Autonomous Vehicle Developers Should Be Encouraged To Search For Safety

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Summary

Through autonomous vehicles, driver assist technologies or a bevy of other applications, vehicles are getting smarter. The loss of life and incidence of injury could see a dramatic dip if autonomous vehicles are more widely deployed. In this vein, the Department of Transportation (DOT) and the National Highway Traffic Safety Administration (NHSTA) released the Federal Automated Vehicles Policy and have asked for public comment on a number of important topics.[1] While there is a lot to be commended in this policy, regulation surrounding autonomous vehicles should support innovation by taking the following considerations into account:

- Congress and NHSTA could avoid a knee-jerk, regulate-first stance by first considering whether the market is capable of innovating without express government permission and pre-approval;
- NHSTA has enforcement authority under current law and could likely use that when appropriate, and;
- Insurance and liability rules will continue to drive safety standards, and that reality should be acknowledged before regulatory measures are applied.

Introduction

Automated driving technologies are progressing at a breakneck pace after decades of research and application. While autonomous vehicles seem to be a radical break in driving technologies, adaptive cruise control, which adjusts vehicle speed to maintain a safe distance from other vehicles, became available to the public beginning in the early 2000s. Since then, new technologies such as lane-keeping assistants and highway driving assistants have become available. Highway driving assistants allow a vehicle to monitor its speed while maintaining a safe distance from other vehicles and stay within its lane.[2] The result has been a dramatic reduction in accidents, cutting them down by 23 percent.[3] Driver error is by far the most common factor implicated in nearly 95 percent of all vehicle accidents.[4] Sadly, over 35,000 people died last year on the road.

Working in conjunction with researchers in and robotics, the automotive industry is progressing towards fully autonomous cars in part because of the potential safety benefits.[5] Following other countries, the NHSTA has jettisoned its own standard and adopted instead the Society of Automotive Engineers (SAE) standard for levels of automation with this policy, clearing up confusion. SAE delineates Level 0 through Level 2 as vehicles being driven by humans, while Level 3 through Level 5 as vehicles being driven by automated systems.[6] Throughout the policy, the NHSTA refers to automated vehicles as Highly Autonomous Vehicles (HAV). Consumer ready products already feature some level of automated driving functionality, the most famous example of which is Tesla's Autopilot. However, the currently deployed version of Autopilot is simply an advanced version of Level 2. A system that could be considered a Level 3 or higher has not been put into production and is only being tested.

Driven by concerns of safety and development, the Federal Automated Vehicles Policy offers guidance and suggestions for bringing these new technologies into wider use.

Policymakers Should Embrace Permissionless Innovation

The most radical change this policy proposes is the creation of a pre-market approval process or hybrid process to ensure adequate safety for automated vehicles. As explained,

Among the categories of new regulatory tools and authorities DOT might apply to regulate the safety of HAVs are pre-market safety assurance tools. Such tools could include pre-market testing, data, and analyses reported by a vehicle manufacturer or other entity to DOT. Those tools would be designed to demonstrate that motor vehicle manufacturers' and other entities' design, manufacturing, and testing processes apply NHTSA performance guidance, industry best practices, and other performance criteria and standards to assure the safe operation of motor vehicles, before those vehicles are deployed on public roads.

Both the agency and Congress should resist calls for this kind of regulatory tool. Instead, they should rely upon the longstanding self-certification process that has been the hallmark of safety regulation for over half a century. Gone would be the era of permissionless innovation, developers would have to work with the agency to come to market, slowing development.

As a regulatory mechanism, pre-market approval has been used sparingly by Congress and for good reason. Notably, the Food and Drug Administration (FDA) has been granted the authority to require pre-market approval for drugs and medical devices. But the agency has been the target of reforms like the fast-track program to ensure drugs come to market.[7] Pre-market approval is a costly and time consuming process for both drugs, fulfilling a significant portion of the $1.5 billion it takes to bring a drug to consumers.[8] For medical devices, the approval process alone can range from $31 million to $94 million. Moreover, in the US it takes an additional four years to get the go ahead as compared to Europe.[9]

The NHSTA references the pre-market process in aviation, which regulates "the safety of complex, software-driven products like autopilot systems on commercial aircraft, and unmanned aircraft systems." The estimated time to market for commercial aircraft is on the order of 8 years, with one year of that dedicated to flight testing and certification.[10] On the other hand, automobiles take about 36 to 48 months to bring to market, and in some cases the time can be as low as 24 months from initial concept to market product.[11] As research has found, well managed firms view commercialization as a highly disciplined system and set measurable goals for ongoing improvement.[12] Firms deploying autonomous vehicles would be in the same boat.

