U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE

February 10, 2017

TO: Members, Subcommittee on Digital Commerce and Consumer Protection

FROM: Committee Majority Staff

RE: Hearing entitled "Self-Driving Cars: Road to Deployment"

I. INTRODUCTION

On Tuesday, February 14, 2017, at 10:15 a.m. in 2123 Rayburn House Office Building, the Subcommittee on Digital Commerce and Consumer Protection will hold a hearing entitled "Self-Driving Cars: Road to Deployment."

II. WITNESSES

- Mike Abelson, Vice President of Global Strategy, General Motors;
- Joseph Okpaku, Vice President of Public Policy, Lyft;
- Gill Pratt, Executive Technical Advisor and CEO, Toyota Research Institute;
- Anders Karrberg, Vice President of Government Affairs, Volvo Car Group; and
- Nidhi Kalra, Ph.D., Senior Information Scientist, RAND; Co-Director, Center for Decision Making under Uncertainty; Professor, Pardee RAND Graduate School.

III. BACKGROUND

A. Overview

There were 35,092 traffic fatalities on U.S. roadways in 2015.[1] The development of self-driving cars creates an opportunity to significantly reduce traffic fatalities, improve transportation mobility and accessibility, and decrease the environmental impact of cars in the U.S. and around the world.[2] While the auto industry has been researching the development of partially automated vehicle technology for decades, a number of automakers, equipment manufacturers, technology companies, and automated driving start-ups have recently announced plans to develop and test fully self-driving cars in the United States.[3] Some companies have

[1] See https://www.nhtsa.gov/press-releases/traffic-fatalities-sharply-2015
[2] See https://www.theguardian.com/technology/2015/dec/17/self-driving-cars-safety-future-interactive; See also http://www.autoblog.com/2016/03/24/study-autonomous-vehicles-improve-mpg-epa-tests/; See also http://www.thetransportpolitic.com/2015/06/23/will-autonomous-cars-change-the-role-and-value-of-public-transportation/
[3] See http://www.autonews.com/article/20161219/OEM06/312199908/the-big-bang-of-autonomous-driving; See also https://www.cbinsights.com/blog/autonomous-driverless-vehicles-corporations-list/

committed to producing commercially viable driverless car technology for deployment on public roads by 2020.[4]

In preparation for commercial deployment, the development of self-driving cars will require extensive testing and validation to ensure that the vehicle is safe for consumer use.[5] Unlike conventional vehicles, self-driving cars cannot rely on a human driver to provide control inputs into the vehicle during operation or maneuver the vehicle through unpredictable situations, such as bad weather, environmental hazards, and equipment failures.[6] The automated driving system must be able to handle safely any faults, malfunctions, and unexpected driving conditions.[7]

Today, vehicle manufacturers operate under the National Traffic and Motor Vehicle Safety Act (Vehicle Safety Act) to certify the safety of vehicles sold in the U.S. market.[8] This law requires auto manufacturers to self-certify that vehicles produced for commercial sale comply with all applicable Federal Motor Vehicle Safety Standards (FMVSS).[9] FMVSS are minimum safety performance standards, issued by the National Highway Traffic Safety Administration (NHTSA), for motor vehicles and items of motor vehicle equipment.[10] These standards address the safety of crash avoidance (e.g., brake systems) and crashworthiness (e.g., seatbelts) vehicle systems and equipment, the post-crash integrity of the vehicle, as well as fuel economy requirements.[11] FMVSS are intended to protect drivers against unreasonable risk of crashes and death or injury if a crash occurs as a result of the design, construction, or performance of the motor vehicle.[12]

Under the Vehicle Safety Act's self-certification program, NHTSA does not issue type approval certifications before a vehicle is manufactured or sold to consumers.[13] Instead, manufacturers certify to an automotive dealer or distributor that the vehicle meets all applicable FMVSS, which is demonstrated by a permanent label or tag affixed to the vehicle.[14] Prior to certifying compliance with the appropriate FMVSSs, manufacturers undergo comprehensive testing processes and procedures to ensure the safety of the vehicle and its equipment for

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[4] See http://www.businessinsider.com/google-apple-tesla-race-to-develop-self-driving-cars-by-2020-2016-4/#nissan-is-committed-to-have-a-commercially-viable-autonomous-car-on-the-roads-by-2020-7. See also http://www.driverless-future.com/?page_id=384

[5] See https://users.ece.cmu.edu/~koopman/pubs/koopman16_sae_autonomous_validation.pdf

[6] Id.

[7] Id.

