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ADVANCING TRANSFORMATIVE TRANSPORTATION  
TECHNOLOGIES TO ENSURE OUR ENERGY SECURITY

March 31, 2021

Acting Administrator Steven Cliff  
National Highway Traffic Safety Administration  
U.S. Department of Transportation  
1200 New Jersey Ave, SE  
West Building, Ground Floor, Room W12 – 140  
Washington, DC 20590

**RE: Docket No. NHTSA-2020-0106**

**Dear Acting Administrator Cliff,**

Securing America's Future Energy (SAFE) is pleased to submit the following comments with regard to the Advance Notice of Proposed Rulemaking (ANPRM) on the development of a *Framework for Automated Driving System Safety*.

SAFE is a Washington, D.C.-based advocacy organization, founded in 2004 to reduce U.S. dependence on oil as an economic and national security priority, and ensure the U.S. is no longer dependent on a volatile oil market that is manipulated by a cartel for its transportation needs. In recognition of the wider role connected, autonomous, shared, and electric vehicles (CASE) will play in our society, SAFE has recently expanded this mission to include advancing transformative transportation and mobility technologies to ensure the United States secures key aspects of the technology supply chain to achieve and maintain our strategic advantage. SAFE also believes that CASE will accelerate the electrification of transportation and help end U.S. dependence on oil, as will be noted in the submission.

This mission has been pursued in partnership with the Energy Security Leadership Council (ESLC), a group of senior retired military and business leaders, which is co-chaired by Adam Goldstein, former President of the Royal Caribbean International and General James Conway (Ret.), the 34<sup>th</sup> Commandant of the U.S. Marine Corps, with Fredrick W. Smith, Chairman and CEO of FedEx Corporation as Chairman Emeritus. The ESLC supports policies that will catalyze the deployment of automated vehicle technology and maximize the societal benefits of the technology.

SAFE appreciates the acknowledgement from the National Highway Traffic Safety Administration (NHTSA) that this notice represents a departure from previous agency notices regarding automated driving systems (ADS), as it looks beyond existing Federal Motor Vehicle Safety Standards (FMVSS) toward the creation of a safety framework specifically tailored to ADS. SAFE also applauds the regulators' ambition to move at the speed of ADS developers' innovation.

SAFE believes NHTSA is now positioned to shape standard setting with regard to safety, but should not define how companies specifically achieve such goals. Consequently, in the broader interests of both regulator and developer at this nascent stage of the industry's development, SAFE considers the

agency's core focus at this time to be on defining a standard for what it requires in terms of safety. The agency should allow companies to access all pathways and opportunities available for innovation regarding how they achieve such a standard. As a result, at this time SAFE recommends that NHTSA not adopt prescriptive measures and instead focus on adding a relevant safety benchmark to the Federal Motor Vehicle Safety Standards (FMVSS) and continuing all the work NHTSA already has underway to update the FMVSS for ADS. A benchmark for ADS safety, and the targets NHTSA sets for industry to achieve, must be measured by the number of lives saved and injuries avoided. In addition, SAFE suggests amending the New Car Assessment Program (NCAP) to account for current collision avoidance technologies and automated vehicles which has not been substantively updated since 2011. With the current pace of technological change, this should be done every two years.

Safety is a critical metric for automated driving. ADS technology has the potential to substantially reduce the estimated 94 percent of collisions that are caused by human error or choice. These collisions—the majority of which are caused by speeding, driving under the influence, or distraction—take the lives of more than 36,000 Americans annually, and injure millions more. The economic and social harm of these collisions calculates to nearly \$1 trillion per year, which is an immense financial cost in addition to the devastating toll on the families of victims.<sup>1</sup> As autonomous vehicles focus solely on the task of driving and do not drive inebriated, tired or otherwise impaired, the safety potential for such vehicles to reduce the unacceptably high levels of deaths on U.S. roads, in addition to sparing millions more from injury, is a highly compelling argument in favor of ADS deployment.

SAFE's research has found that, if deployed at scale, ADS-equipped vehicles will deliver tremendous benefits for the nation's economy and citizens. The combination of reduced collisions, decreased energy consumption in the transportation sector, and a range of social benefits will contribute to nearly \$800 billion in annual social and economic benefits by 2050.<sup>2</sup> By transitioning to automated vehicles and removing the human driver, the physical, economic, and societal harm from roadway accidents could be significantly reduced. Even when accounting only for significant driver errors, such as distraction, inebriation, and speeding, researchers found that the annual benefit from reduced economic cost and increased quality-of-life would exceed \$500 billion.<sup>3</sup>

Moreover, transportation is our nation's largest source of greenhouse gas emissions.<sup>4</sup> Autonomous vehicles can increase the amount of shared rides and accelerate the use of electric vehicles in fleets resulting in meaningful reductions in petroleum fuel use and similarly significant reductions in emissions. Electrifying 84 percent of trips taken every year with one or two occupants and placing them into electric, shared, and appropriately-sized options result in a transportation emissions reduction of nearly 90 percent.<sup>5</sup>

Accelerating the development, manufacturing, and adoption of ADS technology is also vital to U.S. economic competitiveness. The automotive sector is a core driver of the nation's manufacturing power and industrial innovation, directly and indirectly supporting 9.9 million American jobs and contributing to 3-3.5 percent of U.S. GDP.<sup>6</sup> The global transportation sector is investing in and preparing for the

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<sup>1</sup> SAFE, *America's Workforce and the Self-Driving Future: Realizing Productivity Gains and Spurring Economic Growth*, June 2018.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> EPA, "Fast Facts on Transportation Greenhouse Gas Emissions," July 2018.

<sup>5</sup> SAFE, *Fostering Economic Opportunity through Autonomous Vehicle Technology*, July 2020.

<sup>6</sup> "America's automobile industry is one of the most powerful engines driving the US economy," Auto Alliance, available at [autoalliance.org/economy/](http://autoalliance.org/economy/).

transition to an autonomous and electric future, into which American automakers and technology developers have already invested billions of dollars.<sup>7</sup> China has made no secret of its ambition to usurp America's commanding lead in automotive technologies in order to dominate the autonomous and electric future of transportation.<sup>8</sup> The United States was the global leader in automotive innovation in the last century, unleashing a period of unprecedented prosperity and creating new efficiencies in the movement of goods and people, and must focus its efforts on ensuring that the next generation of automotive technologies are designed, manufactured, and deployed in America.

Additionally, autonomous vehicles hold considerable potential to achieve equity in transportation by offering the same on-demand, point-to-point transportation that much of society enjoys today with private vehicles to our low-income, disability, and senior citizen communities. Autonomous vehicles can provide affordable solutions to plug systemic gaps in current mass transportation options,<sup>9</sup> while opening up 2 million job opportunities for Americans with disabilities.<sup>10</sup> As transportation is a critical factor in upward economic mobility,<sup>11</sup> providing affordable and accessible options for all members of society can open up a wider range of opportunities and avenues for Americans that were previously denied by accessibility, availability, or cost.

SAFE appreciates the opportunity to provide comment.

