

April 2, 2020

Mr. Finch Fulton
Deputy Assistant Secretary for Transportation Policy
U.S. Department of Transportation
1200 New Jersey Avenue S.E.
Washington, D.C. 20590

SUBJECT: Docket No. DOT-OST-2019-0179

Dear Mr. Fulton :

Lea+Elliott, Inc. welcomes the opportunity to provide public comments on the document “Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0”.

Lea+Elliott, Inc. is an international transportation consulting firm specializing in comprehensive delivery of automated transit systems. Lea+Elliott offers a broad range of planning, engineering, procurement strategies and delivery, project/program management, and construction management services for clients worldwide. For 47 years, Lea+Elliott has served airport clients in all matters related to Automated People Mover (APM) projects (both landside and airside APM systems) as well as regional connectivity to airports. We are unique in that our experience ranges from master planning, conducting technology assessments and feasibility studies (market review), to developing the schematic design of APM systems, preparing technical specifications, and on to overseeing design, testing and implementation of a new system or existing system upgrades and expansions. The firm is especially well known for its creative structuring of procurements for a wide range of delivery options that include DBOM and P3.

Lea+Elliott provides comments to “Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0”, as follows:

General

AV4.0 describes a unified approach by the federal government to promote collaboration between many relevant stakeholders in the development of autonomous vehicles. Two main topics are discussed, US support for AV growth and collaboration opportunities between the US government and the private sector.

AV4.0 is a very good document that lays the ground for future steps in AV technology. Given the new nature of the technology, it is understandable that a complete legislative framework is under development, namely Safety Standards, Safety Certification, Liability and Insurance requirements.

This short write-up is an integral part of the synergetic platform encouraged by the federal government. The following includes areas that could, in our opinion, be fine-tuned to be a catalyst to such collaborative effort and allow the new technology to be deployed in a safe and consistent manner.

Principle #1- Prioritize Safety and Principle #8- Promote Consistent Standards and Policies**Comment 1/ Safety Standards and Safety Certification**

There is, at present, no complete framework for safety assessment and safety certification of AV technology. This is an area of primary importance as this will allow all manufacturers and integrators to design to clear safety targets. The federal government could facilitate such safety standard development by encouraging institutions such as SAE, IEEE or other similar entity to take the lead in such development with support from relevant agencies and institutions. National Transportation Safety Board (NTSB) would also collaborate in such effort and add significant value based on their investigation of events that occurred in the US and their interaction with their foreign counterparts that investigate similar events throughout the world.

Comment 2/ Cell Phone and Portable Electronic Devices

The Federal Government should include requirements for cell phone and portable electronic devices manufacturers to include software/hardware that will automatically disable distractive functions that would be detrimental to safe operation of an AV. These requirements would be applicable during the complete transition to SAE Level 5. This effort would be performed in close collaboration with AV manufacturers, and standards could be developed to advance this initiative.

Comment 3/ Administration Efforts Supporting Automated Vehicle Technology Growth and Leadership-Connected Vehicles and Spectrum- Page 6

FCC efforts are noted in AV4.0. It appears however that there are competing interests for the 5.9 GHz spectrum and preserving adequate bandwidth for AV needs is crucial to the successful deployment of this technology.

General

The report is generally silent on the government role in soliciting information and developing regulations and standards from the automated transit industry. Various suppliers, agencies and consultants have been engaged in driverless transit since the late 1960's. Existing standards (ASCE-21, NFPA 130, IEEE 1474, etc.) could help in providing valuable guidance to the development and deployment of ADS. Although generally established for driverless systems utilizing a dedicated guideway, these standards and establish industry specifications could help evoke conceptual considerations which would be invaluable to the ADS development. In addition, collaboration with automated transit could help migrate ADS technology for systems such as automated people movers, light rail and metros.

Page 4/II Promote Efficient Markets/5. Remain Technology Neutral

“The U.S. Government will adopt—and promote the adoption on an international level of—flexible, technology-neutral policies that will allow the public, not the Federal Government or foreign governments, to choose the most economically efficient and effective transportation and mobility solutions.”

This position needs clarification. Based on the content of this report, the Federal government is heavily involved in the assessment, research and development of AV technologies at the System and subsystem/component level. If it is determined that certain technologies are far superior than others or if certain technologies are inadequate, especially to ensure safety, should the regulatory agencies remain silent or non-prescriptive?

Page 9/NTSB

In addition to investigating accidents involving ADS technology, is the NTSB currently investigating car accidents involving Advanced Driver Assistance Systems (ADAS) as well? As ADAS components and subsystems are the forerunner of ADS technology, investigations of accidents involving ADAS could be very beneficial to the development and evolution of ADS.

Page 27/Economics and Workforce Research

The section states, “FTA is researching economics and workforce considerations associated with AVs,…” however much of the noted research is centered around the transit bus sector. It would appear that other workforce sectors would be impacted as well including trucking, taxi, Uber, Lyft, etc. Please clarify if the impacts to other workforce areas are being researched as well.

Page 28/B. US Government Enabling Activities in the Automated Vehicle Sector Outreach to Non-Federal Stakeholders

The section describes the government’s effort to “ensure public access to accurate and clear information about ADAS and ADS…” However, most of that effort appears to be addressing the safety perception of this technology. While important, it would be beneficial if the public is fully aware of the full ramifications of ADS. The American driving experience will change considerably, and the public should fully understand what that means. Will the American driver be willing to sacrifice speed control, ad hoc route selection and general autonomy for safety? Perhaps up front buy-in from the public, knowing what the driving experience will turn into, is warranted as development and deployment progresses.

