STATEMENT OF CATHERINE CHASE
PRESIDENT
ADVOCATES FOR HIGHWAY AND AUTO SAFETY

ON

"THE FUTURE OF AUTOMATED COMMERCIAL MOTOR VEHICLES: IMPACTS ON SOCIETY, THE SUPPLY CHAIN, AND U.S. ECONOMIC LEADERSHIP"

SUBMITTED TO THE

UNITED STATES HOUSE OF REPRESENTATIVES
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Introduction

Advocates for Highway and Auto Safety (Advocates) is a coalition of public health, safety, law enforcement and consumer organizations, insurers and insurance agents that promotes highway and auto safety through the adoption of federal and state laws, policies and regulations. Advocates is unique both in its board composition and its mission of advancing safer vehicles, safer motorists and road users, and safer infrastructure. We have been at the forefront of furthering proven and lifesaving technologies to prevent crashes and reduce the motor vehicle crash fatality and injury toll since our inception in 1989. Automated, or autonomous, vehicles (AVs) and automated commercial motor vehicles (ACMVs) may be able to contribute to this goal. However, this outcome cannot be achieved in the absence of effective regulations setting minimum performance standards, as well as thorough transparency, strong government oversight, and AV and ACMV industry accountability.

Currently there are no federal performance standards for advanced driver assistance systems (ADAS), partial automation convenience features, AVs, or ACMVs. ADAS include safety features presently offered in some cars and trucks such as automatic emergency braking (AEB), lane departure warning (LDW) and blind spot detection (BSD). The highly respected Insurance Institute for Highway Safety (IIHS) has found real-world significant crash rate reductions in vehicles equipped with these technologies. For many years, Advocates has been supporting legislation in Congress and regulatory actions by the U.S. Department of Transportation (DOT) to require proven safety technologies as standard equipment in all new vehicles.

Conversely, partial automation convenience features, such as adaptive cruise control (ACC) and lane centering used together, have not been proven to improve vehicle safety. According to IIHS President David Harkey, "[T]here is no evidence that [partial automation systems] make driving safer…In fact, the opposite may be the case if systems lack adequate safeguards."[1] Misuse of and overreliance on some technologies already have led to numerous fatal crashes.[2]

In contrast to ADAS and partial automation convenience features, AVs and ACMVs are not available for consumer purchase at this time. However, testing has been increasing in recent years throughout the country, and operations of so-called robotaxis are allowed in a few cities including San Francisco with a recently approved expansion of their deployment approved by the California Public Utilities Commission (CPUC).[3] However, soon after the expansion was approved, a crash with a fire truck and other incidents that jeopardized public safety resulted in a swift order by the CPUC to reduce the robotaxi fleet while the California Department of Motor Vehicles conducts an investigation.[4] Additionally, the San Francisco Board of Supervisors announced their intention to petition the CPUC for a reconsideration of the robotaxi expansion decision because of the serious threat they pose to public safety.[5] San Francisco officials subsequently filed an administrative motion to pause the CPUC approved expansion.[6] Based on data from the San Francisco Fire Department (SFFD), robotaxis have been involved in 39 incidents since January 2023.[7] Due to this concerning safety record, the SFFD, San Francisco Police Officers Association (SFPOA), San Francisco Municipal Transportation Agency (SFMTA), San Francisco County Transportation Authority and the San Francisco Planning Department have expressed grave concerns about the robotaxis.[8] While AVs and ACMVs have both similar and differing issues in need of consideration, the San Francisco real-world experience cannot be ignored or dismissed and is essential to examine and assess when

developing legislation or national policies on AVs and ACMVs in order to prevent similar or additional safety risks to all road users across the Nation.

Motor Vehicle Crashes are a Public Health Crisis which Demand Immediate Action Using Proven and Viable Solutions

On average, 118 people were killed every day on roads in the U.S. in 2021,[9] totaling nearly 43,000 fatalities for the year. An additional 2.5 million people were injured.[10] This amounts to a 27 percent increase in deaths in just a decade.[11] Early projections for 2022 show traffic fatalities remain high.[12] Specific categories of road users experienced steep increases in deaths as well. Pedestrian fatalities increased 18 percent, and bicyclist deaths were up 12 percent from 2019 (pre-pandemic) to 2021.[13]

In 2021, 5,788 people were killed and nearly 155,000 people were injured in crashes involving large trucks.[14] Since 2009, the number of fatalities in large truck crashes has increased by 71 percent.[15] In the first six months of 2022, traffic fatalities in crashes involving at least one large truck were up 10 percent; 2,811 people were killed.[16] In fatal two-vehicle crashes between a large truck and a passenger motor vehicle, 97 percent of the fatalities were occupants of the passenger vehicle.[17] The cost to society from crashes involving large trucks and buses was estimated to be $143 billion in 2020, the latest year for which data is available.[18] When adjusted solely for inflation, this figure amounts to over $166 billion.[19]

The financial impact of motor vehicle crashes on our economy and on our families is staggering. Conservatively, the annual economic cost of motor vehicle crashes is approximately $340 billion (2019 dollars).[20] This means that every person living in the U.S. essentially pays an annual "crash tax" of over $1,000. Moreover, the total value of societal harm from motor vehicle crashes in 2019 was nearly $1.4 trillion.[21]

On the Potential Path to AVs and ACMVs, Proven and Existing Vehicle Safety Technologies and Policies Can Save Lives, Reduce Injuries and Mitigate Crash Damages

Fortunately, inexpensive and lifesaving solutions to prevent or mitigate motor vehicle and commercial motor vehicle (CMV) crashes are verified and readily available. What is lacking is implementation.

Advocates always has championed proven vehicle safety technologies because they are highly effective and affordable. For example, Advocates led the coalition that supported enactment of the bipartisan Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991[22] which included a mandate for front seat airbags as standard equipment. As a result, by 1997, every new car sold in the United States was equipped with this technology and the lives saved have been significant. Airbags have saved an estimated 50,457 lives from 1987 to 2017, according to NHTSA.[23]

Advocates continued to support proven lifesaving technologies as standard equipment in new vehicles in other federal legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;[24] rear outboard 3-point safety belts;[25] electronic stability control;[26] rear safety belt reminder systems;[27] brake transmission interlocks;[28] safety belts on motorcoaches;[29] rear-view cameras;[30] ADAS;[31] impaired driving prevention technology;[32] enhanced vehicle hood

and bumpers to better protect vulnerable road users;[33] and, advanced head lamps.[34] The NHTSA has estimated that between 1960 and 2012, over 600,000 lives were saved by motor vehicle safety technologies.[35]

ADAS:

ADAS can prevent or mitigate crashes caused by numerous factors including distracted, drugged, drunk, and drowsy driving, and protect drivers, vehicle occupants and other road users.

Compelling and irrefutable research by the IIHS found the following benefits about ADAS components:

- AEB can decrease front-to-rear crashes with injuries by 56 percent;
- LDW can reduce single-vehicle, sideswipe and head-on injury crashes by over 20 percent;
- BSD can diminish injury crashes involving lane changes by 23 percent;
- Rear AEB can reduce backing crashes by 78 percent when combined with rearview camera and parking sensors;
- Rear cross-traffic alert can reduce backing crashes by 22 percent; and,[36]
- Equipping large trucks with forward collision warning and AEB could eliminate more than two out of five crashes in which a large truck rear-ends another vehicle.[37]

Furthermore, the National Transportation Safety Board (NTSB) has included increasing implementation of collision avoidance technologies in its Most Wanted Lists of Transportation Safety Improvements since 2016.[38]

However, the widespread use of these lifesaving technologies and realizing their significant lifesaving benefits are hampered when they are not required as standard equipment on all new vehicles. Today, AEB may only be sold as part of an additional, expensive trim package along with other non-safety features, or included as standard equipment in high end models or vehicles. This situation hinders mass dissemination and safety equity by providing access only to those individuals and families who can afford an upcharge of thousands of dollars for the best brake systems.

Moreover, there are currently no minimum safety standards to ensure the technologies perform as expected and as needed to protect all road users, not just vehicle occupants. This void of regulations for ADAS needlessly endangers bicyclists, pedestrians, roadside first responders, and others.[39] Additionally, the average age of vehicles operated on roads in the U.S. was approximately 15.7 years in 2022.[40] Further delays on issuance of Final Rules will needlessly extend the length of time for ADAS to attain market saturation in the light vehicle (i.e., car) and CMV fleets.

The Infrastructure Investment and Jobs Act (IIJA) took steps to remedy this deficiency.[41] The law requires the U.S. DOT to issue a final rule within two years for AEB in large CMVs and the issuance of a Federal Motor Carrier Safety Regulation (FMCSR) to require drivers use AEB.[42] The U.S. DOT issued a Notice of Proposed Rulemaking (NPRM) in July.[43] The IIJA also required U.S. DOT to promulgate a rule requiring AEB on passenger vehicles.[44] The U.S. DOT subsequently issued an NPRM in June.[45] Advocates submitted comments to both proposed rules

When these two rules are completed and implemented, they will have a significant impact on safety and result in substantial reductions in highway deaths and injuries. It is incumbent that the U.S. DOT not delay completion of comprehensive regulatory action and meet statutory deadlines.

