

Testimony of Dr. Zachary Doerzaph, Director of the Center for Advanced Automotive Research at the Virginia Tech Transportation Institute (VTTI) and Associate Professor of Biomedical Engineering and Mechanics at Virginia Tech

Chairman Barrasso, Ranking Member Carper, and members of the Senate Committee on Environment and Public Works:

I submit testimony as a transportation scientist and Director of the Center for Advanced Automotive Research at the Virginia Tech Transportation Institute (VTTI). At VTTI, we conduct research for many public and private-sector sponsors on automated systems, including vehicles, infrastructure, and the people who own, operate, and ride within them. It is my honor to discuss this important topic and to share the following observations with this committee.

Automation may eventually have a substantial positive impact on transportation safety and efficiency. However, exceeding the capability of human drivers is extraordinarily difficult and is currently underestimated by many. The average driver has one police-reportable crash approximately every 18 years of driving. The safest 10% of drivers—meaning those who remain alert, attentive, and sober behind the wheel—are 10 times safer than the average driver. Many of the safest drivers will go through a lifetime without experiencing a single serious crash. Thus, to achieve the same safety as the best drivers, automated vehicles can almost never crash.

Large-scale deployment of automated vehicles will take decades to achieve, and there will be a significant percentage of manually driven cars for the foreseeable future. Automation remains costly, does not equally benefit all users, and does not operate ubiquitously across all environments.

Fortunately, automated vehicles are designed to operate on roadways created for human drivers. As with humans, reliable automated-vehicle performance is related to the quality of road design, lane markings, signs, and other traffic control devices. Yet, specific infrastructure features can present challenges unique to automated vehicles. Such edge-and-corner cases include work zones, emergency situations, adverse weather, and anywhere that humans rely on a simple glance, nod, or handwave to communicate with other road users.

Connected technologies—including cellular and dedicated short-range communications—between vehicles and between vehicles and the infrastructure provide an additional mechanism for improving the perception, recognition, and path-planning processes for automation, resulting in a safer and more efficient system overall. Connectivity enables proactive collaboration between elements of the transportation network, thereby permitting quicker and more robust decisions.

In conclusion, automation may provide substantial improvements in transportation performance. However, measured actions by all stakeholders based on careful planning should be exercised to ensure that safety is maintained throughout the evolution and deployment of automated vehicles. Therefore, I recommend the following approach:

Support deployment of partial automation within compatible infrastructure. When appropriately designed, advanced driver assistance systems with limited automation, such as well-designed automated emergency braking and lane keep assist systems, improve safety and reduce congestion by leveraging the strengths of both human and machine. The federal government can help by providing a clear pathway to increasing levels of automation within appropriate operational domains based on demonstrated success.

Maximizing mobility benefits while improving safety for all users should be viewed as a nationally advantageous goal that we should work toward as a society rather than as independent competitors. It is not sufficient for automation to work most of the time; it must work nearly all of the time. It will take all of the stakeholders in the transportation system to attain this goal.

Incentivize precompetitive collaboration between individual companies and road operators to overcome technological and policy hurdles. Facilitate mechanisms for automated vehicles to report challenging infrastructure elements to road operators so that public investments may be appropriately prioritized.

Provide the resources and guidance required to improve our physical and digital infrastructure through applied research and deployment support. Connected technologies will significantly improve performance, but they require robust, nationally interoperable backend data systems, precise vehicle localization, and accurate infrastructure information across city, county, and state borders. Security mechanisms that establish digital trust and identify/remediate threats are imperative.

Facilitate broad dialogue and coordination to define the appropriate oversight role for federal and state public agencies. Develop mechanisms for monitoring and updating such oversight to balance innovation with public safety based on objective measures.

Finally, maintain the pace of innovation by facilitating the next-generation transportation workforce through technology-focused multidisciplinary education and by supporting a variety of programs for students of all levels.