NHTSA's Role and Stakeholder Influence in Shaping Autonomous Vehicle Policies

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On my honor as a University Student, I have neither given nor received unauthorized aid on this
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Introduction:

The rapid advancement of autonomous vehicle (AV) technology has sparked interest and discussion worldwide. As autonomous vehicles become more prevalent, understanding their impact on society and how they will affect the world is essential. According to the data provided by the Crash Stats from the National Highway Traffic Safety Administration (NHTSA), 95% of accidents are caused by human errors (Crash Stats: NHTSA, 2015). If autonomous vehicles can get rid of or at least minimize human mistakes, then it will be incredibly beneficial for the safety of the road. Autonomous vehicles are far from being perfect, which is why I will examine the beginning stages of the technology. This research paper will delve into the evolving landscape of autonomous vehicles and the policies involving these changes. Understanding autonomous vehicles is essential because, with the current innovation of autonomous vehicle technology, we will see them a lot on the roads. AVs hold immense promise to change the transportation system worldwide and benefit from those advancements. Realizing these benefits helps establish safety regulations and more AV testing during the beginning stages.

NHTSA is a crucial agency within the United States Department of Transportation (DOT) responsible for overseeing road safety and reducing the number of accidents, injuries, and fatalities on American roads. Established in 1970, NHTSA sets and enforces safety performance standards for vehicles. It also investigates safety defects and researches road safety issues while promoting public awareness campaigns to educate drivers on safe driving practices. Its mission encompasses various activities, from regulating vehicle manufacturing standards to developing and promoting initiatives to prevent drivers from being involved in an accident. NHTSA's efforts are crucial for the safety of motorists, pedestrians, and cyclists nationwide.

In this paper, I will argue that despite the NHTSA regulatory mandate, NHTSA's influence in shaping autonomous vehicle policy remains limited, whether due to insufficient funding or a lack of dedicated commitment to the advancement of autonomous technologies. NHTSA has become the most prominent program that enforces traffic safety policies. This puts them in a critical place where they must look into many variables before placing those policies. With the complexity of autonomous vehicles, NHTSA has no choice but to rely on private companies or other stakeholders to help provide data on the subject. Adding the reliance and underfunding of NHTSA has shifted the power to other stakeholders regarding the policy-making on autonomous vehicles. Although NHTSA still has some say regarding policy-making, it doesn't hold as much power as it should. The remarkable growth of autonomous vehicles in interest and testing initiatives over the past decade has grown. Focusing on the role of stakeholders and the regulatory framework provided by the National Highway Traffic Safety Administration (NHTSA). The paper employs the Social Construction of Technology (SCOT) framework to understand how social groups shape AV development and policies—analyzing various materials, including NHTSA documents, industry publications, and research articles. Using the findings from those articles, the paper analyzes and provides insights into the dynamics shaping AV safety regulations. It aims to clarify the complex interplay between technological advancement, regulatory practices, and societal concerns within AVs. It also looks into the roles of different stakeholders and how they influence the process of AV policymaking.

Literature Review:

The growth of autonomous vehicles over a decade has gotten the attention of many people worldwide. People are more interested in AVs now than ever before. According to an article about *Understanding the Long-Term Emergence of Autonomous Vehicles Technologies,* "The number of peer-reviewed publications from 2000-2009 is nearly three times the number of articles from 1991-2000. The publications from the recent 10-year period (2008- 2017) are more than twice the number of publications from 2000-2009" (Seokkyun W, Jan Y, Ingrid O, & Fenja S, 2021). With the people's interest growing, more manufacturer companies would rush to test the vehicle to be the first to put AVs on the road.

The growing interest in Autonomous Vehicles (AVs) has led to a significant uptick in the frequency of AV testing initiatives. NHTSA provides information on who has been testing AVs and how they have changed. In a 2021 article published by NHTSA, "Previously, nine states and nine companies fully participated in the AV-TEST pilot initiative. Under the expansion, 52 companies, governments, and associations are now participating". This shows the massive growth in AV testing from all companies and how even the government has been interested in the subject. This AV testing is crucial because it helps people and companies understand the capabilities and limitations of AVs. The constant lead of the new findings by the test would promote healthy competition in which the public can review and compare different results. The more companies test the vehicle, the more data can be collected. This journal, *Maturity in Automated Driving on Public Roads: A Review of the Six-Year Autonomous Vehicle Tester Program*, talks more about the permit holders that can test autonomous vehicles privately, "the increase in the number of active permit holders. As of 2019, there were a total of 39 unique

permit holders, conducting AV testing in the program" (Guo & Zhang, p.2, 2022). With the increase in permit holders, there is an increase in AV testing. The large amount of testing would lead to a massive amount of data being collected.