Teen Truckers:

Despite the growing number of needless truck crash deaths and injuries, the IIJA unfortunately allows the DOT to implement a pilot program allowing teens to drive an 80,000 lb. truck in interstate commerce. This program runs counter to numerous studies conducted by the IIHS and others that have found that "age is a strong risk factor for truck crash involvement."[46] CMV drivers under the age of 19 are four times more likely to be involved in fatal crashes, as compared to CMV drivers who are 21 years of age and older, and CMV drivers ages 19-20 are six times more likely to be involved in fatal crashes (compared to CMV drivers 21 years and older).[47] The general pattern of over-involvement in fatal crashes for younger CMV drivers dominates all other factors. Studies of young CMV drivers show that as the age of the driver decreases, large truck fatal crash involvement rates increase.[48] Generally, younger drivers are more likely to be involved in fatal crashes because they lack driving experience and skills and tend to take greater risks. Development of the brain region vital to decision making and complex tasks, specifically the pre-frontal cortex, may not be fully reached until one's mid-20s.[49]

Diverse stakeholders including safety groups, law enforcement, public health and consumer organizations, truck drivers, labor unions, some trucking companies, and truck crash victims and survivors have repeatedly opposed efforts to lower the age to operate CMVs in interstate commerce. Additionally, the public has resoundingly rejected lowering the minimum age for interstate truck and bus drivers. According to a 2020 public opinion poll conducted by Engine's Caravan Survey, a large majority, 62 percent of respondents, oppose reducing the minimum driving age for interstate operations.[50]

The IIJA included a provision requiring the establishment of a pilot program to permit teen truckers to operate in interstate commerce.[51] If accepted research protocols are not followed by the Federal Motor Carrier Safety Administration (FMCSA), it could result in preventable deaths and injuries and will also jeopardize the legitimacy of the outcomes of the program. Additionally, the agency's recommendations and conclusions in the required report to Congress must be supported by sufficient evidence and data collected during the program.

Speed Limiters:

Advocates has consistently supported the use of speed limiting devices for CMVs. As detailed by the FMCSA, the safety benefits of controlling the speed of a CMV are incontrovertible. The agency noted, "crashes involving heavy vehicles traveling faster are more deadly than crashes involving heavy vehicles traveling at lower speeds."[52] Further, a 2012 study commissioned by FMCSA "showed strong positive benefits for speed-limited trucks."[53] Speed governing technology is used throughout the industry and is supported by drivers.[54] Already, speed limiting systems are required throughout world including in Canada, the United Kingdom and Australia.[55]

Data provided by FMCSA also demonstrates safety benefits of setting the speed at 60 miles-per-hour (MPH). The agency estimates that setting the device at 60 MPH has the potential to save

almost 500 lives and prevent nearly 11,000 injuries annually. By comparison setting the speed at 65 or 68 MPH will result in far less lives saved and injuries prevented. In fact, setting the speed at 60 MPH will result in over five times the number of lives saved and injuries prevented each year compared to 68 MPH.[56]

For FMCSA to fulfill its mission to reduce crashes, injuries, and fatalities involving large trucks and buses, the agency must not be prevented from promptly completing an overdue and necessary rulemaking to require the use of speed limiting technology on CMVs.

Underride Guards:

Technology is currently available that can prevent a passenger vehicle from traveling underneath the rear or side of a trailer and significantly increase the chances of survival. The NTSB has recommended rear, side, and front underride protection.[57] The IIHS conducted crash testing of side underride guards in 2017 that demonstrated the device's effectiveness.[58] IIHS conducted crashes at both 35 and 40 MPH.[59] At both speeds the side underride guard which was tested prevented the vehicle from traveling under the side of the trailer resulting in no passenger compartment intrusion of the test vehicle.[60] Moreover, the side underride guard tested by IIHS is currently available for purchase to the public.[61] Requiring side underride guards on trailers could save many lives and prevent numerous serious debilitating injuries over the long use life of a trailer. As such, U.S. DOT should require the installation of comprehensive underride protection (side and front) for the entire CMV.

In June 2022, NHTSA updated the rear underride guard standard, yet it remains insufficient.[62] The IIHS has created a TOUGHGUARD award for improved rear guard performance.[63] The standard issued by U.S. DOT in 2022 does not meet the standards of the IIHS crash testing despite nine of the largest trailer manufacturers having been given the award.[64] Advocates and other safety groups have filed a petition for reconsideration of the rule that is pending before NHTSA.

Protect Current Federal Truck Size and Weight Limits:

Federal weight and size limits are essential to protecting truck drivers, the traveling public, and our Nation's roads and bridges. According to the 2021 Infrastructure Report Card from the American Society of Civil Engineers, America's roads receive a grade of "D," and our bridges were given a "C."[65] Nearly 40 percent of our 615,000 bridges in the National Bridge Inventory are 50 years or older, and one out of 11 is structurally deficient.[66] Raising truck weight or size limits could also result in an increased prevalence and severity of crashes. Longer trucks come with operational difficulties such as requiring more time to pass, having larger blind zones, crossing into adjacent lanes, swinging into opposing lanes on curves and turns, and taking a longer distance to adequately brake.

ELDs:

Truck driver fatigue is a well-known and well-documented problem in the motor carrier industry. In fact, the NTSB repeatedly has cited fatigue as a major contributor to truck crashes.[67] Advocates sought the installation of electronic logging devices (ELDs) to record drivers' hours of service (HOS) to increase compliance and thereby reduce driver fatigue and fatigue related

crashes. ELDs were required in the Moving Ahead for Progress in the 21st Century (MAP-21) Act.[68] Unfortunately, some segments of the trucking industry continue to seek exemptions from the ELD requirement.[69] We urge Congress to reject all attempts to evade compliance with this lifesaving mandate.

Infrastructure Impacts:

The IIJA includes directives to the U.S. DOT to conduct research on the impacts of automated, connected and platooned vehicles on the infrastructure including wear on roadway pavements as well as a report to Congress on the existing and future impacts of AVs to transportation infrastructure, mobility, the environment, and safety. This information will be critical in understanding the complexity of operating AVs on roadways, identifying foreseeable issues and necessary mitigations, and determining future policies for this developmental technology. Advocates urges this Subcommittee to ensure this research is completed without further delay.

Experimental Autonomous Technology Remains Unproven and Lacks Public Support

While the benefits of ADAS are clear, the same is not so for several partial automation and fully autonomous technologies for both cars and trucks which are lacking independent supportive evidence or data.

The current testing and deployment of AVs in San Francisco is alarming. Several San Francisco transportation agencies submitted comments to the CPUC in May detailing numerous dangerous incidents involving AVs operating in the city.[70] These events include:

- Interfering with emergency response operations including 18 incidents documented by the San Francisco Fire Department in which AVs put firefighters and the public at risk.
- Making planned and unplanned stops in travel lanes that have interfered with transit service and blocked traffic.
- Intrusions into construction zones where City employees were working.
- Obstructions caused by AVs having to interpret and respond to human traffic control officers.
- Erratic driving.[71]

These treacherous incidents are also on the rise. The agencies indicate that during this year reported monthly incidents involving AVs have increased six-fold.[72] In fact, in June an AV blocked San Francisco police from responding to a shooting.[73] What San Francisco has been experiencing must not be replicated across the Nation by continuing to allow for the proliferation of AVs that do not comply with any federal safety regulations setting minimum performance standards for driverless systems. Again, while AVs and ACMVs have notable differences, many lessons can be learned from AV deployment in San Francisco so known problems are avoided in future applications.

Moreover, several fatal crashes involving cars equipped with automated driving systems (ADS) or varying levels of driving automation have been subject to investigation by the NTSB and NHTSA. These investigations have and will continue to identify safety deficiencies, determine contributing causes, and recommend government and industry actions to prevent future deadly

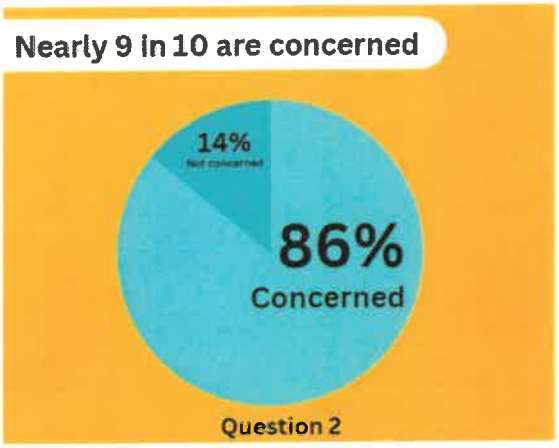
incidents. Advocates urges this Subcommittee to consider critical information from our Nation's preeminent crash investigators to inform any policies related to AVs.

