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Public Interest Comment

*Comments submitted to the National Highway Traffic Safety Administration in the Matter of:*

# Federal Automated Vehicle Policy


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## Executive Summary


Autonomous vehicles are at our doorstep. Recent advances in sensor technology, computer processors and artificial intelligence, and a wealth of data accumulation have helped feed the development of this transformative technology. Now, the biggest hurdle to deployment is state and federal regulatory policy. To that end, the National Highway Traffic Safety Administration's (NHTSA) Federal Automated Vehicle Policy guidelines have taken an important step towards providing certainty in the regulatory landscape. However, some of the proposed authorities in the agency's document could be a hindrance to widespread adoption of autonomous vehicles.

These comments address the toolkit of proposed regulatory authorities in the agency's guidelines. In particular, the Niskanen Center will focus on our concerns related to pre-market approval, self-certification and hybrid certification/approval processes, and post-sale authority to regulate software changes. We also address the need for a thorough cost-benefit analysis of any new powers NHTSA seeks to adopt. Before concluding, we also include a very brief note on the topic of autonomous vehicle cybersecurity, and the ability for state-based torts to remedy potential consumer harms.

# Introduction

The advent of highly autonomous vehicles (AV/HAV) holds the potential to upend the century-old automobile industry. Like any new disruptive technology, however, there are likely to be numerous hurdles to surmount before AVs are incorporated into daily transportation life. Nevertheless, the Niskanen Center is happy to see the National Highway Traffic Safety Administration (NHTSA) is taking the emergence of this technology seriously, and that its new Federal Automated Vehicle Policy recognizes the many benefits likely to accrue to consumers and producers.

We applaud the agency's intention to adapt and supplement this document over the next year and on a consistent basis thereafter.[1] We are also supportive of the "Model State Policy" approach discussed in the document. Furthermore, we agree, as NHTSA argues, that individual states ought to "evaluate their current laws and regulations to address unnecessary impediments to the safe testing, deployment, and operation of highly autonomous vehicles, and update references to a human driver as appropriate."[2] These, we believe, are reasonable recommendations that can positively benefit the safe and expeditious deployment of this technology.

However, we remain concerned about some of the new authorities the guidelines propose. In particular, the potential for a pre-market approval authority stands out as the most troubling and could be a serious roadblock to efforts in deploying this life-saving technology. Additionally, there is a great deal that needs to be clarified when assessing the post-sale authority to regulate software patches and updates. We are unconvinced that NHTSA actually possesses the authority to regulate software updates in advance of their dissemination to customers.

Finally, we argue the need for a thorough cost-benefit analysis is not only a moral and public safety necessity, given the number of lives autonomous vehicles can potentially save, but also legally required if NHTSA pursues a statutory expansion of its authority. While we understand this document is merely a starting point for future conversations, we wish to emphasize the many concerns surrounding some of these proposed new authorities. Understanding the costs associated with seeking new, expanded statutory powers is a first step in comparing those costs with the likely benefits of this technology—an issue which we address at length in the section following the comments on Section IV(C)(1) of the draft policy guidelines.

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[1] "Federal Automated Vehicle Policy: Accelerating the Next Revolution in Roadway Safety," National Highway Traffic Safety Administration, U.S. Department of Transportation, September 2016, p. 8, https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf. ("[W]hile this policy is intended as a starting point that provides needed initial guidance to industry, government, and consumers, it will necessarily evolve over time to meet the changing needs and demands of improved safety and technology. Accordingly, DOT expects and intends this Policy and its guidance to be iterative, changing based on public comment; the experience of the agency, manufacturers, suppliers, consumers, and others; and further technological innovation. DOT intends to revise and refine the Policy periodically to reflect such experience, innovation, and public input. Although it would not be practical to set a specific time for the next iteration, DOT expects to issue the first revised, follow-on Policy sometime within the next year, and at roughly annual intervals thereafter.")

[2] "Federal Automated Vehicle Policy," p. 39.