Since the growth of autonomous vehicles, many studies have examined the crucial subjects that AVs are involved in. There has been a lot of talk about crash reporting for automated driving systems and its limitations. There were many things to consider before the data were obtained from that reporting because of the General Order from NHTSA for accurate interpretation and analysis. The General Order from NHTSA touches on some limitations: "Access to Crash Data May Affect Crash Reporting. Incident Report Data May Be Incomplete or Unverified. Redacted Confidential Business Information and Personally Identifiable Information. The Same Crash May Have Multiple Reports" (NHTSA, 2022). When obtaining crash reports for autonomous vehicles, NHTSA has to be careful about how the data has been reported and understand whether or not the data is reputable. The data might look reputable on paper, but it might be a different story in practice. The reason that data about AVs is lacking in practice is explained by Song Wang and Zhixia Li when discussing the limitations of data collecting. In the journal *Exploring the Mechanism of Crashes with Automated Vehicles Using Statistical Modeling Approaches,* "Some of the AV field tests are still underway in the closed course without field test data being published. For the public road tests, most states' Department of Motor Vehicles (DMV) did not publish the AV crash data or/nor update their crash report." (Wang & Li, p.2, 2019). This provides us with proof of the limitation of data collection in autonomous vehicle crash reports.

The limitation of data collection in autonomous vehicles also relates to the fact that NHTSA has insufficient funding and staffing. Joan Claybrook, administrator of NHTSA, during her talk at Wayne State University about the current state of NHTSA, said, "The agency is understaffed and under-funded, with a hard-to-navigate website that makes it difficult to file complaints. To be effective, NHTSA needs more funding, staff, a user-friendly website, and transparent decision-making" (Ammar, p.21, 2014). This means NHTSA does not have enough money or people to do all the tasks they are responsible for, such as crash testing. They must rely on other private companies to test autonomous vehicles and share their findings. This case study of the National Highway Traffic Safety Administration recalls, "An underfunded regulatory agency, such as the NHTSA, is simply unable to carry out a mission as broad and important as the NHTSA's" (Finch, p.492, 2009). This proves that NHTSA has not been able to do the necessary research regarding autonomous vehicles because of the funding issues that it is facing. Relying on getting data for autonomous vehicles, especially the crash test, might skew the results and provide us with misleading information. NHTSA must be careful about who receives those data and how they receive it.

Framework:

The conceptual framework guiding this research paper is the Social Construction of Technology, or SCOT, developed by Pinch and Bijker. SCOT proposes that different social groups play a significant role in shaping how technology is made, used, and changed. This framework suggests that technology and society are co-constructed, implying that society influences technological development and vice versa.

A key term to this framework is the connection of relevant social groups. Groups that are involved around a shared understanding of a particular technology. In this research paper, relevant social groups include manufacturers, consumers, others on the road, and regulatory agencies like the National Highway Traffic Safety Administration (NHTSA). These groups are to contribute different perspectives and interests that influence the development of autonomous vehicles.

Another important concept from the SCOT framework is the multi-directional model. This model suggests that technological development can take various directions and outcomes. This model indicates the exploration of why specific AV variants succeed while others fail. It could be a small part of AVs has done better than a different variant of that part. This helps us understand why certain AV designs are approved or banned by NHTSA. This concept provides insight into how social values and concerns shape technological trajectories. I will use this framework to show how NHTSA has implemented policies regarding the improvement of autonomous vehicles and how the policies have changed due to changes in AVs.

Method:

To gather the information needed for this research, I analyzed documents, press releases, speeches, and presentations released by NHTSA regarding AV safety. By examining policy changes implemented by NHTSA from 2017 onwards, I aim to see where the shift in regulation occurs. I want to see those changes in response to advancements and challenges in AV technology. I intend to explore the cause of those changes and understand the different social groups involved. To understand what each stakeholder has to say about the advancements or the

modifications to the policies, I will read into the companies' points of view by reading into what they have posted regarding that subject. This research method will allow for a comprehensive examination of the connection between different social groups and how they participate in making those changes to the policy. This approach can offer valuable insights into all the related social groups involved, such as manufacturers, consumers, others on the road, and NHTSA. This method also addresses the complexities of technological innovation and regulation.

