Automotive Safety Council

Prevent   Protect   Notify

April 1, 2021

Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue SE
West Building Ground Floor
Room W12-140
Washington, DC   20590-0001

[Docket No. NHTSA-2020-0106]

RIN 2127-AM15

ANPRM Framework for Automated Driving System Safety

Subject: ANPRM where NHTSA is requesting comment on the development of a framework for Automated Driving System (ADS) safety.

The Automotive Safety Council (ASC) is an industry trade association of 45 of the world's leading suppliers of Autonomous, Crash Avoidance and Occupant Protection automotive safety systems to the automobile industry. The mission of the Automotive Safety Council is to improve the safety of people through-out the world through the development, production and implementation of the latest automotive safety equipment by preventing accidents, protecting occupants and pedestrians when in a collision and to notify emergency responders after the collision when necessary.

The ASC is providing comments on the development of a framework for Automated Driving System (ADS) safety (Docket No. NHTSA-2020-0106). The ASC appreciates the opportunity to comment on this topic and looks forward to making continued progress on this topic.

General Comments:

The Automotive Safety Council appreciates that NHTSA seeks to further establish the framework which can allow the development of new ADS technologies while not impeding innovation.

US Regulatory initiatives on ADS should be compliant with the international AD regulation framework (UNECE). The US is the co-chair of the UNECE Working Group on Functional Requirements for AVs (FRAV) of level 3 and above and have defined 5 general safety principles for ADS:

1. ADS shall drive safely
2. ADS shall manage safety critical situations
3. ADS shall interact safely with users
4. ADS shall safely manage failure modes
5. ADS shall maintain safe operational state

Additional principles should include:

  A. Requirements (on sensing) shall remain technology neutral

  B. Regulatory framework should not inhibit (safety beneficial) innovation

  C. New US Regulatory framework should enable safe deployment of level 3-5 ADS functionality on passenger vehicles.

In addition to the Four Core Functions (sensing, perception, planning, control), ASC believes a 5th core function should be communication. Communication to vehicle occupants, vulnerable road users, other vehicles, over the air software updates, cybersecurity, mapping, and infrastructure. These elements while woven into the other core functions need their own standards.

Occupant protection including alternate seating positions must be an on-going key part of ADS development and ADS vehicles must continue to meet FMVSS 208 and 209.

While the docket is only asking about ADS, the Automotive Safety Council strongly recommends that ADAS technologies be made standard equipment on all new vehicles moving forward as these technologies are the building blocks of ADS vehicles and years of use by the public will give vital feedback allowing next generations of products to be developed and for the public to gain confidence in these basic technologies. FMVSS as well NCAP tools should be used to accelerate the benefits of ADAS while ADS is being developed which may take decades to refine. Infrastructure improvements that benefit ADAS will also benefit ADS when achieved. ADAS implementation is a precursor to ADS and needs to be standardized for all new vehicles.

A. Questions About a Safety Framework

1. **Describe your conception of a Federal safety framework for ADS that encompasses the process and engineering measures described in this document and explain your rationale for its design.**

   Process Measures:

   A set of appropriate industry safety standards addressing important aspects of ADS development such as ISO 26262 (Functional Safety), ISO 21488 (SOTIF), and UL 4600 (Safety Case), future SAE standards and Safety Management System (SMS) and others as identified.

   Safety Management System (SMS) is equal to existing systems used in aviation industries (ICAO SMM). Using SMS in addition to the other systems above would allow the development of ADS into a safe form of transportation.

   NHTSA links safety management "only" to ISO 26262 and functional safety but is missing safety management systems (SMS). The SMS is already known from other industry sectors like e.g., aviation. The consensus is that only processes can ensure safety. These processes and this kind of process management within the whole company developing ADS vehicles will dictate the responsibilities, actions and decisions needed by employees.

   A Public knowledge data base used for validation and verification of ADS vehicles/systems would provide transparency and grow confidence in ADS vehicles. How to establish this database, access and maintenance criteria and technical details needs to be researched.

   Engineering Measures of Minimum Performance:

   A set of stand-alone perception integrated sensor suite tests dependent on speed that would confirm minimum sensor performance capability in field of view, object identification, distinction between objects, distance from vehicle, peripheral vision, decision outcomes, etc.

   : An agreed upon by Government and Industry set of ADS simulation tests utilizing standardized scenarios and associated standardized databases appropriate for the target ODD(s).

   An appropriate physical obstacle course to demonstrate target ODD(s) performance.

   A real-world prescribed driving test in traffic relevant for each target ODD. This test would be the same as a human driver getting a driver's license. As in the human test, traffic patterns and situations will vary somewhat from test-to-test with the set of stand-alone perception integrated sensor suite tests described above being analogous to the vision exam part of the test.

   Additional Measures:

Success milestones of completed safe ADS driving would allow ramping up of ADS deployment volumes based on its track record of safety success in the ODD.

Communication to outside the vehicle to interfaces such as V2V, V2I, V2X and V2P as well as cyber security needs to be considered in addition to the Vehicle ODD. Pedestrian and other vulnerable road users must be part of the ADS framework. This would include a provision about ethics and decision making by the vehicle. Who programs and what is programed in the case of life and death decision outcomes in various scenarios needs to be a standard and not randomly allowed to be left up to individual providers. Cyber security standards need to be identified along with beyond vehicle communications port access as a standard.