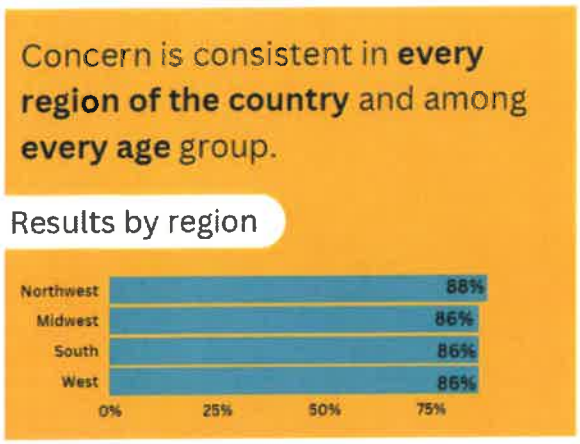
The Washington Post reported in June that according to NHTSA data, there have been 17 fatal incidents, five serious injuries and 736 crashes involving Tesla vehicles operating in Autopilot mode since 2019.[74] As of June 2022, NHTSA's Office of Defects Investigation (ODI) indicated that it had identified at least fourteen crashes in which a Tesla vehicle operating under its "Autopilot System" or Traffic Aware Cruise Control collided with vehicles at crash scenes where first responder vehicles lights and other control measures such as flares and cones were in place. The ODI has yet to conclude this investigation. This action must be a priority for NHTSA because of the serious safety implications associated with these troubling and recurring incidents. Findings from all these investigations should be publicly released and incorporated as applicable into any future legislation or regulation pertaining to AVs.

It is encouraging that NHTSA has taken several essential steps to address the substantial safety concerns associated with vehicles equipped with ADAS and ADS. Advocates supports NHTSA obtaining valuable data involving vehicles equipped with Level 2 ADAS and ADS through Standing General Order 2021-01 (SGO).[75] The agency indicates that it believes the frequency of crashes equipped with these systems will increase.[76] This unique information can help the agency identify common problems or systematic issues with certain vehicles and/or equipment.[77] According to data collected by the SGO, there have been approximately 344 crashes involving ADS and 1,049 with ADAS. These include 27 crashes resulting in a fatality.[78] While it is important that NHTSA continues to collect this data, Advocates supports enhancing the SGO as outlined by several Members of Congress in a February 28, 2023 letter to the agency.[79]

The IIHS also has performed invaluable research on the Level 2 ADAS marketed as a convenience feature intended for highway driving for passenger motor vehicles. They have determined that if a manufacturer does place partial automation convenience systems in a vehicle, it should have essential safeguards to help prevent misuse that can result in dangerous situations such as failure to pay attention to the driving task.[80] These include driver monitoring systems to help ensure driver engagement with alerts to the driver that rapidly escalate in urgency and timing. In addition, emergency interventions such as slowing or stopping the vehicle are needed when driver disengagement with the driving task is detected, and the driver fails to respond appropriately. Additional safety protocols prohibiting a driver from using the system while unbuckled or when crash avoidance systems are disabled are critical. Consumer Reports (CR) currently rates partially automated driving systems, but only if they have adequate driver monitoring systems.[81] IIHS has announced that it plans to issue ratings on the performance of the safeguards that partial automation employs to help drivers stay focused on the roads including escalating alerts and appropriate emergency procedures.[82]

Considering the current inadequate performance of partial automation and fully autonomous technologies, it is unsurprising that the public has significant concerns. In February 2023, Advocates commissioned a public opinion poll that found that 83 percent of respondents were concerned with sharing the road with driverless cars. This number increased to 86 percent of respondents regarding driverless trucks.[83] Yet, 64 percent of respondents indicated that their concerns would be addressed if the vehicles were required to meet minimum government standards.[84]





Ensuring the Safe Development of Autonomous Technology

Development and deployment of AVs and ACMVs must be undertaken without jeopardizing public safety. The following commonsense safeguards are necessary to ensure those in and around AVs and ACMVs are protected. This also will help bolster consumer confidence in the technology and guide development to ensure the promised societal benefits are attained.

Adoption of Basic AV Tenets Will Guarantee Safety and Public Acceptance

Advocates spearheaded the compilation of the "AV Tenets," a people-and-safety-first approach to AV development and deployment that identifies policy positions which should be a foundational part of any AV policy.[85] This comprehensive approach is based on expert analysis, real world experience, and public opinion and is supported by 65 stakeholders representing safety, consumer, public health, labor, bicyclists, pedestrians, disability rights, smart growth, and others. It has four main, commonsense categories including: 1) prioritizing safety of all road users; 2) guaranteeing accessibility and equity for all individuals including those with disabilities; 3) preserving consumer and worker rights; and, 4) ensuring local control and sustainable transportation. Many promises have been touted about AVs and ACMVs bringing reductions in motor vehicle crashes and resultant deaths and injuries, lowering traffic congestion and vehicle emissions, expanding mobility and accessibility, improving efficiency, and creating more equitable transportation options and opportunities. The AV Tenets will be necessary to help realize these goals as well as mitigate potential negative consequences. Among the numerous recommendations in the AV Tenets, requiring that AVs meet minimum standards, including for cybersecurity, and that operations are subject to adequate oversight, including a comprehensive database accessible by vehicle identification number (VIN) with basic safety information, will be critical to putting safety first with regards to this burgeoning technology.

Vigilant Oversight of ACMVs is Essential

The emergence of experimental ACMVs and their interactions with conventional motor vehicles, trucks and buses and all road users for the foreseeable future demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs, including those with ADS, be regulated by U.S. DOT with enforceable safety standards and subject to adequate oversight. The potential of an 80,000 pound truck equipped with unregulated and inadequately tested technology on public roads is a very real and dangerous scenario if these vehicles are only subject to voluntary guidelines. In addition, automated passenger carrying CMVs which have

the potential to carry as many as 53 passengers will need additional comprehensive federal rules specific to this mode of travel.

At a minimum, ACMVs must be subject to the following essential provisions:

- In the near term, rulemakings must be promulgated for elements of ACMVs that require performance standards including but not limited to the ADS, human machine interface, sensors, privacy, software and cybersecurity. ACMVs must also be subject to a "vision test" to guarantee they properly detect and respond to other vehicles, all people and objects in the operating environment. Also, a standard to ensure ACMVs do not go outside of their operational design domain (ODD) should be issued.
- Drivers operating an ACMV must have an additional endorsement or equivalent certification on their commercial driver's license (CDL) to ensure they have been properly trained to monitor and understand the ODD of the vehicle and, if need be, to operate an ACMV. This training must include a minimum number of hours of behind-the-wheel training.
- Each manufacturer of an ACMV must be required to submit a safety assessment report that details the safety performance of automated driving systems and automated vehicles. Manufacturers must be required to promptly report to NHTSA all crashes involving ACMVs causing fatalities, injuries and property damage.
- ACMVs that do not comply with Federal Motor Vehicle Safety Standards (FMVSS) must not be introduced into commerce nor be subject to large-scale exemptions from such.
- Any safety defect involving the ACMV must be remedied before the ACMV is permitted to return to operation. The potential for defects to infect an entire fleet of vehicles is heightened because of the connected nature of AV technology. Therefore, manufacturers must be required to promptly determine if a defect affects an entire fleet. Those defects which are fleet-wide must result in notice to all such owners and an immediate suspension of operation of the entire fleet until the defect is remedied.
- The U.S. DOT Secretary must establish a database for ACMVs that includes such information as the vehicle's identification number; manufacturer, make, and model; the level of automation of each automated driving system with which the vehicle is equipped; the ODD of each automated driving system; and, the FMVSS, if any, from which the vehicle has been exempted. Also, when ACMVs move beyond testing into deployment, they should be required to comply with the SGO.
- For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid CDL in the vehicle at all times. Drivers will need to be alert to oversee not only the standard operations of the truck but also the ADS. Therefore, the Secretary must issue a mandatory safety standard for driver engagement. In addition, critical safety regulations administered by FMCSA such as those that apply to driver HOS, licensing requirements, entry level training and medical qualifications must not be weakened.
- Motor carriers using ACMVs must be required to apply for additional operating authority.
- FMCSA must consider the additional measures that will be needed to ensure that ACMVs respond to state and local law enforcement authorities and requirements, and what measures must be taken to properly evaluate an ACMV during roadside inspections. In particular, the safety impacts on passenger vehicle traffic of several large ACMVs platooning on bridges, roads and highways must be assessed.

- NHTSA must be given imminent hazard authority to protect against potentially widespread catastrophic defects with ACMVs, and criminal penalties to ensure manufacturers do not willfully and knowingly put defective ACMVs into the marketplace.
- NHTSA and FMCSA must be given additional resources, funding, and personnel, in order to meet demands being placed on the agencies due to the advent of AV technology.

Without these necessary safety protections, commercial drivers and those sharing the road with them are at unacceptable risk. Allowing technology to be deployed without rigorous testing, vigilant oversight, and comprehensive safety standards is a direct and unacceptable threat to the motoring public which is exacerbated by the sheer size and weights of large CMVs.

ACMVs Will Impact our Nation's Infrastructure

The design of our roads -- from the asphalt, to the signage, to the lighting, to the speed limit -- is largely based on the history of human performance behind the wheel and the capability of the vehicles. The introduction of AVs and ACMVs stands to essentially require a re-write of many of these guidelines for road design and use in the future. However, in the near term, there will need to be an evaluation of how standards for design can be enhanced and possibly altered to safely accommodate both human and machine "drivers."