In the interest of narrowing the scope of our concerns, these comments will be confined to addressing the following proposed authorities: pre-market approval, self-certification and hybrid certification/approval processes, and post-sale authority to regulate software changes.

## Consideration of Potential New Authorities

We have already seen NHTSA exercise a prohibition on certain semi-autonomous technology in the case of Comma.ai—causing the company to completely scuttle their post-sale upgrade technology.[3] While this is a case of the agency exercising existing aftermarket approval authorities, it is a telling indicator of how the emerging autonomous technology market could be stifled by more precautionary regulatory authorities. Companies like Google and Apple have the resources to effectively address onerously prescriptive mandates from NHTSA and other regulators. Smaller companies, however, are likely to follow Comma.ai to the innovation graveyard.

Many of the proposed new authorities, as crafted, will fall disproportionately on small, entrepreneurial domestic startups that lack sufficient legal resources to navigate a labyrinth of complicated regulatory requirements. Expanded use of a more robust pre-market approval authority is very likely to result in significant curtailment of domestic innovation of a technology that stands to save tens of thousands of lives. Many of these authorities are ultimately more likely to *negatively* impact public safety, by delaying deployment, driving up costs, and disincentivizing new market entrants.

In the past, NHTSA officials have admitted that their ability to regulate effectively was significantly hindered by rapid technological change. Indeed, this problem has been expressed on numerous occasions, leading some to argue that the ability for regulations to be productive and efficacious are limited.[4] A robust report from the RAND Corporation concurred, and pointed to the difficulty in setting regulatory standards for dynamic technological environments:

> *First, regulatory promulgation is fundamentally an iterative and slow process, given the cycles of proposals, requests for comments, reviews, and lobbying that precede rulemaking. Second, with [autonomous vehicle] technologies in particular, their newness and rapid evolution create uncertainty in both rulemaking effects and of the*

[3] Darrell Etherington, "Comma.ai cancels the Comma One following NHTSA letter," *TechCrunch*, October 28, 2016, https://techcrunch.com/2016/10/28/comma-ai-cancels-the-comma-one-following-nhtsa-letter/. ("[George]Hotz tweeted from the official Comma.ai account that rather than providing the requisite response [to NHTSA's 'special order'], the company would instead be cancelling Comma One entirely, and turning its attention to 'other products and markets,' since Hotz says that the prospect of a life 'dealing with regulators and lawyers … isn't worth it.'")

[4] James M. Anderson, Nidhi Kalra, Karlyn D. Stanley, Paul Sorensen, Constantine Samaras, Oluwatobi A. Oluwatola, "Autonomous Vehicle Technology: A Guide for Policymakers," RAND Corporation, 2014, p. 139. ("Given the lack of demonstrated problems with autonomous or self-driving vehicle use, we think state lawmakers would be wise to refrain from passing laws or developing regulations in this area. As NHTSA noted, evolution is occurring too rapidly and there are too many uncertainties for productive regulation at this time.")

> *technology itself. Moreover, with rapid technology changes, it can be challenging to prescribe rules that will remain relevant and appropriate through the development process. A government transportation official we interviewed stated that, when it came to issuing standards, he thought it was extremely difficult to stay relevant, given the swift pace of technological change.*[5]

This is true not just for autonomous vehicle technology, but indeed many categories of emerging technology markets, including commercial unmanned aerial vehicles systems (UAV/S) and artificial intelligence. However, despite the difficulties, we agree with the policy consideration conclusion of the RAND report, which argues:

> *[T]he guiding principle for policymakers should be that AV technology should be permitted and encouraged if and when it is superior to average human drivers. So, for example, safety regulations and liability rules should be designed with this overarching guiding principle in mind. ... This stands in contrast to an alternative approach of viewing AVs with more suspicion and requiring near perfection before introduction.*[6]

For this reason, we will argue that a pre-market approval authority, hybrid certification/approval authority, and post-sale authority to regulate software updates are not ideal policies to advance the safe and timely deployment of HAVs on American roadways.