[8] See the Department of Transportation and the National Highway Traffic Safety Administration's Federal Automated Vehicles Policy, September 2016. Available at: https://one.nhtsa.gov/nhtsa/av/av-policy.html

[9] See https://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/pdf/USCODE-2011-title49-subtitleVI-partA-chap301.pdf

[10] See https://webcache.googleusercontent.com/search?q=cache:vH01q2Cjc_sJ:https://www.nhtsa.gov/staticfiles/rulemaking/pdf/FMVSS-QuickRefGuide-HS811439.pdf+&cd=4&hl=en&ct=clnk&gl=us

[11] See https://icsw.nhtsa.gov/cars/rules/import/FMVSS/

[12] Id.

[13] See https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/manufacturer_information_march2014.pdf; See https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf

[14] See https://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/pdf/USCODE-2011-title49-subtitleVI-partA-chap301-subchapII-sec30115.pdf

consumer use. The testing of vehicle systems occurs in laboratories, on private or public automotive proving grounds or test tracks, and on public roads.[15] At these facilities, cars undergo a variety of crash tests and simulated roadway and weather condition testing to ensure the vehicle is ready for real-world driving.[16] Auto manufacturers are permitted to test vehicles on public roads that do not meet all applicable FMVSS as long as the vehicles are not sold or offered for sale at the conclusion of the testing.[17]

B. Federal Activity: Automated Vehicle Testing and Deployment

In March 2016, NHTSA issued a report in conjunction with the Department of Transportation's (DOT) Volpe Center finding that while existing FMVSS do not explicitly address automated vehicle technology, there are few regulatory barriers facing the deployment of automated vehicles that comply with applicable FMVSS.[18] The advancement of partially automated driving systems in vehicles on the market today and the absence of FMVSS specifically addressing these autonomous systems, however, has prompted regulators at both the federal and state level to begin work establishing a regulatory framework for the testing and deployment of this technology.

In September 2016, NHTSA issued a Federal Automated Vehicles Policy (FAVP) outlining a foundation and framework for the safe introduction and deployment of highly autonomous vehicles (HAVs) – vehicles where the automated system can conduct the driving task and monitor the driving environment without human input or control.[19] The FAVP consists of four sections, including vehicle performance guidance; model state policy; NHTSA's current regulatory tools to oversee the testing and deployment HAVs; and new tools and authorities that may be useful to NHTSA's efforts to facilitate the safe development and deployment of automated vehicle technology.[20]

The FAVP also outlines the division of regulatory responsibilities for federal and state oversight of vehicle operations. NHTSA's responsibilities include: setting FMVSS; enforcing compliance with FMVSS; investigating and managing recalls for vehicle safety defects; public education about vehicle safety issues; and the issuance of guidance to vehicle and equipment manufacturers regarding safety issues.[21] State responsibilities include: licensing; enacting and enforcing traffic laws and regulations; conducting safety inspections; and regulating vehicle insurance and liability.[22] The FAVP makes clear that these areas of responsibility should "remain largely unchanged for HAVs."[23] Moreover, it strongly encourages states not to codify the FAVP as "legal requirements for the development, design, manufacture, testing, and operation of

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[15] See http://www.trcpg.com/what-we-do/; See also http://www.mtc.umich.edu/test-facility and https://users.ece.cmu.edu/~koopman/pubs/koopman16_sae_autonomous_validation.pdf
[16] Id.
[17] See https://www.congress.gov/114/bills/hr22/BILLS-114hr22enr.pdf
[18] See https://ntl.bts.gov/lib/57000/57000/57076/Review_FMVSS_AV_Scan.pdf
[19] See https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf
[20] Id.
[21] Id.
[22] Id.
[23] Id.

automated vehicles" and "to allow the DOT alone to regulate the performance of HAV technology and vehicles."[24] The FAVP cautions that the development of state regulations pertaining to the performance of HAV technology and vehicles whether in testing or deployment could lead to a "patchwork of inconsistent laws and regulations among the 50 States…which could delay the widespread deployment of these potentially lifesaving technologies."[25]

The FAVP's section on vehicle performance guidance focuses predominantly on the testing and deployment of HAVs.[26] It outlines a series of best practices and provides a performance guidance framework for the safe pre-deployment, design, development, and testing of HAVs prior to commercial sale or operation on public roads.[27] The best practices and performance framework cover expected processes and procedures that manufacturers and other entities should follow when testing and deploying HAVs on public roadways to ensure reasonable safety under real-world conditions.[28]