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?**

This is a difficult question to answer as all aspects of the ADS development is crucial. The review of assuring critical process measures were used will give confidence that the development was done with appropriate process standards and the resulting data is of sound integrity. Reviewing minimum sensor performance capability of the perception integrated sensor suite to a standard test pallet, including field of view, object identification, distinction between objects, distance from vehicle, peripheral vision, decision outcomes, etc., will assure minimum data detection capability. Review standardized simulation scenario outcomes and physical operation to a set of tests including vulnerable road user protection. As new infrastructure improvements are made, the review should evolve to include V2X, cyber security and other communication improvements.

3. **How would your conception of such a framework ensure that manufacturers assess and assure each core element of safety effectively?**

The proposed concept of a safety framework focuses primarily on process measures and ADS system level performance testing. Process review and the resulting data from testing should assure the development was done rigorously and the performance meets minimum requirements.

4. **How would your framework assist NHTSA in engaging with ADS development in a manner that helps address safety, but without unnecessarily hampering innovation**

The ADS industry benefits from established safety guidelines and specific safety performance targets and measures that are technology neutral. The framework requires NHTSA to set guidelines and performance criteria to create standardized simulation scenarios, databases, and performance test methods, while focusing on end system performance. Collaboration with international regulators, NGO's, and industry to create global standards would be the preferred

end result as the concept of ADS is difficult enough without the need to develop to different standards globally.

5. **How could the Agency best assess whether each manufacturer had adequately demonstrated the extent of its ADS' ability to meet each prioritized element of safety?**

The agency could review the required process outputs and standardized test reports references in question 1, review the ADS driver's license test and monitor the deployment safety.

6. **Do you agree or disagree with the core elements (i.e., "sensing," "perception," "planning" and "control") described in this document? Please explain why.**

As stated earlier, we view communication as a core element that should be added. Additionally, move prediction, pose, occupant protection and advanced mapping functions may not fit neatly into certain definitions of the stated core elements. A potential 5^h element would be Interact as the vehicles interacts with a plethora of objects, humans both inside and outside of the vehicle, and animals.

The primary focus of NHTSA should remain at the vehicle level, while requiring the specific internal elements to be validated according to best practices with a valid safety case. Frequent regulatory changes or unnecessarily inhibiting innovation should be avoided while still providing a basic level of performance measures.

7. **Can you suggest any other core element(s) that NHTSA should consider in developing a safety framework for ADS? Please provide the basis of your suggestion.**

See answer in question 1 and 6 responses.

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?**

The industry and the public will benefit from the establishment of a robust safety framework for the deployment of ADS equipped vehicles on public roads. This framework should be developed proactively amongst stakeholders rather than re-actively in response adverse events. Certain elements of the framework could be implemented quickly, such as process and performance guidelines and reviews. Minimum performance capabilities such as vulnerable road user identification, stopping distances, lane centering control, infrastructure interface with signals, signs etc., reaction time and avoidance capabilities and other basic vehicle performance criteria should be specified. Items like V2X communications frequencies need to be

standardized and a plan to implement as competing technologies will only delay introduction and raise costs. FMVSS 208 and 209 need to be fully stated as required for all seating positions in ADS leaving no doubt about this requirement including confirmation testing and new anthropomorphic test devices if needed.

All performance should be technology neutral as it is the vehicle interaction to its environment that is a standard.

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?**

NHTSA has extensive knowledge of vehicle crash causation and should be able to write performance-based requirements to prevent such accidents using existing safety profiles of human controlled vehicles and set minimum requirements for operating in specific ODD's. This is much like the basis for any FMVSS regulation authorized by Congress. No additional legal obligation should be needed to write either NCAP based or FMVSS based performance standards.

B. Questions About NHTSA Research

14. **What additional research would best support the creation of a safety framework? In what sequence should the additional research be conducted and why? What tools are necessary to perform such research?**

Data should be collected from already deployed ADAS-equipped vehicles to better assess common challenges to ADAS-equipped vehicles and best practices in mitigating those risks. This could initially be done through a voluntary reporting structure. IIHS and ENCAP data bases as well as NHTSA crash investigations could be used to formulate performance success and deficits leading to refined and improved performance.

Naturalistic Driving Studies as done by MIT evaluates naturalistic driving behavior and is especially useful in determining the human-driving baseline for a wide variety of scenarios.

Safety validation criteria within both the ISO 21448 and the UL 4600 standards employ quantified, measurable metrics as a part of safety validation and risk acceptance. Research is required to define, quantify, and establish the frameworks needed to meet these standards.

As the number of sensors operating in a given environment is expected to increase exponentially, data should be collected to study the effects of sensor interference on other sensors as well as public infrastructure.

C. Questions About Administrative Mechanisms

19. What additional mechanisms should be considered, and why?

NHTSA should consider a pilot program to encourage and study automated vehicle deployment. The Alliance for Automotive Innovation (AAI) has suggested such a program to inform future regulations.
NHTSA should also seek additional opportunities to enable system suppliers to conduct on-road ADS testing.

In conclusion, the ASC welcomes this opportunity to comment on the ANPRM framework for Automated Driving System (ADS) safety.
We welcome any invitation to visit the NHTSA office for a detailed discussion of these comments should the need arise.

Sincerely,

Douglas P. Campbell
President
Automotive Safety Council