## *Pre-Market Approval Authority*

In discussing the potential benefits of a pre-market approval authority, NHTSA's policy guidelines note the use of such authorities by the Federal Aviation Administration (FAA) "to regulate the safety of complex, software-driven products like autopilot systems on commercial aircraft, and unmanned aircraft systems."[7] In determining the value of such an authority, the FAA example provides insightful lessons that illuminate how such powers actually result in sub-optimal outcomes for regulatory rules of emerging technologies.[8]

Additionally, unlike UAS pre-approval authority, delays caused by AV pre-approval authority mean ongoing, daily American roadway deaths remain unaddressed. Delays induced by UAS certification and pre-approval do not, by contrast, contribute to the same level of transportation-related fatalities. Indeed, the policy guidelines point to clear differences in the statutory mandates of NHTSA and FAA:

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[5] RAND, "Autonomous Vehicle Technology," p. 139.
[6] Ibid., p. 145.
[7] "Federal Automated Vehicle Policy," p. 71.
[8] Eli Dourado, Ryan Hagemann, and Adam Thierer, comments submitted to the Federal Aviation Administration in the matter of: "Operation and Certification of Small Unmanned Aircraft Systems," Mercatus Center, submitted April 24, 2015, Docket No. FAA-2015-0150, https://www.mercatus.org/system/files/Dourado-UAS-PIC.pdf; *also see* Eli Dourado and Samuel Hammond, Comments submitted to the Federal Aviation Administration in the matter of: "Registration and Marking Requirements for Small Unmanned Aircraft," Mercatus Center, submitted January 15, 2016, Docket No. FAA-2015-7396, https://www.mercatus.org/system/files/Dourado-FAA-Registration-PIC.pdf.

> *In discussions with NHTSA about usefulness and feasibility of NHTSA's requiring some type of pre-market approval as a precondition to the manufacturing and selling of HAVs, FAA noted that there were significant differences between the industries and products FAA regulates and those NHTSA regulates in terms of the number of manufacturers, number of models, and number and frequency of new model introductions. For example, the FAA deals with only a few manufacturers and only rarely needs to approve an entirely new model of an airliner. NHTSA further notes that the motor vehicle industry's long-established practice of introducing motor vehicles on a model-year basis might create challenges for the industry due to potential delays in the beginning of production of vehicle models caused by the length of the approval process.*[9]

This admission makes us skeptical of the efficacy of instituting a pre-market approval authority, to say nothing of the uncertainty surrounding how NHTSA might employ such an authority when examining software—an area of expertise with which the agency has very little historical experience and institutional knowledge. Other commentators familiar with these issues concur, arguing that any pre-market approval authority mimicking the FAA's authority would likely consume immense time and resources, delaying deployment of autonomous vehicles and contributing to the furtherance of American roadway fatalities.[10]

We believe a pre-market approval authority is a poor avenue for regulating HAVs. In response to NHTSA's solicitation of comments, we argue such approval tools would only slow innovation, drive up costs, and delay deployment, resulting in ongoing, daily deaths and injuries.[11]

## *Self-Certification and Hybrid Certification/Approval Processes*

By NHTSA's own admission, the existing approach of manufacturer self-certification with Federal Motor Vehicle Safety Standards (FMVSS) seems to be working quite well. As a result, restructuring the agency's approval process is likely to encounter confusion, delay, and additional cost—both for the agency and manufacturers. NHTSA itself notes that: "Substitution of pre-market approval for all standards for which manufacturers currently self-certify would be a wholesale structural change in

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[9] "Federal Automated Vehicle Policy," p. 74. ("NHTSA solicits comments on the Agency's potential use of pre-market approval—including hybrid certification/approval processes—for evaluation of HAVs. In addition to other comments and input, NHTSA is particularly interested in comments regarding whether use of pre-market approval tools would expedite or slow innovation.")

