, too, is that we will need the opportunity to be able to thoughtfully and safely test in order for us to be able to build up at that point. And that's something

that's very important; I know that the task force and other efforts that you've taken will help us achieve that.

ASSEMBLYWOMAN JONES: Agreed; thank you.

ASSEMBLYMAN BENSON: Chairman, any final remarks?

ASSEMBLYMAN ZWICKER: I just want to say thank you to you who testified; everyone who has testified today.

Chairman, thank you for bringing your Committee together; for bringing the Science Committee together.

Assemblyman, I think you raised really key issues here.

You know, the charge in front of us today is to ensure that as future technology comes into play, that we do so in a thoughtful way; in a way that takes the safety of the residents of New Jersey -- that's the first thing that we consider; and then we look at jobs, we look at mobility.

The excitement behind this technology is enormous; and I think it's up to us to ensure that we put together a smart public policy. And this has been a wonderful conversation for doing that.

I just want to say thank you to everybody.

And Chairman, once again, thank you so much.

ASSEMBLYMAN BENSON: Great.

Before we close, we just have one item to do; and then we have to get out of here for the Appropriations Committee, which needs to start setting up in about 5 minutes.

So with that, we have Assembly Bill -- AJR 164 is the task force committee.

I want to thank everyone for their testimony on the task force. As a sponsor, we'll take those into account before it comes to the floor; but we're going to try to get it out today.

There are some amendments -- if you could read those.

MR. MERSINGER: There are proposed Committee amendments to the Resolution that would add an additional member to the task force, appointed by the Governor upon the recommendation of the Commissioner of Banking and Insurance, that would have expertise in automobile insurance.

The amendments also require all members of the task force to be appointed within 90 days. Correct the reference to the New Jersey Motor Vehicle Commission; correct references to the Traffic Safety; and to NHTSA; clarify that the task force is to provide recommendations on items that may be enacted or adopted, and also make other grammatical changes.

ASSEMBLYMAN BENSON: Great.

Do I have a motion for the Bill?

ASSEMBLYMAN KENNEDY: Move, with amendments.

ASSEMBLYMAN GIBLIN: I'll second it.

ASSEMBLYMAN BENSON: Second; okay.

Please call the roll.

MR. MERSINGER: On the motion to release Assembly Joint Resolution 164, with Committee amendments, Assemblywoman DeCroce.

ASSEMBLYWOMAN DeCROCE: I'm just going to say a short statement, because I don't want to hold them up.

ASSEMBLYMAN BENSON: Sure; go ahead.

ASSEMBLYWOMAN DeCROCE: I just want to say that, you know, autonomous vehicles -- I believe it's an uphill battle. You know, society dictates change; and individuals -- at least here in the State of New Jersey -- do not like giving up their vehicles.

We've tried shared driving, HOV lanes, etc. I believe Generation X, at the time when they're 17 years old, they're still going to want their own vehicle to drive. So, you know, I take a look at all of this, and I think we should be looking at it and doing what we're doing; and I congratulate both of them, our Chairs, for moving forward to look at the future. But I see it a down-the-road future.

So I will say "yes," and hope to see what happens. It's almost like living in the Jetson age. (laughter)

MR. MERSINGER: Assemblyman Wimberly.

ASSEMBLYMAN WIMBERLY: Yes.

MR. MERSINGER: Assemblywoman Lopez.

ASSEMBLYWOMAN LOPEZ: Yes.

MR. MERSINGER: Assemblyman Kennedy.

ASSEMBLYMAN KENNEDY: Yes.

MR. MERSINGER: Assemblyman Giblin.

ASSEMBLYMAN GIBLIN: Yes.

MR. MERSINGER: Assemblyman Freiman.

ASSEMBLYMAN FREIMAN: Yes.

MR. MERSINGER: Assemblyman Chiaravalloti.

ASSEMBLYMAN CHIARAVALLOTI: Yes.

MR. MERSINGER: Vice Chairwoman Jones.

ASSEMBLYWOMAN JONES: Moving forward; absolutely yes.

MR. MERSINGER: Chairman Benson.

ASSEMBLYMAN BENSON: Yes.

MR. MERSINGER: The Bill passes.

ASSEMBLYMAN BENSON: The Bill passes.

And again, I want to thank everyone. I want to thank Chairman Zwicker. Great discussion; and we'll keep moving along and have further discussions on these matters in the future.

Meeting adjourned.

(MEETING CONCLUDED)