The vehicle performance guidance section also includes a request for auto manufacturers and other entities developing self-driving cars to voluntarily submit a Safety Assessment letter to NHTSA's Office of the Chief Counsel for each HAV system being developed and tested.[29] The Safety Assessment letter, which would be made public, is expected to contain a documented process for how manufacturers or other entities are testing and validating fifteen areas related to vehicle safety.[30] Those areas include: data recording and sharing; privacy; system safety; vehicle cybersecurity; human machine interface (i.e. the interaction between the vehicle and the driver); crashworthiness; consumer education and training; registration and certification; post-crash behavior; federal, state, and local laws; ethical considerations; operational design domain – the specific domain(s) where the HAV is designed to properly operate, such as geographic area or speed range; object detection and response – the ability of the HAV system to detect any circumstance that is relevant to the immediate driving task; fall back (minimal risk condition) – an HAV operating in a safe degraded state when a problem is encountered or a system malfunctions; and validation methods that ensure the safety of the HAV while in operation.[31] The FAVP requests that manufacturers or other entities submit the letter at least four months before active road testing begins on a new automated feature.[32] The FAVP also requests that the manufacturer or entity submit a new letter to the agency when "any significant update(s) to a vehicle or HAV system is made."[33]

In January, NHTSA released an addendum to the FAVP clarifying aspects of the vehicle performance guidance.[34] In the addendum, NHTSA reiterated that the Safety Assessment letter

[24] Id.
[25] Id.
[26] Id.
[27] Id.
[28] Id.
[29] Id.
[30] Id.
[31] Id.
[32] Id.
[33] Id.
[34] See https://www.nhtsa.gov/technology-innovation/automated-vehicles

is voluntary and not intended to be used as an enforcement tool.[35] The addendum also provides that the four-month reference in the FAVP is intended to be the maximum amount of time the agency expects to review the Safety Assessment letter, though NHTSA does not expect the review to take four months in most cases.[36] Manufacturers and other entities are strongly encouraged to submit a letter before testing and deployment, however there is no mandatory requirement to do so.[37]

Under existing law, NHTSA has a number of regulatory tools and authorities at its disposal to oversee and ensure the safety of new automotive technologies introduced into the market. For example, through letters of interpretation, NHTSA can describe how it views the meaning and application of existing statutes or regulations as they relate to emerging automotive technologies, including automated driving systems.[38] NHTSA also has exemption authority where it can temporarily exempt manufacturers from compliance with FMVSS to test new motor vehicle safety features, and rulemaking authority to amend existing safety standards or create new safety standards for motor vehicles and motor vehicle equipment.[39]

In addition to these authorities and tools, NHTSA has broad enforcement authority, which can be used to address both existing and emerging automotive technologies.[40] In an Enforcement Guidance Bulletin released in September 2016, NHTSA claims this authority covers motor vehicles and motor vehicle equipment in all of its forms, including software, and applies "notwithstanding the presence or absence of an FMVSS for any particular type of advanced technology."[41] If safety concerns arise with respect to HAVs, NHTSA has pledged to evaluate those issues through its investigative authority and "exercise its enforcement authority to the fullest extent."[42]

The FAVP also contemplates new authorities and tools for NHTSA to oversee and regulate the testing and deployment of HAVs and automated vehicle technology to ensure its safety.[43] These new tools and authorities include authorizing NHTSA to require the submission of pre-market testing, data, and analyses reports to the DOT by manufacturers and other entities engaged in the development and testing of self-driving cars.[44] It also includes pre-market approval authority to NHTSA, which would empower the agency to "prohibit the manufacture, introduction into commerce, offer for sale and sale of HAVs unless, prior to such actions, NHTSA has assessed the safety of the vehicle's performance and approved the vehicle."[45] In public comments submitted to NHTSA following the release of the FAVP, many auto industry

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[35] Id.
[36] Id.
[37] Id.
[38] Id.
[39] Id.
[40] Id.
[41] See https://www.federalregister.gov/documents/2016/09/23/2016-23010/nhtsa-enforcement-guidance-bulletin-2016-02-safety-related-defects-and-automated-safety-technologies
[42] See https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf
[43] Id.
[44] Id.
[45] Id.

stakeholders expressed concern that pre-market approval authority to the agency would significantly delay the development of self-driving cars and the deployment of their lifesaving benefits.[46]