[10] Adam Thierer and Caleb Watney, "Every day matters with driverless cars," *The Hill*, October 20, 2016, http://thehill.com/blogs/congress-blog/technology/301938-every-day-matters-with-driverless-cars. ("NHTSA admits that FAA certification often lasts three to five years and that the most recent FAA certification process for the Boeing 787 Dreamliner consumed an estimated 200,000 hours of FAA staff time and lasted eight years. That fact alone should foreclose further discussion about the wisdom of NHTSA employing an FAA-like pre-market approval regime for driverless cars. Over a quarter of a million people will have died in accidents during that eight-year approval process.")

[11] "Federal Automated Vehicle Policy," p. 73.

the way NHTSA regulates motor vehicle safety and would require both fundamental statutory changes and a large increase in Agency resources."[12]

We are skeptical that a wholesale transmogrification of NHTSA's institutional culture and expansion of authority would provide a positive benefit to public safety, especially when weighed against the many costs likely to result from such a move. Indeed, the guidelines go on to suggest that, initially, the agency "would not have objective performance metrics or test conditions and procedures to guide consistent, objective, and reliable evaluations of safety."[13] While that would undoubtedly change over time, it is important to remember that every day we delay in deploying autonomous vehicles results in dozens of people killed, and thousands injured—many of them children.[14]

NHTSA suggests a possible hybrid alternative to the current self-certification regime, mandating "the most safety-critical HAV systems subject to pre-market approval by the Agency," while permitting "other lower level automation systems and equipment subject to manufacturer certification."[15] While this would be a more ideal alternative to the proposed pre-market approval authority, the same concerns previously discussed (and discussed later in the cost-benefit analysis section of these comments) remain. It is also worth pointing out that NHTSA's comparison of such a process to the Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) certification and approval process is not wholly comparable to the situation of HAVs. First, the speed of technological progress in autonomous vehicles far outpaces any similarities seen in developments in hazardous waste transport security. Second, PHMSA regulations deal specifically with hazardous waste materials, which involve an entirely different set of public safety concerns. (Specifically, regulating the transport of hazardous materials is an attempt to minimize harms to the general public through exposure to such materials. Alternatively, HAV deployments, on net, are likely to save, not endanger, lives.)

As such, we would argue that even a hybrid certification and approval process fails to adequately balance public safety considerations and innovation, placing an unduly high burden on manufacturers and software programmers by subjecting them to overly-precautionary standards. For all these reasons, a hybrid certification system would not, as NHTSA seems to hope, "facilitate innovation, foster public confidence and acceptance, and be flexible and expeditious enough to keep pace with vehicle product development cycles."[16]

If the agency does decide to move away from a self-certification regime, the burden of proof for denying an applicant in any certification process should fall squarely on NHTSA. More ideally, the current self-certification system, as applied to traditional automobile manufacturers, should be

[12] Ibid., p. 73.
[13] Ibid., p. 73.
[14] *See generally* Adam Thierer and Ryan Hagemann, "Removing Roadblocks to Intelligent Vehicles and Driverless Cars," Mercatus Working Paper, Mercatus Center, September 2014, https://www.mercatus.org/system/files/Thierer-Intelligent-Vehicles.pdf.
[15] "Federal Automated Vehicle Policy," p. 75.
[16] Ibid., p. 75.

applied to autonomous vehicle manufacturers. The agency itself notes that a "combination of self-certification and DOT's strategic approach to ensuring compliance with the [Federal Motor Vehicle Safety Standards] historically has worked well."[17] In short, self-certification should be embraced and an approval-by default mentality should guide the agency's approach to assessing applicants.

## *Post-Sale Authority to Regulate Software Changes*

Although NHTSA maintains it currently possesses "authority to regulate the safety of software changes provided by manufacturers after a vehicle's first sale to a consumer," we remain unconvinced.[18] Indeed, NHTSA provides no statutory citation for these powers and, to the contrary, past commentators have actually challenged this assertion of authority.