## **I. Introduction**

The past decade has witnessed significant progress in the research and development of automated driving systems (ADS), which are now in early stages of deployment for autonomously transporting both passengers<sup>12</sup> and goods.<sup>13</sup> As ADS technology continues to mature, policymakers have been faced with the challenge of developing a regulatory framework that balances the tremendous potential of ADS with one that assures confidence in the safety of these vehicles. SAFE has worked with the federal government on its ADS policy guidance documents including Automated Driving Systems 2.0 and AV 3.0, and provided input on other matters including the FMVSS exemption requests submitted by General Motors (GM)<sup>14</sup> and Nuro,<sup>15</sup> and looks forward to continuing to build on this collaboration.

SAFE has a long history of advocating for policies that will not only improve U.S. energy security, but also enable the deployment of emerging technologies that will improve the safety, efficiency, and accessibility of the nation's transportation sector while fostering economic growth. In the last several years, SAFE has taken a leadership role in researching sound policies for ADS and working with government, industry, and stakeholders to advance these solutions.

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<sup>7</sup> Amir Efrati, "Money Pit: Self-Driving Cars' \$16 Billion Cash Burn," *The Information*, February 2020

<sup>8</sup> Heng Ting-Fang and Lauly Li, "Huawei steps up ambitions in self-driving vehicles race," *Nikkei Asian Review* (Mar. 30, 2020).

<sup>9</sup> SAFE, *Fostering Economic Opportunity through Autonomous Vehicle Technology*, July 2020.

<sup>10</sup> SAFE, *Self-Driving Cars: The Impact on People with Disabilities*, January 2017.

<sup>11</sup> See, e.g. Mikayla Bouchard, "Transportation Emerges as Crucial to Escaping Poverty," *New York Times*, May 7, 2015.

<sup>12</sup> See, e.g., Kirsten Korosec, "Waymo's robotaxi pilot surpassed 6,200 riders in its first month in California," *TechCrunch*, September 2019.

<sup>13</sup> See, e.g., Michael Wayland, "CVS Pharmacy partners with Nuro to test self-driving vehicle prescription delivery," *CNBC*, May 2020.

<sup>14</sup> See SAFE's public comment regarding Docket No. NHTSA 2019-0016, *General Motors, LLC – Petition for Temporary Exemption from Various Requirements of the Safety Standards for an All-Electric Vehicle with an Automated Driving System*, May 20, 2019.

<sup>15</sup> See SAFE's public comment regarding Docket No. NHTSA 2019-0017, *Nuro, Inc. – Petition for Temporary Exemption for an Electric Vehicle with an Automated Driving System ("Petition")*, May 2019.

More recently, NHTSA's approval of Nuro's FMVSS exemption request for its R2X vehicle cited the reasoning and research contained in SAFE's comments.<sup>16</sup> As SAFE argued, the ongoing development of ADS technology will also require federal regulatory structures to evolve alongside it. Earlier this month, SAFE was again cited in NHTSA's January 13, 2021 Notice<sup>17</sup> in the rulemaking to remove barriers in the occupant protection FMVSS for vehicles equipped with ADS that lack the traditional manual controls necessary for human drivers, but that otherwise have typical seating configurations.<sup>18</sup>

a. Automated vehicles can meaningfully enhance the Administration's electrification goals and strengthen U.S. energy security.

Today, the United States is the world's largest consumer of oil, accounting for approximately one-fifth of daily global supply. Transportation accounts for 70 percent of this daily intake, which is used to power a transportation system that is more than 90 percent dependent on petroleum fuels.<sup>19</sup> This reliance comes at a significant cost. Each year, the U.S. military spends roughly \$81 billion protecting global oil supplies.<sup>20</sup> Guided by its mission of strengthening U.S. energy security by reducing our nation's dependence on oil, SAFE began advocating for autonomous vehicles and ADS as a means of accelerating this shift.

Developers are basing their autonomous driving platforms on electric powertrains: Cruise's Origin<sup>21</sup> and the recently-launched robotaxi from Amazon-backed Zoox are all-electric<sup>22</sup>; Waymo is adding Jaguar I-Pace electric vehicles (EVs) to its fleet of hybrid Chrysler Pacificas;<sup>23</sup> and Ford and Volkswagen announced plans to develop autonomous, electric vehicles in 2019.<sup>24</sup> In fact, SAFE's research has shown that the majority of vehicles being used to test ADS technology are EVs – suggesting that this trend will continue to lead toward greater electrification of the nation's passenger vehicle fleet.<sup>25</sup>

SAFE's analysis from 2017 further concluded that 80 percent of all light-duty autonomous vehicles use alternative fuel powertrains, highlighting the synergies between ADS and vehicle electrification. A 2018 study from SAFE took a further step to quantify these gains: By 2050, widespread adoption of autonomous vehicles would save the United States \$58 billion due to the environmental and energy security benefits of reduced oil consumption<sup>26</sup>; autonomous vehicle technologies, electric powertrains

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<sup>16</sup> Ibid.

<sup>17</sup> Note: The January 13, 2021 Notice issued by NHTSA's then-Deputy Administrator is styled as a Final Rule but was not published in the Federal Register before President Biden was inaugurated on January 20, 2021. On the afternoon of the Inauguration, the President's Chief of Staff directed the Federal Register to withdraw all pending rules that had not yet been published. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/regulatory-freeze-pending-review/>

<sup>18</sup> See NHTSA rulemaking Notice in Docket No. NHTSA-2021-0003, *Occupant Protection for Vehicles With Automated Driving Systems*, January 2021.

<sup>19</sup> Department of Energy, "Use Of Energy Explained: Energy Use For Transportation," May 2020.

<sup>20</sup> SAFE, *The Military Cost of Defending the Global Oil Supply*, September 2018.

<sup>21</sup> See, e.g., Kirsten Korosec, "Cruise unveils Origin, an electric driverless vehicle design for sharing," *TechCrunch*, January 21, 2020.

<sup>22</sup> See, e.g., Sean O'Kane, "Zoox unveils a self-driving car that could become Amazon's first robotaxi," *The Verge*, December 14, 2020.

<sup>23</sup> Andrew Hawkins, "Waymo And Jaguar Will Build Up To 20,000 Self-Driving Electric SUVs," *The Verge*, March 2018

<sup>24</sup> See, e.g., Alexander Stoklosa, "Ford and Volkswagen Announce Multibillion-Dollar EV and Self-Driving-Car Tie-Up," *Car & Driver*, July 12, 2019.

<sup>25</sup> Robbie Diamond and Amitai Bin-Nun, "Self-Driving Cars: Road to Deployment", Written Testimony to the House Committee on Energy and Commerce, Subcommittee on Digital Commerce and Consumer Protection, February 14, 2017.

<sup>26</sup> SAFE, *America's Workforce and the Self-Driving Future: Realizing Productivity Gains and Spurring Economic Growth*, June 2018.

and driver-assist technologies would reduce U.S. daily oil consumption by 6 million barrels per day in the light-duty fleet.<sup>27</sup>

b. Automated vehicles can play a key role in achieving equity in transportation.