Analysis:

The NHTSA's self-reporting for crash data from automated driving systems improves crash reporting using real-time vehicle data. Self-reporting from the companies has been one of the most significant ways to gain data on AVs. The reports come from companies that have testing licenses for AVs. We can understand that the data comes from reliable sources such as Google and other big AV companies. Google tested the most significant number of autonomous vehicles in 2017. According to the research article *Examining accident reports involving autonomous vehicles in California*, " Google's reports of AV accidents account for 84% of the total. This disparity is due to the much larger effort (when compared to the other reporters) in terms of fleet size and mileage travelled" (Favarò, p.6, 2017). The information gathered from all the accidents reported by Google has benefited the innovation of autonomous vehicles. Learning and testing are the best ways to create a product that would be best placed on the road. Especially autonomous vehicles, which are complicated to understand. Some may say that NHTSA relies on self-reporting for crash data from automated driving systems, which makes crash reporting less accurate and complete. With this being said, NHTSA must understand the limitations of the data produced from self-reporting. They have to understand the loopholes that can be created to let

companies focus more on competition rather than safety than how they can affect the future of autonomous vehicles and their safety policies.

The fast growth of AV testing could make loopholes in regulations, letting companies focus more on competing in the market than on safety standards. As stated in this law journal by UCLA, "If this misapplication of law and regulation remains unchallenged, the risk remains that other AV industry participants, not only Tesla, may use this "loophole" to gain some advantage at the expense of safety33 (though we do not foresee other major AV industry participants going so far as to use their own customers as "beta testers")" (Widen. & Koopman, p.178, 2022). This shows that there are loopholes that AV companies can use to exploit and get an advantage over their competitors. We were able to get some light on some loopholes, but others might go without being overlooked. This proves that NHTSA needs to be careful about what laws and policies are being passed down so that there are no loopholes or at least a minimum amount. Loopholes do not always lead to lousy intentions but could lead to the help of rapid growth of AV testing. This could lead to innovation and technological advancement of AVs, ultimately leading to safer vehicles.

The NHTSA's emphasis on data transparency and collaboration among industry players enhances public trust and confidence in AV technology. According to the article *Autonomous Vehicles: U.S. Regulatory Policy Challenges*, it states that "December 2018 Rasmussen Reports national telephone and online survey found just 14% of American adults say they would hire a self-driving vehicle through a service like Uber or Lyft, while 75% say they would opt for a car they can drive themselves" (Hemphill, p.1 2020). To gain the public trust and confidence in AV

technology, all manufacturers must be transparent in their data sharing and collaboration in the industry. Sharing data can lead to a deeper understanding of autonomous vehicle technology. This could help accelerate technological advancements and ultimately enhance the safety of AVs. Even through NHTSA's effort to prompt transparency, the NHTSA's data sharing and collaboration strategies might still require sufficient mechanisms to effectively uphold accountability and manage potential conflicts of interest within the automotive industry. There are a lot of examples of hindrances to the advancement of AV technology due to the lack of data shared by one company to another and the lack of collaboration. One example is Tesla not sharing the raw crash data with other original equipment manufacturers (OEMs). The crash occurred when the Tesla sensor was not able to distinguish the 18-wheeler's white trailer from the bright sky, and the auto-pilot decided to go full speed into the truck, instantly killing the driver. Following the incident, Tesla figured out the issue regarding the accident using video footage, radar logs, and sonar sensor data. They upgraded the auto-pilot feature based on the findings from the incident. They didn't share their data with other OEMs, and their reasons were that "Competitors who make the same mistake must figure out a solution themselves" (Krompier, p.441, 2017). After this incident, NHTSA came forward with a Federal Automated Vehicles Policy (AV Policy). The policy states that OEMs should develop a plan to share their data. This would accelerate knowledge and understanding of self-driving cars' performance (Krompier, p.443, 2017). This seems like an innovation for data-sharing; however, this policy is just a non-binding guideline for future regulation. Mandatory regulations for data sharing and mechanisms for ensuring accountability are necessary steps to foster public trust and confidence in autonomous vehicle technology.