For example, in comments provided to the agency in the matter of *Vehicle-to-Vehicle (V2V) Communications (Docket No. NHTSA-2014-0022)*, The Wireless Association (CTIA) argues that NHTSA lacks the authority to regulate apps and software under 49 U.S.C. § 30102(a)(7)(C).[19] Motor vehicle equipment, as defined in this subsection, constitutes:

> *(C) any device or an article or apparel, including a motorcycle helmet and excluding medicine or eye-glasses prescribed by a licensed practitioner, that*
> *(i) is not a system, part, or component of a motor vehicle; and*
> *(ii) is manufactured, sold, delivered, or offered to be sold for use on public streets, roads, and highways with the apparent purpose of safeguarding users of motor vehicles against risk of accident, injury, or death.*[20]

CTIA points out that:

> *[I]n certain circumstances, NHTSA has authority to regulate items that are not "accessories" under 49 U.S.C. § 30102(a)(7)(B) but are instead devices, articles and apparel created or sold for safety-related purposes.* ***The statutory history of this subsection shows that Congress enacted it to cover tangible items*** *such as motorcycle helmets and goggles, tire repair equipment, and vehicle safety testing equipment, which might not otherwise be covered under the definition of motor vehicle equipment.* ***The customary definitions of device, article and apparel denote tangible items and would not apply to apps or software.*** (emphasis added)

[17] Ibid., p. 72.
[18] Ibid., p. 77.
[19] Michael F. Altschul, "Federal Motor Vehicle Safety Standards: Vehicle-to-Vehicle (V2V) Communications, Advance Notice of Proposed Rulemaking, Docket No. NHTSA-2014-022," Comments submitted to the National Highway Traffic Safety Administration, October 20, 2014.
[20] 49 U.S.C. § 30102(a)(7)(C).

An examination of NHTSA's statutory authority suggests that, despite claims to the contrary, the agency does not currently possess the authority to pre-approve software patches and updates. We would agree that "[i]f a software change results in a defect posing an unreasonable risk to safety, NHTSA's defects and recall authorities apply."[21] However, that seems to be different than what the agency is proposing under Section IV(C)(1)(e). Our primary concern is that the agency's claim that post-sale "software updates could affect the basis for [manufacture certification]" and that "such updates would themselves constitute new items of motor vehicle equipment, subject to the certification requirement and verification."[22] As previously discussed, NHTSA does not appear to have any statutory authority to classify software updates as "new items of motor vehicle equipment," as these are not "tangible items," as pointed out by the CTIA comments.

We do not dispute NHTSA's defects and recall authorities. Indeed, identifying an autonomous system defect that negatively impacts vehicle performance likely falls under the agency's existing authority.[23] However, a great deal of clarification will be needed for outlining the specifics of when a recall order would be justified in the case of autonomous vehicles. Some argue that "the components of autonomous driving technology are motor vehicle equipment," and may be subject to recall, but only if those components are "installed (as aftermarket equipment) on a vehicle that was not originally manufactured as an autonomous vehicle."[24] Alternatively, as noted in the CTIA comments, it remains debatable as to whether the software algorithms, which are the core "component" of any autonomous vehicle technology, can reasonably be classified as "motor vehicle equipment."

Any proposal to extend these authorities to assessing post-sale software updates of autonomous vehicles, however, would necessitate new statutory authorities not currently proscribed to the agency. We argue that pursuing any such authority is likely to be time-consuming and resource-intensive, and that the agency should focus its efforts on promoting general best practices to guide manufacturer self-certification, rather than seek dubiously efficacious authorities such as these.

## Cost-Benefit Analysis: A Legal and Moral Necessity

While we argue many of these new authorities proposed by NHTSA are unnecessary, we nonetheless believe the agency is moving in the right direction. The most valuable role NHTSA can play in advancing the development and deployment of AV technology lies in establishing best practice

[21] "Federal Automated Vehicle Policy," p. 77.
[22] Ibid., p. 77.
[23] Stephen P. Wood, et. al., "The Potential Regulatory Challenges of Increasingly Autonomous Vehicles," *Santa Clara Law Review*, Vol. 52, No. 4, December 20, 2012,, pp. 1488-1489, http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=2734&context=lawreview. ("The Safety Act generally gives NHTSA the ability to order recalls of autonomous driving technologies because of defects present in the components of those technologies or because of defects attributable to the improper installation of the technology by an alterer. ... Under the Safety Act, the presence of a defect is not dependent on the source of the performance failure leading to an unreasonable risk to motor vehicle safety.")
[24] "The Potential Regulatory Challenges of Increasingly Autonomous Vehicles," p. 1489.