A broader suite of benefits emerged as SAFE expanded its scholarship on ADS, particularly regarding equity. The most important factor in upward economic mobility is transportation.<sup>28</sup> However, in a country as dependent on the automobile as the United States for everyday mobility, the cost of private vehicle ownership is unaffordable for many. Costs associated with vehicle ownership are also often higher for those in low-income communities. In terms of car financing, residents of lower-income neighborhoods pay \$50 to \$500 more for the same car than residents of higher-income neighborhoods. Auto loans on average cost 2 percentage points higher for low-income drivers.<sup>29</sup>

Autonomous transportation holds considerable potential to reduce the current cost of on-demand, point-to-point transportation. A conservative calculation from Morgan Stanley estimates that the 2016 cost per mile of a shared ride is \$1.50; in 2030, with an autonomous, shared and electric car, that cost per mile decreases to just 50 cents.<sup>30</sup> Not only is this conservative figure lower than the approximate 60 cent-per-mile cost of a personal vehicle, but also lower than the \$1.31 per-mile cost for buses which is frequently subsidized by the government.<sup>31</sup> It may be possible to subsidize free point-to-point rides for low-income individuals, providing them with better access and service.

More than 75 million households—almost two-thirds of U.S. households—live in neighborhoods with housing and transportation costs above 45 percent of typical household income, a level that forces many families to make difficult choices and which is also hard to sustain over time. SAFE analysis has shown that AV transportation could reduce household costs by as much as \$5,600 per household, or \$3,800 per American.

The problem persists with employment growth areas in our modern economy—such as job opportunities in e-commerce—remaining accessible only by car. For instance, Amazon’s 60 largest U.S. fulfillment centers and facilities are inaccessible to those who work there, unless commuting by personal vehicle, which makes it hard for people to benefit from these new economic opportunities.<sup>32</sup> The necessity of owning a car to access jobs compounds this inequity by forcing millions of low-income Americans to make difficult choices to keep a personal vehicle. Seven million Americans are at least three months behind on car payments, and many that do make car payments often do so instead of paying rent or mortgages.<sup>33</sup>

Around 6 million individuals with disabilities in the United States experience barriers to mobility such as the inability to drive, limited financial resources for transportation services, and inadequate access to public transportation and paratransit. This leads to a range of ill effects including fewer employment opportunities, poorer health, and social isolation. SAFE’s research has concluded that ADS-equipped

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<sup>27</sup> W. David Montgomery, *Public and Private Benefits of Autonomous Vehicles*, June 2018.

<sup>28</sup> See, e.g. Mikayla Bouchard, “Transportation Emerges as Crucial to Escaping Poverty,” *New York Times*, May 7, 2015.

<sup>29</sup> Elizabeth Kneebone and Alan Berube, “Confronting Suburban Poverty in America,” *Brookings Institution Press*, January 13, 2014.

<sup>30</sup> Morgan Stanley, “Shared Mobility on the Road of the Future,” June 15, 2016.

<sup>31</sup> SAFE, *Fostering Economic Opportunity through Autonomous Vehicle Technology*, July 2020.

<sup>32</sup> *Ibid.*

<sup>33</sup> See, e.g., Heather Long, “A record 7 million Americans are 3 months behind on their car payments, a red flag for the economy,” *Washington Post*, February 2019

vehicles can provide people with disabilities with access to 2 million additional employment opportunities and yield \$19 billion in savings from health care expenditures including missed appointments.<sup>34</sup>

Additionally, the proliferation of occupant-less vehicles that can conduct autonomous deliveries of groceries, medicine, and other goods could contribute to substantial improvements in quality-of-life for those with insufficient access to transportation. This could substantially benefit residents of food deserts (areas where it is difficult to access affordable, good-quality food), which would contribute to positive nutritional and health outcomes in many underprivileged communities. Of the 20 million Americans living in food deserts, research from autonomous delivery company Nuro found that its driverless delivery vehicles could reach 14 million.<sup>35</sup> The current pandemic has demonstrated for all Americans the importance and benefits of contactless delivery.

c. Automated vehicles hold tremendous promise for environmental and public health improvements in communities across the United States.

As noted above, transportation is our nation's largest source of greenhouse gas emissions.<sup>36</sup> Reduced access to private vehicles not only limits economic prosperity, but also negatively impacts individuals' physical health. Low-income communities are more likely to be located near areas and facilities with higher emissions, such as highways and industrial plants.<sup>37</sup> Increased exposure to air pollution is associated with increased depression in both adults and children, with the latter also at higher risk of anxiety. Exposure to fine particulate matter (PM2.5) emitted by car engines is positively associated with higher levels of psychological distress.<sup>38</sup> Low-income communities suffer even more sharply from unclean air: exposure to higher levels of total suspended particulates (TSP) in children from low-income families is linked to lower upward economic mobility, whereas there is no association for children from high-income families.<sup>39</sup>

SAFE analysis of U.S. Department of Transportation (DOT) data found that fully electrifying 84 percent of trips taken every year with one or two occupants and placing them into electric, shared and appropriately-sized options result in a nearly 90 percent reduction in transportation emissions. Even if those journeys are simply taken in electrified transportation alone, emissions are more than halved.<sup>40</sup>

d. Automated vehicle leadership can play a key role in securing American future economic prosperity and maintaining U.S. national security.

As mentioned above, China has made clear its ambition to supplant the United States as the global leader in automated vehicle technology. Leadership in this emerging industry promises significant economic and strategic benefits for the country that gets there first and sets the standards for others to follow. Guided by its Made In China 2025 strategy, Beijing is seeking leadership in ADS technology—among other industries—as a means of gaining greater global strategic authority.<sup>41</sup> The Chinese government is accelerating the development of its AV industry in the private sector. In January, the

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<sup>34</sup> SAFE, *Self-Driving Cars: The Impact on People with Disabilities*, January 2017.

<sup>35</sup> Sola Lawal, "Serving America's Food Deserts," *Medium*, July 2020

<sup>36</sup> EPA, "Fast Facts on Transportation Greenhouse Gas Emissions," July 2018

<sup>37</sup> Cheryl Katz, "People in Poor Neighborhoods Breathe More Hazardous Particles," *Scientific American*, November 1, 2012.

<sup>38</sup> Sass et al., "The effects of air pollution on individual psychological distress," *Health & Place*, October 2017.

<sup>39</sup> O'Brien et al., "Prenatal Exposure to Air Pollution and Intergenerational Economic Mobility: Evidence from U.S. County Birth Cohorts," *Social Science & Medicine*, September 27, 2018.

<sup>40</sup> SAFE, *Fostering Economic Opportunity through Autonomous Vehicle Technology*, July 2020.

<sup>41</sup> SAFE, *The Commanding Heights Of Global Transportation*, September 2020.