Expanding AV testing encourages healthy competition and information sharing within the industry. However, it does not guarantee the establishment of clear safety regulations in a recent incident in Florida with the driverless shuttle transporting school children. Transdev is the company that was in charge of the driverless shuttle. They were using EZ10 generation II to transport children around the Southwest area of Florida without having it thoroughly tested. NHTSA directed a driverless shuttle to cease transporting school children because of its non-compliance with safety standards. NHTSA Deputy Administrator. "Using a non-compliant test vehicle to transport children is irresponsible, inappropriate, and in direct violation of the terms of Transdev's approved test project" (NHTSA, 2018). Transporting people without having done the proper testing that guarantees the safety of the children being transported shows that the companies are more focused on the innovation of AVs rather than the safety of the people. The advancement of technology is coming before the safety of the people. NHTSA has implemented policies that are in the best interest of public safety rather than innovation. Heidi King, Administrator of the National Highway Traffic Safety Administration, stated in a public statement, "Innovation must not come at the risk of public safety"(NHTSA, 2018). Some argue that the advancement of AV technology correlates to the overall improvement of the public's safety in the future. The public safety of the future does not mean that the public safety during the testing phase should be disregarded. Finding the balance between innovation and safety is crucial, even during the testing phase. In this case, NHTSA does have a significant role in policy making and stopping under-tested vehicles from transporting children. This doesn't underline that the driverless vehicle proposal was accepted by NHTSA due to its carelessness. This situation provides information that NHTSA doesn't entirely research the policies they are accepting and only shows their face when there is a high chance of public safety concerns.

The involvement of various stakeholders in shaping AV safety policies ensures comprehensive consideration of societal needs and concerns. Stakeholders include manufacturers that are doing testing on autonomous vehicles. As of May 2017, the California Department of Motor Vehicles (CA DMV) had permitted thirty manufacturers to conduct AV testing on public roads, reflecting the growing interest and investment in this transformative technology. Different manufacturers are focusing on various levels of autonomy. Semi-autonomous vehicles have been the lead for most vehicles that have been tested and are currently leading the testing field. (Favarò, p.3, 2017). This provides us proof of the growing interest and investment in autonomous vehicles. However, amongst this enthusiasm for improving autonomous vehicles, notable incidents such as the Tesla Model S crash in May 2016 have ignited debates about the adequacy of existing regulations and the safety of semi-autonomous vehicles. This has led to some discussion on tightening the requirements for autonomous vehicles. This incident has underscored the importance of comprehensive safety policies that consider stakeholders' diverse needs and concerns. According to a research article published where they were examining accident reports involving AVs in California has stated that "Many automakers have advanced the hypothesis that skipping Level 3 altogether and aiming directly for Level 5 (although on a longer timeline) might be a safer option, which would also allow regulators to pick up the pace with the AV technology" (Favarò, p.4, 2017). Automakers have suggested that skipping Level 3 and aiming directly for Level 5 autonomy together will help improve the advancement of autonomous vehicles in the long run because everyone can focus on AV technology and help pick up the pace. Stricter regulations for autonomous vehicles could also prevent incidents like this one, but more manufacturing companies testing on autonomous vehicles will provide us with more data. Data that can be used by everyone to improve AV technology. Involving various stakeholders in

shaping AV safety policies is crucial for enhancing transparency, accountability, and trust in the technology.

Conclusion:

Evidently, AV technology's growth has sparked widespread interest and investment. However, this rapid advancement has also raised important questions regarding safety regulations. This paper proves that while the NHTSA has a role in shaping policies for autonomous vehicles (AVs), its influence is limited due to factors like funding shortages and reliance on other stakeholders. Through an analysis of various sources, it becomes evident that different stakeholders have a more significant role in shaping the policies and advancement of AV technologies than NHTSA itself. These findings imply the need for increased funding and resources for regulatory agencies like the NHTSA to conduct independent research and testing. There is also an implication regarding the stricter regulations to address safety concerns while fostering innovation and collaboration within the industry. Future research could explore the long-term impacts of AV technology on society and infrastructure. It could also explore the effectiveness of different regulatory approaches in ensuring safety and innovation.

NHTSA's stepping up regarding the policy-making of autonomous vehicles looks promising due to the recent incident that caused the death of Angela Chao, the sister-in-law of Mitch McConnell, Minority Leader of the United States Senate. Angela Chao was trapped in a submerged Tesla because it manufactured the recent Telsa's automated shifting of different modes. The car automatically went into reverse instead of driving forward, submerging the vehicle in the backyard lake. This news might cause the NHTSA to take action because Mitch

McConnell holds a big name in our country. To save their names, NHTSA might place some new

safety policies that could help prevent incidents such as this in the future.

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