Every driver has experienced road signs or markings that have been damaged, intentionally altered or blocked by objects. This could lead to misinterpretation of roadway and highway cues and result in stopped or misdirected AVs and ACMVs that will present additional hazards. Both human and machine "drivers" would benefit from improved lane marking as well as establishing standards for pavement resurfacing to ensure that repair seams and color differences do not confuse AV systems. Establishing uniform standards for signage color, lighting, contrast, letter size, and other roadway features will likely benefit the performance of AVs and ACMVs and will also reap similar advantages for human drivers in the interim. Many of the current manuals' guidelines and recommendations are almost always open to engineering interpretation. With the advent of AVs and ACMVs, more emphasis must be placed on consistency, and consideration must be given to the effects variations can have on autonomous driving technology. While a human driver can see a unique situation and interpret those circumstances, an AV or ACMV may not be able to do the same. Research already has shown that minor distortion of a sign can cause havoc for AVs, causing stop signs to be interpreted as speed limit signs, a confusion which can have serious, and potentially fatal, results.[86] Clearly, new rules are required if ACMVs are allowed on our roadways on a widespread basis.

Roadway deterioration and delayed repair, which are common occurrences on existing infrastructure, will have a negative impact on AV and ACMV operation. Additionally, the lower variance of an AV's, including ACMVs, position within a lane could lead to accelerated wear in lanes, and condensed convoys of automated trucks, commonly known as platooning, could place further strain on roads and bridges. These concerns must be evaluated to consider operational constraints for AVs and ACMVs before further damage is inflicted upon our Nation's roads and bridges which are already weakened and in dire need of fortification and updating, as mentioned above. For example, the spacing between ACMVs in a platoon could have wide-ranging implications. If these large vehicles travel too closely together, their combined weight load could place severe stress on a bridge. In addition, lengthy platoons which consist of many ACMVs could be difficult to pass and affect merging and exiting from roadways.

Taking into consideration the long-term ramifications, the budgetary constraints, the impacts on safety, and the necessary coordination among a diverse group of stakeholders when it comes to planning and implementing infrastructure projects at any level, research on the impact of AVs on our roads is clearly needed. In addition, further research is required to examine the differing infrastructure upgrades that will be required for urban, suburban, and rural regions. More analysis and deliberation must be given to this complex issue before AVs, particularly ACMVs, can be deployed.

Dispelling Misleading Claims about AVs and ACMVs

Some proponents of ACMVs claim that they will relieve supply chain issues by addressing the so-called "driver shortage" within the trucking industry by eliminating the need for human drivers and allowing for the more efficient movement of goods through the constant operation of trucks. However, harsh and unsafe working conditions for truck drivers have created a retention crisis, not a driver shortage. In fact, the U.S. Department of Labor has determined that "the labor market for truck drivers works about as well as the labor markets for other blue-collar occupations" and "a deeper look [at the truck industry labor market] does not find evidence of a secular shortage."[87] In addition, states issued more than 50,000 new CDLs and permits each month on average in 2021, demonstrating that there are candidates to fill vacancies.[88]

The supply chain issues currently facing the Nation are complex and will not be solved by the introduction of ACMVs, which will not be ready for prime time in the near future. This technology still faces significant operational challenges such as responding to all participants in the transportation ecosystem including traffic control officers and vulnerable road users as well as differing weather conditions. Moreover, the constant operation of trucks raises serious questions as to the ability to properly service vehicles continuously in use. Even without this potential new regime, 23 percent of CMVs were placed out of service in 2022 for maintenance issues.[89] In addition, many of the issues with the physical condition of the truck that would be identified by a human driver during a pre- or post-trip inspection as well problems during a trip such as the shift of a load or other emergencies noted by a human driver may not be identified or corrected under this type of use.

Furthermore, adding an autonomous driving system into passenger carrying vehicles such as buses does not negate the need for a driver. Human interaction remains essential. Beyond the operational task, these professional drivers have a myriad of other responsibilities including assisting individuals with disabilities on and off the bus safely, managing emergency situations and the delivery of medical care, and coordinating safe transportation for all people.

Supporters of ACMVs also contend that placing autonomous systems in a CMV is not as daunting a task as with passenger vehicles because CMVs operate largely on highways, an easier environment for the technology to master. Operating a CMV on a congested highway at a high rate of speed is a complicated task in a dangerous environment as evidenced by the fact that a quarter of fatal crashes involving CMVs occur on highways.[90] Additionally, as CMVs do not operate exclusively on highways, safe operations on the more complex environment of the first and last mile must be achieved.

Lastly, supporters of ACMVs also claim that the technology will eliminate most crashes citing a statistic accredited to NHTSA which indicates that 94 percent of crashes are due to human error

or the fault of the driver.[91] Their use of this statistic is misleading. The agency has noted in the same report which includes this data point that "[t]he critical reason is the immediate reason for the critical pre-crash event and is often the last failure in the causal chain of events leading up to the crash. Although the critical reason is an important part of the description of events leading up to the crash, *it is not intended to be interpreted as the cause of the crash nor as the assignment of the fault to the driver, vehicle, or environment*" (emphasis added).[92] This statistic was rebuked by NTSB Chair Jennifer Homendy who stated, " At the same time it relieves everybody else of responsibility they have for improving safety, including DOT… You can't simultaneously say we're focused on a 'safe system' approach - making sure everybody who shares responsibility for road safety is taking action to eliminate fatalities and serious injuries…- and have a 94% number out there, which is not accurate."[93] There are often multiple causes of a crash and replacing human error in the operation of a vehicle, when it does occur, with unproven, unreliable and unsafe technology is not an acceptable solution to reducing the death toll on our Nation's roads.

Some proponents of advancing the deployment of AVs contend the U.S. is at risk of falling behind other nations unless it takes steps to merely promote and identify a regulatory "framework" rather than regulate ACMVs. However, this fear-inducing claim is inaccurate. In fact, other countries are taking a more calculated, careful, and cautious approach to the development of AVs.[94] For example:

- China continues to require permits or restricts operations of AVs on its roads to only those areas approved by the authorities.[95]
- Germany continues to require permits, approvals, and limits areas of operation for AVs.[96]
- In Japan, the introduction of Level 4 vehicles will be controlled and limited to specific, lightly populated areas.[97]
- Even the latest United Nations Economic Commission for Europe (UNECE) regulations will limit operations to restrict risks and oversee approval through testing and other requirements.[98]

According to the most recent KPMG analysis, the U.S. ranks fourth in the world for AV readiness, while China stands at number twenty. In short, the U.S. is not lagging other countries in allowing AVs to go to market, but we are behind in establishing comprehensive regulations to ensure public safety will not be jeopardized or diminished. As Dr. Missy Cummings, Professor, George Mason University, College of Engineering and Computing, and a well-respected expert on autonomy and robotics, stated during a briefing convened by Advocates in March 2023:

> I was a military officer; I spent three years on the Defense Innovation Board advising the Secretary of Defense. China is a real threat, a real problem that we have to address from a national security perspective. What it [China] is not is a threat to our commercialization of autonomous vehicles. And any insistence that it actually takes away from the emphasis that we need to place on national security. So, what I would really like everyone to do is back off the China fear mongering. China is not beating us to the commercialization of autonomous vehicles…[99]

In sum, no country is selling fully automated vehicles to the public and by many accounts, none will be for a significant time in the future.[100] The U.S. is not behind other countries in allowing

them to go to market, but we are behind in establishing and enforcing comprehensive safeguards to ensure that this process happens without jeopardizing or diminishing public safety.

The fact remains that there is scant independently verifiable data that ACMVs can operate safely on any road or help to address any of the Nation's longstanding supply chain issues. Furthermore, we already know from real world experience the limitations, mistakes, defects, failings, and faults of self-driving technologies currently in cars. It would be irresponsible and an abrogation of safety to allow self-driving trucks, weighing 80,000 pounds and traveling at high speeds to operate on streets and highways with cars, motorcycles, and other road users without first meeting basic minimum performance requirements established with federal government standards.

Conclusion

Since our founding in 1989, Advocates has supported and worked to advance in federal legislation and government rulemaking the safe and equitable development and requirement for proven technologies to reduce crashes and save lives on our Nation's roads. Consequential and worthwhile societal benefits and improvements to public safety will require implementing and enforcing mandatory comprehensive safeguards to ensure AV and ACMV technology is developed and deployed without putting the public at risk. To address the current motor vehicle crash crisis, public officials should work to require the installation of available, advanced, and proven safety technologies in all new vehicles and improving our compromised infrastructure. Concurrently, the approach of the AV Tenets should be utilized to ensure the safety of all road users and address the known and foreseeable challenges and issues of AV operations. Advancing safety and moving forward with innovation can and must be compatible goals, and not trade-offs. The public deserves that its safety on our public roadways be the number one priority and that known safety solutions be implemented immediately.

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1 IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).

2 Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian Tempe, Arizona, March 18, 2018, Accident Report NTSB/HAR-19/03 (Nov. 19, 2019); NHTSA Office of Defects Investigation Preliminary Evaluation PE21-020.

3 CPUC, CPUC Approves Permits for Cruise and Waymo To Charge Fares for Passenger Service in San Francisco (Aug. 10, 2023), available at: https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-permits-for-cruise-and-waymo-to-charge-fares-for-passenger-service-in-sf-2023.

4 Dana Hull, San Francisco orders Cruise to cut robotaxi fleet by half and take 'corrective actions' after collision with firetruck, Fortune (Aug. 19, 2023).

5 Evan Symon, San Francisco Petitioning CPUC for Reconsideration Following Robotaxi Vote, California Globe (Aug. 15, 2023).

6 Ricardo Cano, San Francisco asks California regulators to halt approval of expanded robotaxi service, San Fracisco Chronicle (Aug, 16, 2023).