Ministry of Industry and Information Technology published a proposal that encourages local governments to open more roads for testing self-driving cars,<sup>42</sup> and the state is investing in private domestic AV companies.<sup>43</sup>

Both the Chinese government and Chinese private enterprises are spending heavily and working swiftly to achieve this outcome. Beijing has taken a top-down approach to digital infrastructure development, pledging more than \$400 billion in 5G research and development through 2020.<sup>44</sup> The scale of China's investment is far larger than the United States; China has installed at least 350,000 5G sites, compared to fewer than 30,000 in the United States.<sup>45</sup> A similarly well-funded approach has been taken with the development of automated vehicles. In September 2017, Baidu launched its \$1.5 billion Apollo Fund to invest in 100 different autonomous vehicle-related projects from 2017 to 2020.<sup>46</sup> State-backed technology company Huawei has also entered the ADS industry, developing low-cost ADS technologies to expedite autonomous vehicle deployment in China.<sup>47</sup>

Besides the privacy concerns associated with allowing Chinese technology companies to transport people and goods around the United States, there is a wider strategic consideration to Chinese leadership in tomorrow's transportation technologies. The control that China has over batteries and the supply chain of electric vehicles is currently far greater than Saudi Arabia or OPEC has ever had over the oil market.<sup>48</sup> If the United States therefore does not compete for ADS and EV supply chain leadership now, it risks swapping its dependence on an unstable oil market for a reliance on Chinese domestic policy for the materials, technologies, and vehicles the United States will require to power its economy in the 21<sup>st</sup> century.

## II. Setting the Standards

The 21<sup>st</sup> century will be defined by the United States' relationship with China, a country that has emerged as our greatest competitor on the world stage. A critical facet will be maintaining American global authority in emerging industries, particularly in setting the global industry standards in ADS and autonomous vehicle development, deployment, and operation. Unfortunately, China is driving these standards bodies and steering them in favor of Chinese technologies.<sup>49</sup>

The U.S. government must therefore become more engaged in this vital endeavor. NHTSA should participate in global standard-setting forums and argue for standards that support American technology and innovation rather than sidelining it. If a differing standard is decided upon, NHTSA can register its opposition to whatever standard is adopted, and emphasize its specific objections to terms that are tailored to benefit China at the expense of the United States or the rest of the world.

- a. Government should not cede active leadership to international rivals. International standards must work for American technologies.

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<sup>42</sup> See, e.g., Nikki Sun, "China guides its self-driving startups into the fast lane," *Nikkei Asian Review*, February 26, 2021.

<sup>43</sup> See, e.g., Jill Shen, "Autonomous car startup Uisee raises \$150 million from state-backed fund," *Technode*, January 27, 2021.

<sup>44</sup> See, e.g., Dan Littmann et al., *5G: The Chance to Lead for a Decade*, Deloitte, 2018, at page 1

<sup>45</sup> *Ibid.*

<sup>46</sup> SAFE, *The Commanding Heights Of Global Transportation*, September 2020.

<sup>47</sup> Che Pan, "Huawei aims to develop low cost lidar systems to boost autonomous driving deployment in China," *South China Morning Post*, August 2020.

<sup>48</sup> Robbie Diamond, "The future of sustainable vehicles," *Axios*, January 2021.

<sup>49</sup> Mercator Institute for China Studies, "Chinese tech standards put the screws on European companies," January 2019.

In the race to deploy connected, autonomous vehicles, it is imperative that the United States does not cede global leadership to China or other competitors like the European Union. The DOT recognized this imperative in the Comprehensive Plan for Automated Vehicles released by the Department in the final days of the Trump Administration.<sup>50</sup> The Comprehensive Plan asserts that:

U.S. DOT is leading the global development of principles and public policies for facilitating and guiding the testing and introduction of automated vehicles. The Department engages with partners worldwide in a variety of bilateral and multilateral forums, such as the United Nations Economic Commission for Europe Global Forum for Road Traffic Safety and World Forum for the Harmonization of Vehicle Regulations; the G7 Expert Group on Automated and Connected Driving; the International Technical Conference on the Enhanced Safety of Vehicles; the SAE World Congress; the Consumer Electronics Show; and the ITS World Congress. U.S. DOT is also collaborating on research and testing to promote U.S. best practices regarding safety standard development and regulatory policies and procedures. These activities are expected to demonstrate that the U.S. science- and data-based system of regulation results in the most robust safety standards, which can increase economic competitiveness, improve foreign market access for U.S. industry, and reduce barriers to trade.

In reality, DOT and NHTSA, under the Trump Administration, largely disengaged from the global development of international standards for automated vehicles with the organizations listed in the Comprehensive Plan. SAFE recommends that, under the Biden Administration, NHTSA resume participation in these international organizations to achieve the goals stated in the Plan.

If the U.S. automated vehicle industry is to thrive, international standards must not work to its detriment. Normalizing and internationalizing our competitors' standards will impel companies to invest in and partner with non-American companies.

China has already begun work on setting those standards. In June 2017, a group of 98 automakers, universities, and institutes formed a strategic alliance to collaborate on research and standards.<sup>51</sup> In 2018, China's National Development and Reform Commission (NDRC) unveiled a draft Strategy for Innovation and Development of Smart Cars, which created a framework for technology innovation, industrial and infrastructure development, and regulatory standards.<sup>52</sup> The strategy aims to establish a complete ecosystem for AVs in China, with nearly all new vehicles being "smart" vehicles by 2025; and for China to become a world leader in the AV industry and infrastructure by 2035.<sup>53</sup>

Beijing has increased its role in international standards-setting organizations for the emerging technologies it has prioritized, most notably for 5G.<sup>54</sup> According to an October 2018 research report prepared for the bipartisan US-China Economic and Security Review Commission, Beijing employs a two-pronged strategy.<sup>55</sup> It wields its growing clout to increase its standard-shaping power in international

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<sup>50</sup> U.S. Department of Transportation, *Automated Vehicles Comprehensive Plan* (Jan. 11, 2021) at p. 25

<sup>51</sup> See, e.g., Hao Yan, "Auto, tech specialists form alliance to guide future collaborations," *China Daily*, June 2017.

<sup>52</sup> Eurasia Group, "Chinese AV Ambitions at Risk Amid Trade War," July 2019.

<sup>53</sup> *Ibid.*

<sup>54</sup> Hideaki Ryugen and Hiroyuki Akiyama, "China leads the way on global standards for 5G and beyond," *Nikkei Asian Review*, July 2020.

<sup>55</sup> John Chen, et al., "China's Internet of Things," Research Report Prepared on Behalf of the U.S.-China Economic and Security Review Commission, October 2018.

standards bodies. At the same time, Beijing pushes—mostly through its partners on the Belt and Road Initiative—for countries to adopt its technology and standards.<sup>56</sup>

This strategy, which Beijing calls “Standardization Work,” has enabled China to grow its influence in the standards setting space: by the end of 2018, Chinese companies had proposed more than 25 percent of 5G standards.<sup>57</sup>

b. Government should define what the goals for ADS safety should be, but not prescribe a specific technical approach while technology is still in development.

There are a variety of approaches toward this goal currently being advocated by differing companies, or groups of companies. Formal and informal standard-setting efforts appear at this point to be dictated by different groups, which have resulted in multiple and competing ideas for what standards should be adopted, how safety should be approached and, ultimately, how it should be achieved.