guidelines for what constitutes a minimum threshold standard of safety, and making the process transparent to the public.[25]

If NHTSA decides to pursue the additional regulatory authorities outlined above, a thorough and comprehensive cost-benefit analysis will be required, pursuant to E.O. 12866, which holds, in part, that:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*[26]

The scope of proposed new authorities in this document constitutes a "significant guidance document," which, as stated under E.O. 12866 Sec. (3)(h):

> *(1) means a guidance document disseminated to regulated entities or the general public that, for purposes of this order, may reasonably be anticipated to:*
>
> > *(A) lead to an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities.*[27]

The projected annual economic impact of the introduction of AVs has been studied at some length. Even taking a conservative view of a ten percent market penetration rate for autonomous vehicles suggests the potential benefits of this technology far exceed the $100 million baseline set by the definition of "significant guidance document" under E.O. 12866 Sec. (3)(h)(1)(A).[28] Additionally, this is

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[25] Nidhi Kalra, "When Will We Know Self-Driving Cars Are Safe?," RAND Corporation, September 25, 2016, http://www.rand.org/blog/2016/09/when-will-we-know-self-driving-cars-are-safe.html?adbsc=social_20161005_1027251&adbid=783798933424185344&adbpl=tw&adbpr=22545453. ("First, it sets a minimum safety bar that developers must clear before they can make their autonomous vehicles available to the public. This bar is necessary (though not provably sufficient) for safety. But the transparency is perhaps even more important. Assuming that developers' information will be available in some form to the public, it would give consumers the ability to make choices about whether or not to use one autonomous vehicle or another.")

[26] Executive Order 12866 of September 30, 1993, as amended by E.O. 13258 of February 26, 2002 and E.O. 13422 of January 18, 2007, https://www.dol.gov/sites/default/files/ebsa/laws-and-regulations/laws/executive-orders/eo12866.pdf.

[27] Executive Order 12866 Sec. (3)(h)(1)(A).

[28] Adam Thierer and Ryan Hagemann, "Removing Roadblocks to Intelligent Vehicles and Driverless Cars"; *see also* RAND, "Autonomous Vehicle Technology."

the same baseline set for "significant regulatory action," which would undoubtedly apply to any new regulatory tools or authorities proposed by NHTSA for statutory authorization.[29]

In particular, NHTSA will need to examine the costs as they pertain to continued loss of life on the American roadways. By the agency's own estimates, 2015 saw 35,092 roadway deaths and 2,443,000 injuries, including a 5.9 percent increase in deaths of children under the age of 16 from the previous year.[30] This is the current state of affairs that should serve as a baseline analysis against the potential safety concerns related to AVs. For example, although a great deal of attention was paid to the May 17, 2016 crash of a Tesla operating in semi-autonomous Autopilot mode, what went unreported were the many dozens of other automobile deaths that occurred that same day as a result of human-operated error.[31] According to NHTSA's own statistics, in the second quarter of 2016 (April-June) alone, 9,600 people died on American roadways, up 9.5 percent from the same quarter the year prior.[32]

A request for pre-market approval authority for autonomous vehicles will require NHTSA to account for costs in relation to continued loss of American lives, additional costs accrued by manufacturers, lost market share to foreign competitors, and other considerations, weighed against the supposed safety benefits of delayed market entry for autonomous vehicles.

The NHTSA guidelines suggest that a pre-approval regulatory authority may "contribute to public acceptance of and confidence in HAVs, because it would involve affirmative approval by the federal government of the safety of HAVs and new safety technologies."[33] This is a dubious assertion, and one the agency would be hard-pressed to back up. Public acceptance of new technologies tends to be more closely correlated with time and exposure/proximity, not with regulatory rules.[34] However, even if we were to grant that such authorities resulted in greater "public acceptance of and confidence in" AVs, that benefit would need to be weighed against the cost of delaying deployment of this life-saving technology.