7 Russ Mitchell, San Francisco's fire chief is fed up with robotaxis that mess with her firetrucks. And L.A. is next, LA. Times (Jun. 22, 2023).

8 San Francisco Comments on the Draft Resolution Approving Authorization for Cruise LLC's Expanded Service in Autonomous Vehicle Passenger Service Phase I Driverless Deployment Program, Order Instituting Rulemaking on Regulations Relating to Passenger Carriers, Ridesharing, And New On-Line-Enabled Transportation Services, R.12-12-011 (May, 31, 2023).

9 Overview of Motor Vehicle Traffic Crashes in 2021, NHTSA, Apr. 2023, DOT HS 813 435. (Overview 2021).

10 Overview 2021.

11 Traffic Safety Facts 2020: A Compilation of Motor Vehicle Crash Data, NHTSA, Oct. 2022, DOT HS 813 375, (Annual Report 2020); and Overview 2021; [comparing 2012 to 2021].

[12] Traffic Safety Facts: Crash Stats, Early Estimate of Motor Vehicle Traffic Fatalities in 2022, NHTSA, Apr. 2023, DOT HS 813 428. (Early Estimates 2022).
[13] Overview 2021, Annual Report 2020.
[14] Overview of Motor Vehicle Traffic Crashes in 2021, NHTSA, Apr. 2023, DOT HS 813 435.
[15] *Id.* and Traffic Safety Facts 2020: A Compilations of Motor Vehicle Crash Data, NHTSA, Oct. 2022, DOT HS 813 375. Note, the 71 percent figure represents the overall change in the number of fatalities in large truck involved crashes from 2009 to 2021. However, between 2015 and 2016 there was a change in data collection at U.S. DOT that could affect this calculation. From 2009 to 2015 the number of fatalities in truck-involved crashes increased by 21 percent, and between 2016 to 2019, it increased by 7.6 percent, and between 2020 and 2021, it increased by 17 percent.
[16] Traffic Safety Facts: Crash Stats; Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories Through June 2022, NHTSA, Dec. 2022, DOT HS 813 405.
[17] Insurance Institute for Highway Safety (IIHS), Large Trucks. See: https://www.iihs.org/topics/large-trucks.
[18] 2022 Pocket Guide to Large Truck and Bus Statistics, FMCSA, Dec. 2022, RRA-22-007.
[19] CPI Inflation Calculator, BLS, Jan. 2020 to Jan. 2023, available at https://www.bls.gov/data/inflation_calculator.htm.
[20] The Economic and Societal Impact of Motor Vehicle Crashes, 2019, NHTSA, Dec. 2022, DOT HS 813 403. (Economic and Societal Impact 2019).
[21] Economic and Societal Impact 2019.
[22] Pub. L. 102-240 (Dec. 18, 1991).
[23] Traffic Safety Facts 2018, A Compilation of Motor Vehicle Crash Data, DOT HS 812 981, NHTSA (Nov. 2020).
[24] Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Pub. L. 106-414 (Nov. 1, 2000).
[25] Anton's Law, Pub. L. 107-318 (Dec. 4, 2002).
[26] Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59 (Aug. 10, 2005).
[27] *Id.*
[28] *Id.*
[29] Moving Ahead for Progress in the 21st Century (MAP-21) Act, Pub. L. 112-141 (Jan. 3, 2012).
[30] Cameron Gulbransen Kids Transportation Safety Act of 2007, Pub. L. 110-189 (Feb. 28, 2008).
[31] Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021).
[32] *Id.*
[33] *Id.*
[34] *Id.*
[35] Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012, DOT HS 812 069 (NHTSA, 2015); See also, NHTSA AV Policy, Executive Summary, p. 5 endnote 1.
[36] IIHS, Real world benefits of crash avoidance technologies, available at: https://www.iihs.org/media/259e5bbd-f859-42a7-bd54-3888f7a2d3ef/e9boUQ/Topics/ADVANCED%20DRIVER%20ASSISTANCE/IIHS-real-world-CA-benefits.pdf.
[37] IIHS, Study shows front crash prevention works for large trucks too, available at: https://www.iihs.org/news/detail/study-shows-front-crash-prevention-works-for-large-trucks-too.
[38] NTSB Most Wanted List Archives, https://ntsb.gov/safety/mwl/Pages/mwl_archive.aspx.
[39] Note some ADAS may not be appropriate for certain CMV operations.
[40] Robert Ferris, Cars on American roads keep getting older, CNBC (Sep. 28, 2021).
[41] Pub. L. 117-58 (Nov. 15, 2021).
[42] *Id.*
[43] 88 FR 43174, July 6, 2023.
[44] Pub. L. 117-58.
[45] 88 FR 38632 (June 13, 2023).
[46] Insurance Institute for Highway Safety, Comments to the docket, FMCSA-2000-8410-0515; citing Christie, R. and Fabre, J. 1999. Potential for fast-tracking heavy vehicle drivers. Melbourne, Australia: National Road Transport Commission; Blower, D. 1996. The accident experience of younger truck drivers. Ann Arbor, MI: University of Michigan Transportation Research Institute; Frith, W.J. 1994. A case-control study of heavy vehicle drivers' working time and safety. *Proceedings of the 17th Australian Road Research Board Conference*, 17-30. Queensland, Australia: Australian Road Research Board; Stein, H.S. and Jones, I.S. (1988).

[47] Campbell, K. L., Fatal Accident Involvement Rates By Driver Age For Large Trucks, Accid. Anal. & Prev. Vol 23, No. 4, pp. 287-295 (1991).
[48] Campbell, K. L., *Fatal Accident Involvement Rates By Driver Age For Large Trucks*, Accid. Anal. & Prev. Vol 23, No. 4, pp. 287-295 (1991).
[49] Arian, M, et al., Maturation of the adolescent brain, Neuropsychiatric Disease and Treatment (Apr. 3, 2013).
[50] Engine's Caravan Survey Public Opinion Poll (2020).
[51] Pub. L. 117-58, § 23022 (2021).
[52] 81 FR 61944 (Sep. 9, 2016).
[53] *Id* at 61950.
[54] Preliminary Regulatory Impact Analysis (PRIA) and Initial Regulatory Flexibility Analysis, FMVSS No. 140, Speed Limiting Devices, p. 28 (NHTSA, Aug. 2016); Insurance Institute for Highway Safety (IIHS), Speed limiters in trucks would serve 2 purposes, Status Report, Vol. 45, No. 8 (Aug. 21, 2010).
[55] PRIA.
[56] See: 81 FR 61942 (Sep. 7, 2016).
[57] NTSB Safety Recommendations H-10-12, H-10-13, H-14-03, H-14-02, H-14-04.
[58] IIHS, Side guard on semitrailer prevents underride in 40 mph test (Aug. 29, 2017).
[59] *Id.*
[60] *Id.*
[61] *Id.*
[62] 87 FR 42339 (Jul. 15, 2022).
[63] IIHS, Truck Underride Guard Ratings, available at: https://www.iihs.org/topics/large-trucks/truck-underride.
[64] *Id.*
[65] 2021 Infrastructure Report Card – Bridges, American Society of Civil Engineers (ASCE); 2021 Infrastructure Report Card – Roads, ASCE.
[66] 2021 Infrastructure Report Card – Bridges (ASCE).
[67] National Transportation Safety Board, 2016 Most Wanted List, accessed at ntsb.gov/safety/mwl/Documents/MWL2016_Brochure_web.pdf.
[68] Pub. L. 112-141 (2012).
[69] H.R. 4820, Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2024, 1st Sess., 118th Cong. (2023).
[70] San Francisco Comments to the Draft Resolution Approving Authorization for Waymo Autonomous Vehicle Passenger Service Phase I Driverless Deployment Program, R.12-12-011 (May 31, 2023). Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://sfstandard.com/wp-content/uploads/2023/06/SF-Comments-on-Waymo.pdf.
[71] *Id.* at pgs. 9-11.
[72] *Id.* at p. 3.
[73] Self-driving car blocks police responding to San Francisco shooting, KTVU (Jun. 11, 2023). Available at: https://www.ktvu.com/news/self-driving-car-blocks-police-responding-to-san-francisco-shooting
[74] Faiz Siddiqui and Jeremy B. Merrill, *17 fatalities, 736 crashes: The shocking toll of Tesla's Autopilot*, Wash. Post (Jun. 10, 2023).
[75] 86 FR 54287, 54288; 87 FR 4099 (Jan. 26, 2022).
[76] *Id.*
[77] *Id.*
[78] Data includes crashes from July 2021-July 2023.
[79] Letter from Reps. Schakowsky, Castor and Trahan to NHTSA Acting Administrator Ann Carlson (Feb. 28, 2023).
[80] IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).
[81] Mike Monticello, Ford's BlueCruise Ousts GM's Super Cruise as CR's Top-Rated Active Driving Assistance System , Consumer Reports (Jan. 25, 2023).
[82] IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).
[83] ENGINE'S CARAVAN SURVEY, Public Concern About Driverless Cars and Trucks (Feb. 2023).
[84] *Id.*
[85] A summary of the AV Tenets is attached as an Appendix.
[86] Evtimov, Ivan & Eykholt, Kevin & Fernandes, Earlence & Kohno, Tadayoshi & Li, Bo & Prakash, Atul & Rahmati, Amir & Song, Dawn. (2017). Robust Physical-World Attacks on Machine Learning Models.
[87] United States Department of Labor, Bureau of Labor Statistics, Is the U.S. labor market for truck drivers broken? (Mar. 2019).