SAFE believes the industry has not yet reached a point of maturation in which it can settle on a particular engineering prescription or approach. Rather, the ADS safety framework aims of NHTSA would be currently best served by engaging with all approaches and the companies that advocate for them and participating in those discussions. Specifications and design only stabilize as a technology matures, and in the case of ADS, innovation does not stand in opposition to safety; innovation and maturation are necessary to provide a realizable level of safety. Picking winners and losers at this early stage of technological development risks a sub-optimal outcome for the safety of ADS technology and the ultimate viability of the domestic industry as a whole.

That said, when the industry reaches consensus on standards and they are published as final standards, they can be adopted by NHTSA in the FMVSS as safety performance standards for AVs. As noted, NHTSA should actively participate in these various forums such as the Society of Automotive Engineers (SAE), International Organization for Standardization (ISO), and the Institute of Electrical and Electronics Engineers (IEEE) to engage in all approaches and thus be able to adopt the best of each or all of one. One of the most promising approaches for development of a performance standard for AVs is in the final stages of development by IEEE. The IEEE P2846 working group is preparing “A Formal Model for Safety Considerations in Automated Vehicle Decision Making.”<sup>58</sup> Mobileye (now a part of Intel) has contributed its Responsibility-Sensitive Safety (RSS) model,<sup>59</sup> and technical experts from 28 other companies and organizations in the AV industry have joined and are participating in IEEE P2846.

Besides IEEE there are other standards organizations developing safety performance standards for AVs. ISO Technology Report (TR) 4804, *Road vehicles — Safety and cybersecurity for automated driving systems — Design, verification and validation methods*,<sup>60</sup> follows up the paper on Safety First for Automated Driving (SAFAD) that was published in July 2019 by Daimler and 10 other companies.<sup>61</sup> Many of the companies participating in the development of ISO TR 4804 are also participating in IEEE P2846, so the resulting standards will likely be complementary rather than conflicting.

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<sup>56</sup> Ibid.

<sup>57</sup> Dan Strumpf, “Where China Dominates in 5G Technology,” The Wall Street Journal, February 26, 2019

<sup>58</sup> IEEE P2846: Assumptions for Models in Safety-Related Automated Vehicle Behavior

<sup>59</sup> Shai Shalev-Shwartz, Shaked Shammah, Amnon Shashua, “On a Formal Model of Safe and Scalable Self-Driving Cars,” Mobileye, 2017.

<sup>60</sup> ISO, “ISO/TR 4804:2020: Road vehicles — Safety and cybersecurity for automated driving systems — Design, verification and validation,” 2020.

<sup>61</sup> Daimler et al, “Safety First For Automated Driving,” 2019.

SAE is also working through the Automated Vehicle Safety Consortium (AVSC) to develop best practices for AVs. To date, the AVSC has been focused on writing best practices for the testing and development of AVs, but AVSC is beginning work on best practices to govern the performance of AVs after they go into operation. As mentioned with ISO TR 4804, there is overlap among the industry members of the standards-setting organizations, so any SAE safety performance standards that result from the AVSC are likely to be complementary to IEEE P2846.

### III. A Benchmark for Safety

Section IV.D of the ANPRM on page 78072 seeks comment on what next steps the Agency should take in the regulation of ADS, the timing of those steps, and whether any of the detailed steps discussed in the ANPRM are required for the development of an ADS-specific FMVSS regime that achieves appropriate standards for highway safety while preserving incentives for innovation and accommodating improvements in technology. SAFE asserts that most of the steps and analysis discussed in the ANPRM are unnecessary to establish an enforceable standard for ADS safety. Instead, SAFE recommends that NHTSA establish in the FMVSS a performance-based metric for ADS safety, which we set forth below.

NHTSA has estimated that 94 percent of all crashes are due wholly or in part to human error.<sup>62</sup> It is widely acknowledged that ADS technology will be able to reduce this figure by a meaningful margin—and will improve over time as the vast reams of data generated by these vehicles allow developers to further refine their driving systems. As mentioned above, the industry remains in its early stages of technological development, and the opportunities for innovation must not be limited at this nascent stage by prematurely adopting an overly prescriptive approach for safety. The question of what is considered safe enough for wider ADS deployment has yet to be answered.

a. Providing an answer to the question of safety is key for public trust in ADS technology. Even as the technology becomes more mainstream and the deployment of vehicles on public roads increases, public skepticism remains high – and winning consumer confidence is crucial to the successful development and deployment of ADS technologies, and their attendant societal benefits. Approximately 48 percent of respondents to a 2020 survey from autonomous vehicle industry group Partners for Automated Vehicle Education said they would never get in a taxi or ride-sharing vehicle that was self-driving. A further 20 percent thought autonomous vehicles will never be safe, and only 34 percent thought the advantages of driverless vehicles would outweigh the disadvantages.<sup>63</sup>

SAFE believes government must therefore be able to explain autonomous vehicle safety in terms that the wider public understands and accepts. Regardless of the approach eventually taken, government and industry must take three steps to ensure public confidence in the technology. They must clearly define and effectively communicate autonomous features—including the limitations—of ADS systems; they must demonstrate responsible progress toward safety goals; and layers of redundant technology must be deployed.<sup>64</sup>

b. Defining a safety benchmark is a social and political question rather than a technical task. Ultimately, the question of safety is not a technological one. It is an ethical and philosophical question, and driving in conventional vehicles is already considered in such terms. There is approximately one

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<sup>62</sup> NHTSA, “Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey,” February 2015.

<sup>63</sup> Andrew Hawkins, “Americans still don’t trust self-driving cars,” *The Verge*, May 2020.

<sup>64</sup> SAFE, *Commission on Autonomous Vehicle Testing and Safety*, January 2017

death for every 100 million miles driven.<sup>65</sup> In 2019, there were 36,096 deaths on U.S. roadways.<sup>66</sup> This toll crosses the threshold required for it to be considered an epidemic, yet society is willing to deem these figures as an acceptable cost of driving.

This question of safety, and what threshold ADS technologies must surpass before being considered safe, is one that only government can answer. As is the case with conventional vehicles driven by humans, SAFE believes this is a social, political and ethical question rather than a technical one, and that the threshold can be defined in the abstract, and then met. NHTSA's regulations for exemptions from the FMVSS have long allowed non-compliant vehicle designs and technologies to be publicly deployed if they would not lower the safety level of the vehicle,<sup>67</sup> and government would not want to put vehicles on the road that would be less safe than human-driven vehicles at any stage of the ADS technological maturation process.

While we would expect the safety thresholds to become more stringent as vehicle performance improves further, the question of what would be considered safe enough to allow automated vehicles to operate on our nation's highways is ultimately a judgement that must be made by government, and then left to ADS developers to work toward that goal in an approach they deem most appropriate.

- c. A standard for ADS safety, and the targets NHTSA sets for industry to achieve, must be measured by the number of lives saved and injuries avoided.

There will always be accidents, and while achieving zero death and injuries is a laudable goal that should be pursued, there may never be a vehicle that is absolutely safe. Attempts to limit ADS deployment until they are proven to cause zero deaths over an undefined period of time or mileage risks making unattainable perfection the enemy of incremental improvements in road safety—which will improve over time with the deployment of ADS.