In coping with potentially destructive events, public policy can aim for strategies of anticipation or resilience, as the pioneering risk theorist Aaron Wildavsky explained. Resilience enables "the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back," while anticipation aims "to predict and prevent potential dangers before damage is done." Pre-market approval is a kind of anticipation strategy that focuses on predicting specific hazards through centralization of decision making and detailed standards.

As Wildavsky famously noted, safety doesn't magically appear, it must be actively searched for. FDA drug trials, flight testing, and the currently running autonomous vehicles tests are all methods of searching for safety. In the case of HAVs, safety is achieved through the learning that occurs with roadmiles. Competition among firms now is occurring via the complexity and adaptability of these learning systems.[13] Indeed, Google is

likely to be a continued leader in the space since their cars have driven more than 2.2 million miles since 2009, [14] can recognize hand signals from traffic officers, and can respond at speeds few humans can match.[15] Importantly, these learning systems can be continually updated, compiled, and then exported as a software package, giving each new HAV the cumulative knowledge of all previous interactions. As the market marches towards a viable consumer product, the benefits of a pre-market approval system quickly fade. Instead of putting each new iteration through the regulatory gauntlet, NHTSA should be ready to use their current enforcement authority and ensure everyone knows the current state of play.

NHSTA Can Protect Consumers With Current Enforcement Authority

Manufacturers of automated vehicle systems will still be subject to NHTSA current enforcement authority, which includes letters of interpretation, exemptions from existing standards, rulemakings to amend existing standards or create new standards; and enforcement authority to address defects that pose an unreasonable risk to safety.

These tools have served to both protect consumers and expedite cars to market. Self-certification has continually proven to be a workable model without any of the problems that occur with pre-market approval in other countries. Since the usefulness of these tools is widely accepted and clearly beneficial, the agency should make the information that comes from these actions more widely available via a data dashboard as well as ensuring that Data.gov is up-to-date.[16] Data sets that are available in machine-readable and open formats would take a step toward increased transparency into what would will likely be a quickly changing regulatory process.[17]

Pay Attention to Insurance / Liability

Scant attention is paid to issues of insurance and liability in this policy even though they will be key elements in safety regime. The policy notes that "it may be desirable to create a commission to study liability and insurance issues and make recommendations to the States." Regardless of the exact form that liability takes in the coming years with regard to autonomous vehicles, their existence and continued development undercut a reason for pre-market approval.

In general, products liability law has been extremely adept in responding to new technologies as they come to the market.[18] The interactions of liability and insurance form the legal backdrop to the permissionless regulatory regime and will do much of the heavy lifting to guard consumers. In the past, car manufacturers have been involved in suits over cruise control systems and adaptive control systems, precursors to more intelligent systems on the way. For their own part, Google, Mercedes, and Volvo each expect that they will be held liable in the event of an accident. Thus, wide commercial deployment will be extensively tested.[19] The shadow of a future lawsuit looms large over the development of HAVs, yet this aspect is hardly highlighted in the policy. Allocation of liability will drive deployment decisions and safety protocols.

Conclusion

While some consider it a revolutionary break, the regulatory apparatus to ensure consumer safety in autonomous vehicles is already in place. NHSTA already has the tools that it needs, making pre-market approval largely unnecessary. However, the agency could ensure that developers have all the information they need, by making data more available. Like other public policy areas, the optimal legal and regulatory institutions will need to be discovered, methods of avoiding a collision will have to be discovered with testing. If NHSTA is granted the ability to determine which autonomous systems can come to market, the natural evolutionary process will be

slowed.

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