[88] FACT SHEET: The Biden-Harris Administration Trucking Action Plan to Strengthen America's Trucking Workforce (Dec. 16, 2021).

[89] See: FMCSA Enforcement Programs.

[90] U.S. DOT, Large Truck and Bus Crash Facts 2019, Table 5, Report FMCSA-RRA-20-055 (Oct. 2021).

[91] Singh, S. (2015, February). Critical reasons for crashes investigated in the National Motor Vehicle Crash Causation Survey. (Traffic Safety Facts Crash•Stats. Report No. DOT HS 812 115). Washington, DC: National Highway Traffic Safety Administration.

[92] *Id.*

[93] Hope Yen and Tom Krisher, NTSB chief to fed agency: Stop using misleading statistics, Associated Press (Jan. 18, 2022).

[94] Autonomous vehicles: cross jurisdictional regulatory perspectives update, Oct. 7, 2022.

[95] China drafts rules on use of self-driving vehicles for public transport; Aug. 8, 2022, Reuters; and Baidue bags China's first fully driverless robotaxi licenses, Aug. 7, Reuters. Real driverless cars are now legal in Shenzhen, China's tech hub, Jul. 25, 2022, TechCrunch+.

[96] Germany completes legal framework for autonomous driving | Federal Cabinet approves new ordinance, Apr. 2022, Malterer, M.

[97] Japan to open roads to autonomous vehicles in 2023, Nov. 28, 2022, Wessling, B., The RobotReport.

[98] New rules to improve road safety and enable fully driverless vehicles in the EU, Jul. 6, 2022, UNECE.

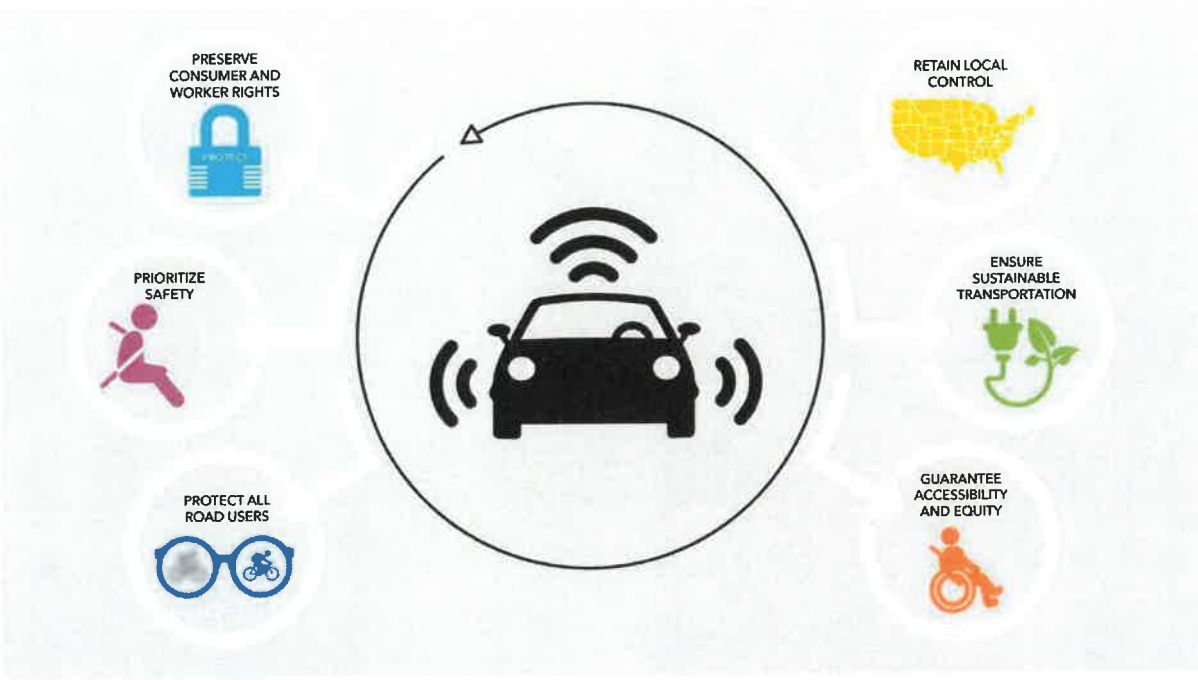
[99] Advocates for Highway and Auto Safety, Virtual Capitol Hill Briefing: Expert Panel on Autonomous Vehicle Safety (Mar. 7, 2023). See: https://saferoads.org/briefing-expert-panel-on-autonomous-vehicle-av-safety-3-7-23-public/.

[100] Lawrence Ulrich, Driverless Still a Long Way From Humanless, N.Y. Times (Jun. 20, 2019); Level 5 possible but "way in the future", says VW-Ford AV boss, Motoring (Jun. 29, 2019).

Appendix

Autonomous Vehicle (AV) Tenets[1]

November 30, 2020



Prioritizing Safety of All Road Users

Safety Rulemakings: All levels of automated vehicles[2] must be subject to comprehensive and strong federal standards ensuring they are safe and save lives. While the U.S. Department of Transportation (DOT) has the authority to issue motor vehicle safety standards for all levels of automated vehicles, for the last four years, it has abrogated this responsibility by focusing its efforts on inadequate voluntary initiatives. When Congress considers legislation on AVs, it is imperative that the protection of all road users is the guiding principle and that legislation requires the DOT to commence rulemakings on safety standards and issue final rules by a prompt date certain with a reasonable compliance date. The rulemakings must address known and foreseeable safety issues, many of which have been identified by the National Transportation Safety Board (NTSB) and other research institutions, including:

- ***Revising Federal Motor Vehicle Safety Standards*:** Any actions by the National Highway Traffic Safety Administration (NHTSA, Agency) to revise or repeal existing Federal Motor Vehicle Safety Standards (FMVSS) in order to facilitate the introduction of AVs must be preceded by and conducted in a public rulemaking process and cannot be undertaken by internal Agency actions. Any revision must meet the safety need provided by current standards.
- ***Collision Avoidance Systems:*** Certain advanced safety technologies, which may be foundational technologies for AVs, already have proven to be effective at preventing and mitigating crashes

[1] These tenets are limited to vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less unless otherwise noted; however, it is imperative that automated delivery vehicles (including those used on sidewalks and other non-roadways) and commercial motor vehicles be subject to comprehensive regulations, including rules regarding the presence of a licensed, qualified driver behind the wheel.

[2] Partially automated vehicles (SAE International Level 2) and conditional / highly automated vehicles (SAE International Levels 3, 4, 5).

across all on-road modes of transportation and must be standard equipment with federal minimum performance requirements. These include automatic emergency braking with pedestrian and cyclist detection, lane departure warning, and blind spot warning, among others. A lack of performance standards has contributed to instances of dangerous malfunctions of this technology, highlighting the need for rulemakings for collision avoidance systems and other fundamental AV technologies. As collision avoidance technology continues to improve and evolve, it should also be required to detect and prevent collisions with all vulnerable road users and objects in the operating environment.

- ***"Vision Test" for AVs:*** Driverless cars must be subject to a "vision test" to guarantee an AV will operate on all roads and in all weather conditions and properly detect and respond to other vehicles, all people and objects in the operating environment including but not limited to Black and Brown people, pedestrians, bicyclists, wheelchair users and people with assistive technology, children and strollers, motorcycles, roadway infrastructure, construction zones and roadside personnel, and interactions with law enforcement and first responders. Any algorithm that will inform the technology must be free of bias. Risk assessments for AVs must ensure adequate training data which is representative of all users of the transportation system. Manufacturers and developers must be required to meet basic principles in the development and use of algorithms including: the use of algorithms should be transparent to the end users; algorithmic decision-making should be testable for errors and bias while still preserving intellectual property rights; algorithms should be designed with fairness and accuracy in mind; the data set used for algorithmic decision-making should avoid the use of proxies; and, algorithmic decision-making processes that could have significant consumer consequences should be explainable. The DOT must review algorithms and risk assessment procedures for potential issues, and any identified problems must be then corrected by the developer or manufacturer and verified by the DOT. Coordination and oversight should be led by the Office of the NHTSA Civil Rights Director in partnership with the Office of the Assistant Secretary for Research and Technology, NHTSA Office of Vehicle Safety Research, and NHTSA Chief Counsel's office. The Office of the NHTSA Civil Rights Director should be given adequate resources, expertise and authority to accomplish this role.
- ***Human-Machine Interface (HMI) for Driver Engagement:*** Research demonstrates that even for a driver who is alert and performing the dynamic driving task, a delay in reaction time occurs between observing a safety problem, reacting and taking needed action. For a driver who is disengaged from the driving task during autonomous operation of a vehicle (i.e., sleeping, texting, watching a movie), that delay will be longer because the driver must first be alerted to re-engage, understand and process the situation, and then take control of the vehicle before taking appropriate action. Therefore, an AV must provide adequate alerts to capture the attention of the human driver with sufficient time to respond and assume the dynamic driving task for any level of vehicle automation that may require human intervention. This mechanism must be accessible to all occupants, including people with disabilities and vulnerable populations.
- ***Cybersecurity Standard:*** Vehicles must be subject to cybersecurity requirements to prevent hacking and to ensure mitigation and remediation of cybersecurity events. The Federal Aviation Administration (FAA) has a process for the certification and oversight of all U.S. commercial airplanes, including avionics cybersecurity, although improvement is needed according to a recent Government Accountability Office (GAO) study.[3] The DOT should be directed, in cooperation with the National Institute of Standards and Technology (NIST), to develop a cybersecurity standard for automated driving systems. The DOT should then require the cybersecurity standard be applied to all new vehicles. The DOT must be engaged in all relevant discussions on artificial intelligence.