SAFE believes that the appropriate standard for ADS safety must be measured by the number of lives saved and injuries avoided through the deployment of automated vehicles. As stated above, what the benchmark must be – whether it is 10 percent, or 50 percent or 90 percent, or any other level better than the safety of vehicles with human drivers today – is not a technical question, but instead a social and political question. As such, the question should be answered by our nation's leadership and by the public at large. SAFE recommends that NHTSA use this rulemaking to answer that question.

SAFE suggests that the leadership of NHTSA, informed by the technical expertise of NHTSA staff with regard to the capabilities of ADS technologies today, recommend to the Office of the Secretary of Transportation (OST) an appropriate benchmark measured in lives saved and injuries avoided that AV companies will need to meet or exceed in order to deploy their AVs on America's highways. The Secretary and also the White House should then approve NHTSA's recommended benchmark, or establish a different benchmark, as they deem appropriate. NHTSA should then propose that benchmark in a Notice of Proposed Rulemaking (NPRM) following up on the present ANPRM. The AV industry, safety groups, state and local governments, and the public at large, can then provide their suggestions for a different benchmark, or agreement with the proposed benchmark, in comments in response to the NPRM. NHTSA, with the concurrence of OST and the White House, can then issue a Final Rule that reflects the best consensus of the comments from the public.

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<sup>65</sup> Insurance Institute for Highway Safety, "Fatality Facts 2018 state by state," December 2019.

<sup>66</sup> NHTSA, "NHTSA Releases 2019 Crash Fatality Data," December 2020.

<sup>67</sup> 49 CFR 571.555.6(b)&(d)

Following SAFE's recommended approach, a final rule in this Rulemaking that adds the benchmark as a standard in the FMVSS, will be the best estimate of what level of safety AVs need to provide to the public in order to begin operations. However, it must also be stressed that the government can increase the stringency of the safety standard as ADS technology continues to prove itself and improve further over time. There should always be a plan to reassess the standard over time that allows industry and government to define pathways toward even greater safety goals. We want to make sure ADS technology, and autonomous vehicles, get safer as innovation allows.

Additionally, NHTSA can use its New Car Assessment Program (NCAP)<sup>68</sup> to assess the relative safety of automated vehicles as they begin operation on America's highways. Instead of rating the relative safety of automated vehicles by comparing the performance of automated vehicles in crash tests, as NHTSA calculates NCAP ratings for conventional cars today, NHTSA can compare the real-world data on collisions, and if they occur, injuries, caused by automated vehicles in operation on streets and highways. Using NCAP in this way, NHTSA can inform consumers as to which AV models have fewer collisions than other AV models. Of course, NHTSA will need to determine from the data it collects under NCAP which collisions and injuries were caused by a human driver of another vehicle or a pedestrian. An automated vehicle that comes to a complete stop at a stop sign and is then rear-ended by a human driver, or a pedestrian or bicyclist preoccupied by texting on his phone who collides with a stationary AV, would only illustrate that automated vehicles are safer than humans.

Because NCAP ratings, in contrast to the FMVSS, do not require notice and comment rulemaking in order to be updated, NHTSA could issue new ratings for automated vehicles on an annual basis, or even more frequently. And because NHTSA would only need to collect and compare data reported by the AV companies, rather than testing expensive vehicles, budget constraints should not limit the number of vehicle models that NHTSA could rate in each rating cycle. The data collected under NCAP can also be used to increase the stringency of the FMVSS for ADS Safety over time as discussed below.

#### **IV. The United States Requires an Enforceable Standard for ADS Safety**

There is currently no legislation or regulation governing ADS technology development and deployment at the federal level. In 2018, the American Vision for Safer Transportation Through Advancement of Revolutionary Technologies (AV START) Act provided a federal framework for ADS, but after passing the House its passage stalled in the Senate.<sup>69</sup> States have filled this vacuum with a variety of differing legislative efforts and executive orders.<sup>70</sup> Industry requires regulatory certainty as soon as possible for the responsible development of ADS technologies in the shortest timeframe in order to bring the benefits of AVs and while passage of that legislation rests with Congress, SAFE believes the DOT can now set a safety threshold by regulation that autonomous vehicles must achieve, without prescribing technological approaches industry must use to meet such a standard.

If NHTSA includes a safety benchmark for automated vehicles as we recommend, manufacturers will have to certify their vehicles will meet or exceed this benchmark when they are sold to customers or deployed in commercial operation (not just testing or demonstration) on public highways and streets. If the data reported by AV companies, or other data that NHTSA obtains, indicate that any AV models may not be meeting the benchmark, NHTSA can and should initiate an investigation that can lead to recall of the AV models in question. NHTSA's authority to investigate and enforce through a recall a safety

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<sup>68</sup> <https://www.nhtsa.gov/ratings>.

<sup>69</sup> Chris Teale, "Federal AV legislation to go no further in Congress," *Smart Cities Dive*, December 2018.

<sup>70</sup> See, e.g., Kaveh Waddell, Kia Kokalitcheva, "States are sewing a patchwork of AV regulations," *Axios*, October 2018

standard included in the FMVSS gives the public the assurance it needs that NHTSA has a mechanism to determine whether the autonomous vehicles operating on U.S. roadways are safe, and to order them off the road if they prove to be unsafe.

An enforceable FMVSS for ADS Safety will also give the AV industry the regulatory certainty it is seeking. Any standard issued as part of the FMVSS preempts conflicting state laws and regulation under the Federal Motor Vehicle Safety Act.<sup>71</sup> This will provide industry with the necessary regulatory certainty to pursue greater safety through innovation.

a. Government should update existing standards, where feasible, without delay

Even in the absence of a federal ADS framework established by legislation, NHTSA has made some progress on updating its existing standards and refining rulemaking processes for AVs, but more work is needed. NHTSA has initiated six different rulemakings to update the existing FMVSS to remove language that is currently delaying or blocking the deployment of automated vehicles. The rulemaking that is furthest along is the Occupant Protection standards in Series 200 of the FMVSS. NHTSA attempted to issue a final rule in this rulemaking with a notice signed one week before the inauguration, but the Trump Administration took too long to complete its review of the final rule and to submit it to the Federal Register, so it was not published before President Biden took office. The final rule in the Occupant Protection Rulemaking has now been suspended along with all other rules that were still pending publication in the Federal Register on January 20. After making any changes deemed necessary by the Biden Administration, NHTSA should proceed to issue a Final Rule in the Occupant Protection Rulemaking, and to proceed with completion of the other pending rulemakings to update the FMVSS for automated vehicles, all as soon as reasonably possible.<sup>72</sup>

As NHTSA has noted, however, the rulemakings it has initiated so far do not address all of the provisions in the FMVSS that are delaying the development of automated vehicles. For example, in the January 13, 2021 Notice that has now been suspended, NHTSA stated that it assumes that initial ADS-equipped vehicles will have “conventional” forward-facing front seating positions similar to non-ADS vehicles.<sup>73</sup> The rulemaking notice explains that NHTSA has decided that additional research is necessary to understand and address different safety risks posed by vehicles with unconventional seating arrangements, such as rear-facing seats or campfire seating.<sup>74</sup> SAFE urges NHTSA to undertake such additional research and to subsequently issue the necessary rulemakings to clarify the standard regarding unconventional seating, and other standards that are holding back the safety benefits that deployment of automated vehicles can bring to America’s highways.