NHTSA should engage in a full and robust cost-benefit analysis of the potential economic and social implications of these proposed authorities, including assessing alternative scenarios in which no new authorities are promulgated. Failure to do so could very well mean AVs suffer the same uncertain fate

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[29] Executive Order 12866 Sec. (3)(f)(1). (This section mirrors that of Sec. (3)(h)(1)(A) when discussing "significant regulatory action." It states, in part: *"Significant regulatory action" means any regulatory action that is likely to result in a regulation that may: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities.*)

[30] "2015 Motor Vehicle Crashes: Overview," National Highway Traffic Safety Administration, August 2016, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812318.

[31] Fred Lambert, "Understanding the fatal Tesla accident on Autopilot and the NHTSA probe," electrek.co, July 1, 2016, https://electrek.co/2016/07/01/understanding-fatal-tesla-accident-autopilot-nhtsa-probe/.

[32] "Early Estimate of Motor Vehicle Traffic Fatalities for the First Half (Jan–Jun) of 2016," Traffic Safety Facts, National Highway Traffic Safety Administration, October 2016, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812332.

[33] "Federal Automated Vehicle Policy," p. 72.

[34] Adam Thierer and Ryan Hagemann, "Removing Roadblocks to Intelligent Vehicles and Driverless Cars."

as the domestic commercial drone industry is experiencing with lagging FAA rules, with the added cost of continuing loss of life on American roads.[35]

## A Brief Note on Cybersecurity

The commercial roll-out of AVs are likely to involve considerable debate and scrutiny surrounding issues of privacy and cybersecurity. We note these concerns because some legislators have taken to calling for NHTSA, in conjunction with the Federal Trade Commission (FTC), to impose cybersecurity standards.[36] While the promulgation of such standards would seem unobjectionable at face value, we urge caution in examining the feasibility of imposing one set of security standards for all autonomous vehicles. Different security standards will emerge in response to real world, yet-unknown vulnerabilities, at which point software engineers and manufacturers will be better positioned to assess the various costs and benefits of employing a multitude of standards.

Running headlong into establishing federal cybersecurity standards runs the risk of incentivizing technological lock-in, resulting in a "race to the bottom"—that is, with a baseline mandate from NHTSA and the FTC, manufacturers will be less inclined to invest in continual improvements to security. A better alternative would be to leave standards of "reasonable security" to engineers and automakers—or delegated to the National Institute of Standards and Technology—who in turn are more likely to effectively address real, proven harms to consumers.[37] Automakers are historically held liable for "defects" in their automobiles, conditioned on state tort liabilities. This system has served remedying consumer harms quite well for traditional automobiles, and there is no indication the fundamentals would change for the worse if applied to autonomous vehicles.

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[35] Eli Dourado and Andrea O'Sullivan, "FAA Projections Reflect Deep Uncertainty about the Effect of Regulations on Drone Adoption," Mercatus Center, May 18, 2016, https://www.mercatus.org/publication/faa-projections-reflect-deep-uncertainty-about-effect-regulations-drone-adoption. (In its own projections, the FAA admits uncertainty about the effects its recently proposed drone rules will have for a still-nascent domestic market. Yet it failed to conduct a reasonable cost-benefit analysis that effectively captured all the potential effects of its proposed rules: "The fact that there is so much uncertainty about the effect of the FAA's regulations on the immature and fragile market for sUAS suggests that the regulations are far too burdensome.")

[36] "Markey, Blumenthal To Introduce Legislation to Protect Drivers from Auto Security and Privacy Vulnerabilities with Standards and 'Cyber Dashboard,'" Press Release, Office of Senator Ed Markey, February 11, 2015, http://www.markey.senate.gov/news/press-releases/markey-blumenthal-to-introduce-legislation-to-protect-drivers-from-auto-security-and-privacy-vulnerabilities-with-standards-and-cyber-dashboard.