[3] United States Government Accountability Office, Aviation Cybersecurity, FAA Should Fully Implement Key Practices to Strengthen Its Oversight of Avionics Risks, GAO-21-86 (Oct. 2020).

- ***Electronics and Software Safety Standard:*** Vehicles must be subject to minimum performance requirements for the vehicle electronics and software that power and operate vehicle safety and driving automation systems individually and as interdependent components.
- ***Operational Design Domain (ODD):*** The NHTSA must issue federal standards to ensure safeguards for driving automation systems to limit their operation to the ODD in which they are capable of functioning safely. An ODD includes elements such as: the type of roadway, geographical area, speed range, vehicle operating status, and environmental and temporal conditions in which the vehicle is capable of operating safely; any roadway or infrastructure asset required for the operation of the vehicle, such as roadside equipment, pavement markings, signage, and traffic signals; and, the means by which the vehicle will respond if the defined ODD changes or any circumstance which causes vehicle to operate outside of its defined ODD. The rule shall also: specify requirements for how the vehicle will safely transition to a minimal risk condition as a result of a malfunction or when operating outside of the ODD, including the necessity for human intervention that is accessible to all occupants including people with disabilities and vulnerable populations; and, the ability of the vehicle to comply with local laws as part of whether the vehicle is operating inside the ODD.
- ***Functional Safety Standard:*** Requires a manufacturer to ensure the design, development, verification and validation of safety-related electronics or software demonstrates to NHTSA that an AV will perform reliably and safely under the conditions the vehicle is designed to encounter. Additionally, NHTSA must validate that the manufacturer's certifications of functional safety are accurate and reliable by conducting their own testing as needed.
- ***Safe Fallback:*** Every driving automation system must be able to detect a malfunction, a degraded state, or operation outside of ODD and safely transition to a condition which reduces the risk of a crash or physical injury. In the event of a failure, it is essential that the occupants of a driverless car have the ability to assume manual control to complete or command a safe transition to reach a safe location and safely exit the vehicle. This mechanism must be accessible to all occupants, including people with disabilities and vulnerable populations. Commercial vehicles, including those used for public transportation or freight, present distinct challenges, such as the need to identify qualifications necessary to operate, that will need to be addressed separately.
- ***Crash Procedures Standard:*** Requires manufacturers to have procedures in place, including proper shutdown protocols, for when an AV is involved in a crash to ensure the safety of all occupants of the AV, other road users and emergency responders.
- ***Standard for Over-the-Air (OTA) Updates:*** Requires consumers be given timely and appropriate information on the details of the OTA update and ensures any needed training or tutorials are provided. Limits the circumstances in which manufacturers can update a vehicle OTA and provides requirements for OTA updates that necessitate a recall or an additional demonstration of safety. OTA updates that enhance the safety of a vehicle should not be optional or require the consumer to incur any additional expense. During the update process cybersecurity must be maintained. In developing the OTA standard, NHTSA should develop rigorous testing around the most effective way to push out OTA updates to owners and operators of vehicles. Updates must be accessible for all users, including people with disabilities. In addition, information on OTA updates should be available in multiple languages, similar to compliance with Section 508 of the Rehabilitation Act of 1973 (Pub. L. 93-112), and via video with closed captioning as appropriate, as well as other means of communication to promote access. In a commercial setting, it will be especially critical for there to be clear protocols for how and when OTA updates are carried out.

Safety and Performance Data: With the increasing number of vehicles with different automated technologies being tested and some being sold to the public, standardized data elements, recording, and access to safety event data are necessary for the proper oversight and analysis of the performance of the driving automation systems. Vehicles on the road today are already producing enormous amounts of data,

and the amount and type of data will only increase as driving automation evolves. There are many stakeholders who need that data for numerous and varied reasons, most importantly safety. The DOT must issue a FMVSS requiring all vehicles to be equipped with technology that captures all necessary data to understand and evaluate the safety performance of AVs on the road. Moreover, following best practices, data on disengagements and near-misses would help to identify flaws in the technology and may allow cities and states to proactively invest in infrastructure improvements or update the design of dangerous intersections and corridors to ensure safety for all street users. Real-time data on vehicle speeds, travel times, and volumes enables states, cities, and communities to manage congestion and speed, uncover patterns of excessive speeds, evaluate the success of street design projects, and ultimately improve productivity and quality of life. It could also facilitate emergency response by summoning and providing important information to emergency personnel, assist in the safe extraction of occupants, and provide a way for first responders to safely disable and secure the vehicle. Safety and performance data should be made available to relevant stakeholders such as state and local governments, federal agencies, operators or dispatchers of the vehicle itself, independent research bodies, law enforcement, first responders, insurers, and the public, with appropriate privacy protections.

Manufacturer Submissions to NHTSA: Any submission to NHTSA by AV manufacturers or developers must be mandatory, publicly available and include thorough and adequate data and documentation. Additionally, NHTSA must be directed to review and evaluate all submissions to assess whether an approach to automated driving system (ADS) development and testing includes appropriate safeguards for operation on public roads. Moreover, submissions should be substantive and include, but not be limited to the following issues: ADS control capabilities; ODD; other limitations and constraints; methods and timing of driver engagement (if applicable); data definitions; recording; and, accessibility. Miles accumulated by simulation, as opposed to on-road testing, cannot substitute for on-road testing or serve as the sole basis for the data included in the submission. (See section below on Proper Oversight of Testing.) If NHTSA finds information indicating further operation of these vehicles on public streets poses a danger, the Agency must be able to intervene and enforce the law[4] effectively, which will require not just the greater use of its existing authority but also new, stronger enforcement authorities that should be enacted by Congress (See section below on Additional Resources and Enforcement Authorities for NHTSA). If the Agency determines that a submission is deficient, manufacturers must be required to submit any additional information requested. The legislation should clarify that the Agency has civil and criminal penalty authority for false, fictitious or fraudulent submissions under 18 United States Code (USC) 1001. This submission process cannot be a substitute for NHTSA promptly issuing minimum performance standards through a public rulemaking process.

Proper Oversight of Testing: AV testing is already underway in many states and localities. Fundamental and commonsense safeguards must be instituted for testing on public roads including the establishment of independent institutional review boards (IRBs) to certify the safety of the protocols and procedures for testing of AVs on public roads. The IRB requirements established by the Department of Health and Human Services (HHS) in 45 Code of Federal Regulations (CFR) 46 should serve as a basis for the requirements for IRBs overseeing AV road testing and be modified as needed for this particular use. Test vehicles should be prohibited from providing a service for compensation. In Section 24404 of the Fixing America's Surface Transportation Act (FAST) Act (Pub. L. 114-94), Congress excluded test vehicles from having to comply with federal standards as long as those vehicles are not sold to the public.

[4] Motor Vehicle Safety Act, Pub. L. 89-563 (1966).

NHTSA actions required:

- Develop empirical data reporting standards and metrics for such data;
- Mandate developer reporting of the metrics to the public to enable comparison of AV safety performance among developers;
- Require manufacturers to provide data on the safety and performance of test vehicles and systems and to report safety-critical events including crashes and incidents that occur during testing that result in death, injuries or property damage;
- Verify developer compliance with all applicable laws;
- Make safety-critical event information publicly available with the rebuttable presumption in favor of disclosure, unless it is deemed proprietary or confidential in accordance with federal law;
- Determine which safety-critical events must result in the suspension of testing until a thorough review is completed and additional safeguards are implemented and verified by the Agency, as necessary; and,
- Prior to the introduction of the AV into commerce, review and analyze testing for oversight and research purposes, including but not limited to rulemaking.

Additional Resources and Enforcement Authorities for NHTSA: Ensuring NHTSA has adequate resources, funds, staff, and enforcement authority is essential for the Agency to successfully carry out its statutory mission and address the multiple challenges presented by the testing and deployment of self-driving technologies. The Agency also should be given additional enforcement powers including imminent hazard authority, and enhanced authority to pursue criminal penalties and levy larger civil penalties to ensure industry accountability and thwart misconduct.[5]

Guaranteeing Accessibility for All

Access for Individuals with Disabilities and Older Adults: Nearly one in five people in the U.S. has a disability (more than 57 million), and 16 percent of the U.S. population is over the age of 65. Yet, significant barriers to accessible, affordable and reliable transportation remain across all modes, and many people with disabilities are unable to obtain a driver's license and cannot afford to purchase an accessible vehicle. Autonomous driving technology has the potential to increase access and mobility for older adults and individuals with disabilities, including those with sensory, cognitive, and physical disabilities, wheelchair users, and people with neurological conditions, who have varying needs as well as traditionally underserved communities. This goal can be realized by Congressional directive ensuring access for everyone, including accessible HMI, and ramps and securement for wheelchair users. Discrimination on the basis of disability in licensing for SAE International level 4 and 5 AVs must also be prohibited. In addition, the diverse needs of all members of the disability community and older adults must be accommodated for systems that require human engagement as well as when developing a safe fallback.