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<sup>71</sup> 49 U.S.C. 30103(b)(1)

<sup>72</sup> The other five incomplete rulemakings that NHTSA has initiated are: Removing Regulatory Barriers for Vehicles with ADS (Crash Avoidance Standards), 84 Fed. Reg. 24433

<https://www.federalregister.gov/documents/2019/05/28/2019-11032/removing-regulatory-barriers-for-vehicles-with-automated-driving-systems>; Passenger-Less Delivery Vehicles Equipped With ADS

<https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202004&RIN=2127-AM18>; Removing Regulatory Barriers for Innovative Motor Vehicle Technologies

<https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202004&RIN=2127-AM05>; Considerations for Telltales,

Indicators and Warnings for ADSs <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201810&RIN=2127-AM07>; Specialized Motor Vehicles With ADS

<https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202004&RIN=2127-AM19>.

<sup>73</sup> See NHTSA’s Notice in Docket No. NHTSA-2021-0003, *Occupant Protection for Vehicles With Automated Driving Systems*, January 13, 2021.

<sup>74</sup> *Ibid.*

Additionally, SAFE believes there is no reason additional testing and deployment of AVs cannot continue. SAFE has argued in the past that the safety of the ADS is appropriately governed by NHTSA's recall, enforcement, and rulemaking authorities.<sup>75</sup> SAFE believes that the Department of Transportation has an interest in assuring public safety as AVs continue to increase their presence on public roads. This interest is manifested through the NHTSA's recall authority, enforcement bulletins, and rulemaking, as well as its ability to set policies such as requesting Voluntary Safety Self Assessments (VSSAs).

As an example, the exemption petition can be a key step in the Department's learning process by providing NHTSA data on the workings of ADS and its interface with the regulatory system. However, SAFE maintains its belief that requiring petitioners to demonstrate ADS safety to a level considerably beyond that required by autonomous vehicle developers who are not requesting exemptions has the potential to harm the public interest. Before NHTSA issues an FMVSS for ADS Safety that applies to all automated vehicles, denying an exemption petition for a vehicle will not necessarily block its ADS from public roads, as the same ADS could legally be used in FMVSS-compliant vehicles.

- b. NHTSA should require data from AV companies on the safety performance of their AVs to enable the agency to evaluate compliance with, and to initiate enforcement for noncompliance with, the safety benchmark.

A similar approach has already been taken by NHTSA regarding Nuro's exemption petition. In its final notice granting the petition, NHTSA mandated data sharing by Nuro to inform future activities, requiring both crash-related information that is sent to the agency very soon after any crash, and periodic reporting of general information about the operation of the R2X.<sup>76</sup> In order to enforce an FMVSS for ADS safety, SAFE recommends that the agency require AV manufacturers to report to NHTSA all deaths, injuries, and collisions involving automated vehicles. NHTSA should require the reporting more frequently than the process established in early warning reporting (EWR) for conventional vehicles — within five days instead of quarterly. Because of the small volumes of AVs that many manufacturers will deploy initially, the reporting requirements should also apply to all AV manufacturers, without relaxed reporting requirements for small volume manufacturers, as with EWR.

## **V. Moving at the Speed of Innovation: Staffing NHTSA to Meet ADS Needs**

Vehicle regulators face a certain Catch-22 in that by the time a new technology is ready to be standardized, it has often already achieved significant market penetration. This phenomenon is illustrated by a 2011 NHTSA decision to issue a standard requiring curtain airbags to be installed in all new vehicles: at the point that this regulation was created, the devices were already present in 91 percent of new vehicles.<sup>77</sup>

The challenge of regulating immature technologies stems from the fact that specifications and design only stabilize as a technology matures. ADS technology is rapidly changing, and advanced artificial intelligence systems that are still maturing now play a large role in ADS development. Technological advancements such as these also represent a workforce issue for NHTSA, as regulatory and compliance

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<sup>75</sup> See SAFE's public comment regarding Docket No. NHTSA 2019-0017, *Nuro, Inc. – Petition for Temporary Exemption for an Electric Vehicle with an Automated Driving System ("Petition")*, May 20, 2019.

<sup>76</sup> See NHTSA Notice of grant of a petition for a temporary exemption from three provisions of Federal Motor Vehicle Safety Standard (FMVSS) No. 500 regarding Docket No. NHTSA-2019-0017, *Nuro, Inc.; Grant of Temporary Exemption for a Low-Speed Vehicle with an Automated Driving System*, February 6, 2020.

<sup>77</sup> Stephen Zoepf, "Automotive Features: Mass Impact and Deployment Characterization," Massachusetts Institute of Technology, May 2011.

teams will need considerably more input from experts in artificial intelligence, robotics, and other skills that have not traditionally been important subject matters for automotive regulation.<sup>78</sup>

As a result, the challenges that already exist with airbags and other preventative safety measures will be magnified exponentially as they apply to autonomous vehicle technology. NHTSA needs increases in both funding and staffing to meet this need.

In particular, SAFE recommends greater funding and staffing for NHTSA's Office of Defects Investigation (ODI), and for such funding to be focused on ADS technologies and autonomous vehicles to assure the public that NHTSA will respond promptly to any automated vehicles that appear to be unsafe. Additional staffing and funding should also be made available for NCAP and for NHTSA's research to address automated vehicles.

## **VI. Responses to specific questions**

SAFE begins its responses to numbered questions in the ANPRM with Question 4, which we consider the key question in the Notice: "How would your framework assist NHTSA in engaging with ADS development in a manner that helps address safety, but without unnecessarily hampering innovation?"

The safety framework SAFE proposes is based on the metric that defines NHTSA's mission and its authority under the Federal Motor Vehicle Safety Act—how many lives are saved and how many injuries are avoided. An automated vehicle manufacturer needs to be able to certify, using whatever engineering and process measures the manufacturer deems appropriate, that its vehicle will save the number of lives and avoid the number of injuries specified in the standard. NHTSA can then monitor the automated vehicle's performance in the real world, and if the automated vehicle exceeds the specified threshold, initiate a recall of the automated vehicle. Such a standard would be a pure performance standard—the ideal that NHTSA should strive to promulgate in the FMVSS. As such, the performance standard would in no way hamper innovation in the development of automated vehicles. Under the standard, an AV manufacturer can use any measures it chooses to save lives and prevent injuries in the design, manufacture, and deployment of its automated vehicles.

In addition, Question 6 asks, "Do you agree or disagree with the core elements (i.e., "sensing," "perception," "planning" and "control") described in this notice?"