Following the release of the FAVP, the DOT solicited proposals from interested entities across the country to form a network of multiple proving grounds to encourage the testing of automated vehicle technology.[47] According to the DOT, these entities would be "designated as a Community of Practice to develop and share best practices around the safe testing, demonstration and deployment of automated vehicle technology."[48] In January, the DOT announced the designation of ten automated vehicle proving grounds that include: the City of Pittsburgh and the Thomas D. Larson Pennsylvania Institute; Texas AV Proving Grounds Partnership; U.S. Army Aberdeen Test Center; American Center for Mobility at Willow Run; Contra Costa Transportation Authority & GoMentum Station; San Diego Association of Governments; Iowa City Area Development Group; University of Wisconsin-Madison; Central Florida Automated Vehicle Partners; and North Carolina Turnpike Authority.[49]

C. State Activity: Automated Vehicle Testing and Deployment

The Vehicle Safety Act establishes NHTSA as the sole regulatory authority responsible for setting FMVSS and enforcing compliance with those standards.[50] States are expressly preempted from issuing any standard that regulates motor vehicle or motor vehicle equipment performance if that standard is not identical to an existing FMVSS regulating the same aspect of performance.[51] As discussed above, states have traditionally been responsible for motor vehicle regulations that address the licensing of drivers, vehicle registration, traffic law enactment and enforcement, safety inspections, and the regulation of motor vehicle insurance and liability.[52]

The absence of specific FMVSS addressing automated vehicle technology, however, has prompted some states to enact laws creating performance standards for self-driving cars and requirements about how the technology must be tested within the State's jurisdiction.[53] For example, some states are requiring the presence of a human driver behind the wheel at all times to take corrective action in the event of a system failure when automakers or other entities are engaged in the testing of automated driving systems or fully self-driving cars.[54] There are other states that are allowing self-driving cars on the road for testing purposes, but have expressly prohibited the commercial deployment of these vehicles.[55] Other states are limiting the testing of

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[46] See https://www.regulations.gov/docketBrowser?rpp=50&so=DESC&sb=postedDate&po=0&dct=PS&D=NHTSA-2016-0090
[47] See https://www.transportation.gov/sites/dot.gov/files/docs/File11-22-2016-153743.pdf
[48] Id.
[49] See https://www.transportation.gov/briefing-room/dot1717
[50] See https://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/pdf/USCODE-2011-title49-subtitleVI-partA-chap301.pdf
[51] See https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf
[52] Id.
[53] See https://www.law360.com/articles/819698/a-state-by-state-guide-to-driverless-car-regulations
[54] Id.
[55] Id.

self-driving cars to certain geographic areas.[56] Local governments are also working to take action on self-driving cars, with some planning to prohibit the use of these vehicles outright for both testing and commercial deployment.[57] Many states have stayed silent on the issue altogether.[58] States are expected to continue monitoring the development of self-driving cars and future federal action to inform their plans to address the safety of the technology.

D. Secretary Chao

On January 31, 2017, the Senate confirmed Elaine Chao as the U.S. Secretary of Transportation.[59] During her confirmation hearing, Secretary Chao indicated an interest in advancing opportunities for the testing and experimentation of self-driving cars and automated driving systems without overly prescriptive regulations.[60] A nomination for the next NHTSA Administrator has not yet been made. Former President George W. Bush made his nomination for NHTSA Administrator in June 2001, almost six months after his inauguration.[61] Former President Obama did not nominate a NHTSA Administrator in his first term until December 2009.[62]

I. ISSUES

The following issues will be examined at the hearing:

- How auto manufacturers and other entities are testing self-driving cars and automated vehicle technology.
- Projected timelines for the commercial deployment of self-driving cars.
- Challenges to testing automated vehicle technology.
- Infrastructure developments needed to facilitate the testing of self-driving cars.
- Federal and state oversight of the testing and deployment of self-driving cars and automated vehicle technologies.
- Privacy and security considerations in the testing and deployment of self-driving cars.
- Consumer engagement in the testing of self-driving cars.

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[56] Id.
[57] See https://www.cnet.com/roadshow/news/chicago-city-council-might-ban-autonomous-cars/
[58] See http://www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx
[59] See http://www.cnn.com/2017/01/31/politics/elaine-chao-transportation-confirmation/
[60] See https://www.wired.com/2017/01/elaine-chao-confirmation-hearing/
[61] See https://georgewbush-whitehouse.archives.gov/news/releases/2001/06/text/20010618-7.html
[62] See http://www.consumerreports.org/cro/news/2009/12/strickland-nominated-as-new-head-of-nhtsa/index.htm

IV. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Olivia Trusty or Paul Nagle of the Committee Staff at (202) 225-2927.