Access for Underbanked Populations: Access to on-demand transport services is often predicated on the ability to make digital payments. Twenty-five percent of U.S. households are unbanked or underbanked, with higher incidence in working-age disabled households, lower-income households, less-educated households, younger households, Black and Hispanic households, and households with volatile income. AV-based transport services must consider a variety of ways in which payment for service can be made in order to ensure that this technology supports equitable access and the inclusion of all.

[5] If NHTSA is not to have authority over the commercial operation of an AV, these same oversight powers must be conveyed to the respective modal agency responsible for overseeing the deployment of commercial AVs.

Equity: Transportation is an imperative part of life. It is the connector for people's work, medical care, worship, recreation, essentials for life and all other tasks. As new modes of transportation continue to grow and evolve, investment and development must include a process where all people can safely participate.

Accessibility, Passenger Safety, and Transportation Services: The safety of passengers is not a monolith, and the measurement and descriptions of safety differ for all people in particular for those who are part of marginalized communities. The use of public transportation safely is currently partially in control of the operators of the modes and vehicles. Human interaction remains essential even when there is an AV and no operators. There must be clear plans that coordinate the safe transportation for all people including the need for delivery of medical care as well as laws that embrace social equity to protect those who are marginalized (Black and Brown people, Indigenous people, lesbian, gay, bisexual, transgender, queer, + (LGBTQ+) people, people with disabilities, women, older adults, and all other groups) in the implementation of these transportation services.

Preserving Consumer and Worker Rights

Consumer Information: Consumer information regarding AVs should be available at the point of sale, in the owner's manual, including publicly accessible electronic owner's manuals, and in any OTA updates. The vehicle identification number (VIN) should be updated to reflect whether certain features were built into the vehicle, either as standard or optional equipment. Additionally, similar to the user-friendly safercar.gov website, NHTSA must establish a website accessible by VIN with basic safety information about the AV level, safety exemptions, and limitations and capabilities of the AV driving system including those resulting from OTA updates. The U.S. New Car Assessment Program (NCAP) was the first government program to provide the public with comprehensive auto safety ratings, including crash test results. It is vital that Congress require NHTSA to act upon consumer and stakeholder recommendations to modernize U.S. NCAP (See Claybrook/Advocates for Highway and Auto Safety paper) and include ratings on how vehicles perform in crashes with motorcyclists, pedestrians and bicyclists. This enhancement of NCAP will be especially crucial as AVs are introduced into the marketplace. Consumer information should be available in multiple languages, similar to compliance with Section 508 of the Rehabilitation Act of 1973 (Pub. L. 93-112), and via video with closed captioning as appropriate, as well as other means of communication to promote access.

Privacy: Passenger vehicles have the potential to collect significant amounts of data that could interfere with personal privacy rights. Therefore, all manufacturers of passenger motor vehicles, including AVs, should be required to comply with robust data privacy safeguards and policies. Any personally identifiable information (PII) should only be collected or shared for purposes of delivering the services a consumer has requested or affirmatively opted-in to, with appropriately tailored exceptions for essential public purposes, safety, data security, compliance with regulatory requirements, and analytics/performance monitoring, among other purposes. Companies should be required to be transparent with consumers and workers operating a vehicle about the collection and sharing of information, protect information associated with the vehicle and the vehicle itself from data breaches, obtain consumers' express permission to sell or disclose their PII to third parties, and provide consumers the ability to access and delete PII that is not needed to support essential public purposes, safety, data security, compliance with regulatory requirements, and analytics/performance monitoring. The ability of NHTSA, the NTSB, and local law enforcement to access critical safety performance data, while preserving the integrity of personal, private or identifying data, in a timely manner for research, crash investigation and other governmental purposes must be preserved. In addition, radio spectrum needed for traffic safety purposes including vehicle-to-everything communications must be limited to non-commercial use.

Workforce Protections: The deployment of AV technology will have a significant impact on our Nation's workforce. While these technologies will create new business and employment opportunities, they will also lead to displacement and major shifts in jobs and job functions that will not necessarily be linked to those new opportunities, especially for those same individuals who are being displaced. Policymakers have a major role to play in determining whether AV deployment will help or harm working people and whether the benefits from these technologies will be broadly shared. Absent strong leadership, AV technology risks worsening severe inequalities already inherent in our society, predominantly for blue collar workers. Existing and foreseeable issues which stand to be greatly exacerbated by this technology must be addressed before this technology is broadly deployed on our roads. Similarly, unforeseeable issues throughout deployment will need to be resolved with input from affected stakeholders. Congress must ensure that workers and unions are partners in the development and implementation of AV technology and policy. It must recognize the projected negative effects of a transition to AVs, including but not limited to ensuring strong worker protections in federal funding and procurements, and providing worker support programs for current and future workers including training and re-skilling to ensure that displaced and otherwise affected workers are able to move into middle class jobs created by technological change. In order to achieve these goals, Congress must also take action to require companies and government agencies that plan to transition to AV fleets to be transparent and honest with their workers regarding budgets, plans - including training programs - and timelines for the implementation of new technology. In workplaces where the employees are unionized and thus bargain collectively, these issues should be negotiated.

Whistleblower Protections: Employees or contractors of any manufacturer, supplier, or operator of software or hardware for AVs who want to report safety defects to NHTSA should not be prevented from doing so as the result of a non-disclosure agreement (NDA). The type of protections afforded whistleblowers in Section 31307 of the Moving Ahead for Progress in the 21st Century (MAP-21) Act (Pub. L. 112-141) as well as Section 24352 in the FAST Act (Pub. L. 114-94) must be extended in any AV bill. In addition, the Department of Labor prohibits a NDA that prevents an individual from providing information to the federal government. However, only a limited number of cases have been filed with the Occupational Safety and Health Administration. Therefore, more must be done to inform employees as to their rights and responsibilities when such a situation arises.

Consumer and Worker Rights[6]: The well-established rights of consumers to seek accountability in a court of law for injuries suffered as a result of AVs must be preserved. Nothing in this bill shall exempt a person from liability at common law or under a state law, or permit a consumer to be required to forgo their rights by a manufacturer or provider of AVs. Moreover, exploitative independent contractor relationships that shield AV companies from liability and deny workers basic workplace rights should be explicitly prevented.

Ensuring Local Control and Sustainable Transportation

Local, State and Federal Regulatory Roles: The statutory mission of the DOT established by Congress in 1966 is to regulate the performance of motor vehicles to ensure public safety, which now includes AVs. In keeping with existing law and practice, the federal government should prescribe regulations for the performance of these vehicles, leaving regulation of the operation of these vehicles to the states. Even after federal regulations are in place regarding AVs, existing federalism practices demand that states retain a legal right and a duty to their residents to develop proposals and implement solutions to ensure public safety. In addition, state and local governments have the authority to manage the operation of vehicles on their streets to address concerns such as safety, noise, local air quality, and congestion. Any action on the

[6] Advocates for Highway and Auto Safety does not take a position on this issue.

regulation of AVs shall not preempt states and localities from regulating the operation of these vehicles just as they do for traditional motor vehicles.

In-Depth Study of AV Impacts on Transportation Systems and Environment: AVs could have direct and indirect negative impacts on safety, congestion, pollution, land use, accessibility, transportation infrastructure capacity and needs, energy consumption, public transit, jobs and job functions, mobility and equity. DOT must be directed to undertake a comprehensive study to inform policymakers and the public about how these vehicles will impact our existing transportation systems and ensure effective mitigation of problems identified. Implementation of infrastructure to support the safe operations of AVs, such as placement of electric vehicle charging stations, visible lane striping, and uniform and unobstructed signage, must be equitable for all communities to ensure equal opportunity for people of all racial and socioeconomic backgrounds.

NOTE: **The AV Tenets outlined in this document do not constitute the entirety of each supporting organization's policy priorities related to AVs.**

Glossary of Acronyms

ADS – Automated Driving System

AV – Autonomous Vehicle

CFR – Code of Federal Regulations

DOT – Department of Transportation

FAA – Federal Aviation Administration

FAST – Fixing America's Surface Transportation Act, Pub. L. 114-94

FMVSS – Federal Motor Vehicle Safety Standard

GAO – Government Accountability Office

GVWR – Gross Vehicle Weight Rating

HHS – Health and Human Services

HMI – Human-Machine Interface

IRB – Institutional Review Board

LGBTQ+ -- Lesbian, Gay, Bisexual, Transgender, Queer, +

MAP-21 – Moving Ahead for Progress in the 21st Century Act, Pub. L. 112-141

NCAP – New Car Assessment Program

NDA – Non-Disclosure Agreement

NHTSA – National Highway Traffic Safety Administration

NIST – National Institute of Standards and Technology

NTSB – National Transportation Safety Board

ODD – Operational Design Domain

OTA – Over-the-Air

PII – Personally Identifiable Information

SAE – Society of Automotive Engineers

USC – United States Code

VIN – Vehicle Identification Number