[37] John Villasenor, "Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation," Brookings Institution, April 2014, p. 16, https://www.brookings.edu/wp-content/uploads/2016/06/Products_Liability_and_Driverless_Cars.pdf. ("Liability for vehicle manufacturing defects has always been the province of state courts applying state tort remedies. That should continue to be the case for autonomous vehicles. While it is certainly true that state court remedies are sometimes inconsistent, it does not follow that the solution is for the federal government to strip state courts of their authority. Among other problems, federal preemption would put the federal government in the impossible position of trying to formulate the 'right' set of liability standards that would then be imposed, including the inevitable mistakes they would contain, on the states.")

For the time being, cybersecurity regulations for autonomous vehicles are likely to do more harm than good. Indeed, automakers and AV researchers and developers are already hard at work on these issues.[38] As John Villasenor notes in a 2014 Brookings Institution report on liability concerns associated with autonomous vehicles: "The United States has a robust products liability law framework that, while certainly not perfect, will be well equipped to address and adapt to the autonomous vehicle liability questions that arise in the coming years."[39] That same framework will be more than adequate to remedy issues related to AV cybersecurity.

## Conclusion

NHTSA has a difficult task before it. In a report assessing intelligent vehicle and highway systems from 1991, the DOT postulated that we should not expect the "fully automatic road" "to be deployed earlier than 40 years from now."[40] Yet the advent of AVs became apparent less than two decades after that predicted timeline. Now here we are, less than 30 years later.

Predicting the future is a challenge—perhaps insurmountably so. This is especially true when attempting to craft rules of the road for new and disruptive technologies that could look very different just a short time later. As such, a general disposition towards regulatory forbearance would be a more ideal alternative to any of the newly proposed authorities in these guidelines.[41] Many other countries are wrestling with many of the same regulatory issues,[42] and thus far—to the credit of NHTSA—the lack of prescriptive domestic regulations has positively contributed to innovation here in the United States. Whether that remains the case moving forward is largely up to policymakers and regulators.

These policy guidelines noted that the DOT "does not intend to advocate or oppose any of the tools" it discusses in the document.[43] The Niskanen Center is happy to hear that NHTSA is committed to fact-based rulemaking on this issue, and is interested in an objective assessment of the benefits and costs of various regulatory paths before it. Nonetheless, we remain concerned that a number of proposed authorities in this guiding document hold the potential to curtail innovation and

[38] Adam Thierer and Ryan Hagemann, "Removing Roadblocks to Intelligent Vehicles and Driverless Cars," pp. 40-41. ("Manufacturers have powerful reputational incentives at stake here, which will encourage them to continuously improve the security of their systems. Companies like Chrysler and Ford are already looking into improving their telematics systems to better compartmentalize the ability of hackers to gain access to a car's controller-area-network bus. Engineers are also working to solve security vulnerabilities by utilizing two-way data-verification schemes (the same systems at work when purchasing items online with a credit card), routing software installs and updates through remote servers to check and double-check for malware, adopting of routine security protocols like encrypting files with digital signatures, and other experimental treatments.")
[39] John Villasenor, "Products Liability and Driverless Cars," p. 18.
[40] "Smart Highways: An Assessment of Their Potential to Improve Travel," Report to the Chairman, Subcommittee on Transportation, Committe on Appropriations, U.S. Senate, May 1991 http://www.gao.gov/assets/160/150579.pdf.
[41] Adam Thierer and Ryan Hagemann, "Removing Roadblocks to Intelligent Vehicles and Driverless Cars."
[42] Darrell M. West, "Moving forward: Self-driving vehicles in China, Europe, Japan, Korea, and the United States," Brookings Institution, Center for Technology Innovation, September 2016, https://www.brookings.edu/wp-content/uploads/2016/09/driverless-cars-3-ed.pdf.
[43] "Federal Automated Vehicle Policy," p. 70.

deployment of what is bound to be a technology that helps ameliorate one of the most pressing public health hazards of modern times: roadway fatalities due to human-operated error of automobiles.

We thank you for the opportunity to comment on these draft guidelines and look forward to a constructive dialogue moving forward.