As explained in response to Question 4 above, SAFE disagrees that any of the four core elements described in the ANPRM should be the basis of the initial regulatory framework for automated vehicles. Creating metrics for any of these four elements in NHTSA's initial regulatory framework will constrain innovation in the design of automated vehicles. Eventually, some or all these elements could be the basis for an FMVSS developed using NHTSA's lengthy process envisioned in the ANPRM, but initially NHTSA should develop a standard that uses the straightforward metric of lives saved and injuries avoided to judge the compliance of a vehicle with an FMVSS for ADS Safety.

Many of the questions and the requests for comment in the ANPRM presuppose that a regulatory framework for ADS safety must address the four elements in this question. Because we disagree, SAFE

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<sup>78</sup> SAFE, *Commission on Autonomous Vehicle Testing and Safety*, January 2017

has not responded to questions 3, 5, 7, 11, 20 and 21. Because SAFE's recommended regulatory framework does not require engineering or process measures, we have likewise not responded to Question 1. SAFE's brief response to selected questions in the ANPRM follows below.

**Response to Question 2.** "In consideration of optimum use of NHTSA's resources, on which aspects of a manufacturer's comprehensive demonstration of the safety of its ADS should the Agency place a priority and focus its monitoring and safety oversight efforts and why?"

SAFE recommends that NHTSA focus on the ultimate metric for ADS safety – the number of lives saved and injuries avoided by the deployment of a manufacturer's automated vehicle.

**Response to Question 8.** "At this early point in the development of ADS, how should NHTSA determine whether regulation is actually needed versus theoretically desirable? Can it be done effectively at this early stage and would it yield a safety outcome outweighing the associated risk of delaying or distorting paths of technological development in ways that might result in forgone safety benefits and/or increased costs?"

There can be no debate that the metric that SAFE proposes for regulation—lives saved and injuries avoided by automated vehicles—is actually needed. Rather than risking delay or distorting paths of technological development, a performance standard based on this metric can be added to the FMVSS in short order. We believe it can be accomplished before the end of the year. NHTSA has ample data to establish the risk of death or injury with human drivers behind the wheel of vehicles. NHTSA and DOT and the Biden Administration need only decide how much safer do automated vehicles need to be than human drivers to allow them to operate on America's highways and begin to save lives.

**Response to Question 9.** "If NHTSA were to develop standards before an ADS-equipped vehicle or an ADS that the Agency could test is widely available, how could NHTSA validate the appropriateness of its standards? How would such a standard impact future ADS development and design? How would such standards be consistent with NHTSA's legal obligations?"

As explained above, SAFE's recommended standard—based on lives saved and injuries avoided—does not require ADS-equipped vehicles to be widely available or even deployed on public highways, will not impact the design or development of AVs, except to require them to be safe, and is entirely consistent with NHTSA's authority under the Motor Vehicle Safety Act.

**Response to Question 10.** "Which safety standards would be considered the most effective as improving safety and consumer confidence and should therefore be given priority over other possible standards? What about other administrative mechanisms available to NHTSA?"

The safety benchmark standard proposed by SAFE should have priority over other standards now in development. Currently, all other standards would constrain technology choices while industry is in this nascent stage. We should allow ADS development to become safer as innovation allows. Only an enforceable standard, such as the standard we suggest, should be added to the FMVSS in these comments, which will improve consumer confidence in automated vehicles. Voluntary standards, and non-enforceable guidance documents issued by NHTSA, will not allay the concerns about the safety of automated vehicles held by a large percentage of the public that we cited above.

**Response to Question 12.** “What types and quanta of evidence would be necessary for reliable demonstrations of the level of performance achieved for the core elements of ADS safety performance?”

Per SAFE’s approach, these metrics would include the number of vehicle miles traveled (VMT) by each AV model, the number of collisions per VMT, the number of injuries per VMT, and the number of deaths per VMT. In the event of any injuries or deaths, and for some collisions, involving an AV, NHTSA will also need to examine data captured by the ADS.

**Response to Question 15.** “Discuss the administrative mechanisms described in this notice in terms of how well they meet the selection criteria in this notice.”

SAFE’s Benchmark strategy meets all but one of the selection criteria in the ANPRM. SAFE’s recommendation to add a lives saved/injuries avoided benchmark to the FMVSS meets the selection criteria of Consistent and Reliable Assurance of Safety, Technology Neutrality/Performance-Based, Predictability, Efficiency, Equity, Consistent with Market-Based Innovation, and Resource Requirements. These comments explain above how SAFE’s recommended strategy meets most of these criteria. As to the Resource Requirements criterion, SAFE’s recommended administrative mechanism (a standard in the FMVSS) is expressly measured in added safety, and we explained that the core elements identified in the ANPRM are not actually relevant to the mechanism, so our approach will provide more efficient use of NHTSA’s available resources than other administrative mechanisms discussed in the ANPRM. As also explained above, SAFE’s Benchmark strategy requires no physical tests to determine the safety of automated vehicles, and thus is clearly more efficient than the other administrative mechanisms NHTSA is considering.

SAFE’s recommended Benchmark strategy does not necessarily meet the Transparency criterion. However, SAFE’s recommendation complements NHTSA’s current administrative mechanism of VSSAs, and it would also complement the mechanism of mandatory Safety Self Assessments should NHTSA choose to change its current policy and require AV companies to submit Safety Self Assessments to the agency and the public.

**Response to Question 16.** Of the administrative mechanisms described in this notice, which single mechanism or combination of mechanisms would best enable the Agency to carry out its safety mission, and why? If you believe that any of the mechanisms described in this notice should not be considered, please explain why.

As explained above, SAFE submits that a Safety Benchmark for ADS Safety measured by lives saved and injuries avoided incorporated in the FMVSS coupled with an enhanced NCAP that compares the relative safety of AV models would best enable NHTSA to carry out its safety mission. SAFE does not believe that reliance on only voluntary standards or a sub-regulatory approach to ADS safety will maximize the number of lives saved and injuries avoided by automated vehicles.

**Response to Question 17.** “Which mechanisms could be implemented in the near term or are the easiest and quickest to implement, and why?”

If NHTSA and DOT act immediately to implement, rather than study, SAFE's recommendations in these comments, a recommendation by NHTSA for the appropriate level of safety to be proposed as a Safety Benchmark could be submitted for consideration by OST and the White House within 60 days of the close of comments for this ANPRM. The Safety Benchmark could then be proposed in an NPRM within 30 days after the appropriate officials decide on the level of safety to propose. If all parties act with alacrity, a final rule in this rulemaking adding a new standard for ADS Safety could be issued before the end of 2021. The usual approach to rulemaking will take longer than this, but at the cost of lives lost and injuries suffered because humans continue to make mistakes behind the wheel while the government delays rulemaking to allow AVs that will not make those mistakes on America's highways.

**Response to Question 19.** What additional mechanisms should be considered, and why?

SAFE recommends above in this response that NHTSA consider amendments to NCAP as an additional mechanism to achieve AV safety. Instead of rating the relative safety of automated vehicles by comparing the performance of automated vehicles in crash tests, as NHTSA calculates NCAP ratings for conventional cars today, SAFE recommends that NHTSA compare the real-world data on collisions, and if they occur, injuries, involving automated vehicles in operation on streets and highways.