Page 5 / III. Facilitate Coordinated Efforts / 8. Promote Consistent Standards and Policies

The promotion of consistent standards is especially important from a safety perspective. Current safety standards for road-based vehicles with human drivers results in tens of thousands of fatalities per year. For current automated transit vehicles such as automated people movers, a single fatality is unacceptable. US Government may need to intervene if safety is not consistent among competing standards. Providing a lower level of safety is likely more

cost effective. Safety standards should be equally rigorous across all standards. Some items to consider:

- Mandatory sensors that determine whether any safety-related part (e.g. sensors, brakes, tires) is defective or unsafe. A critical part failure that introduces potential for catastrophic failure should prevent vehicle operation, whereas less critical failures could allow limited operation until repair has been performed.
- Minimum vehicle separation. How will a vehicle determine how closely to follow the vehicle ahead? Should vehicles provide enough separation to avoid collisions even in the event of failures, such as a propulsion failure that results in maximum acceleration? Factors to consider include: maximum deceleration rate under normal braking, maximum deceleration rate in an emergency, vehicle weight, grades, weather conditions, etc.

Page 5 / III. Facilitate Coordinated Efforts / 10. Improve Transportation System-Level Effects

Please clarify the intention of “avoiding negative transportation system-level effects from AV technologies”. If the negative effects being referenced are the employment disruption of AV technology, then transportation improvements and innovation opportunities would likely be missed because employment disruption is likely inevitable.

Pages 33-34 / United States Patent and Trademark Office

As the goal of *Automated Vehicles 4.0* is to ensure the United States leads the world in AV technology development and integration, the government should make certain that there are patent examiners in the United States Patent and Trademark Office with an appropriate level of AV expertise. Some studies have shown that patents can stifle innovation, so the threshold for a unique invention should be high.

General

Non-Cybersecurity Threats

From a review of **Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0** (AV 4.0), a national policy that addresses the threat posed by non-cybersecurity terrorism with regard to automated or autonomous vehicles should be better defined. The reason this is so important is that clearly defined national policy can help to provide guidance and assistance in the development and formulation of proactive mitigation strategies (to counter non-cybersecurity terrorism threats) that AV designers and manufacturers can design and build their AV technology to.

In reviewing the report, it appears that most “security” issues within the document appear to be related to cybersecurity threats. Yet non-cybersecurity terrorism threats pose a much greater danger to national security than cybersecurity threats and does not appear to be adequately addressed. Only briefly, does text in the report (on page 4) vaguely allude to “malicious use of AVs” and “security threats targeting or exploiting AVs” (without much specificity).

Although the document does include mention of a myriad of federal agencies involved in various aspects related to automated vehicles, there does not appear to be any specific mention of some of the key agencies that could address both cybersecurity and non-cybersecurity threats, such as the **Central Intelligence Agency (CIA)**, **Federal Bureau of Investigation (FBI)**, **National Security Agency (NSA)**, **National Counterterrorism Center** and its parent agency – **Office of the Director of National Intelligence (ODNI)**, **Defense Intelligence Agency (DIA)**, **National Reconnaissance Office (NRO)**, etc.

A Report to Congressional Committees (GAO-19-204SP) prepared by the **U.S. Government Accountability Office (GAO)** titled *National Security – Long-Range Emerging Threats Facing the United States As Identified by Federal Agencies* (December 2018) describes “dual-use technologies” – these are technologies that may be developed by governments or the private sector for benign or beneficial purposes, but may have a dual-use application. For instance, in an adversary’s hands, these technologies may pose a risk to the United States. Agency officials identified examples such as unmanned vehicles, artificial intelligence, and encryption technologies – autonomous and unmanned vehicles were given as an example.

A March 2019 thesis by Kevin S. Knopf for the **Naval Postgraduate School**, Monterey, California, titled *Fully Autonomous Vehicle-Born Improvised Explosive Devices—Mitigating Strategies*. The thesis overviews the projected threat posed by the nefarious use of fully autonomous vehicles being used as fully autonomous vehicle-borne improvised explosive devices (FAVBIED). The thesis describes how easily autonomous vehicles can be used for explosive delivery and discusses technological mitigation strategies that could be implemented, proactively, to reduce the threat. The author posits that there is a pressing need for mitigation strategies, such as secure communications, user authentication, law enforcement override, and payload interrogation that should be implemented at the beginning of the system design process.

Mr. Knopf only addressed fully autonomous vehicle-borne improvised explosive devices, but it would not be much of a stretch of our imagination to envision that terrorists could also utilize fully autonomous vehicles for delivery of biological agents, chemical weapons, nuclear weapons or other weapons of mass destruction (WMDs). Malicious actors could also lease or purchase autonomous vehicles, including autonomous semi-tractor trailer trucks, autonomous large buses or even autonomous fuel tankers and turn them into weapons of terror, and could even carry out massive concurrent attacks using a fleet of these self-driving vehicles. All this could be controlled remotely by anonymous perpetrators, many miles away – perhaps even from other locations around the world, without sacrificing their own lives and achieving martyrdom, and living on to be able to perpetrate additional acts of terror.

Based upon the preceding comments, it is suggested that a clearly defined national policy be developed by **U.S. DOT**, working in close collaboration with the **CIA**, **FBI**, **NSA**, **ODNI**, **DIA**, **NRO** and other relevant intelligence agencies, to address the very real threat posed by non-

cybersecurity terrorism, and to provide guidance and assistance in the development and formulation of proactive mitigation strategies (to counter these non-cybersecurity terrorism threats) that AV designers and manufacturers can design and build their AV technology to.

Sincerely,

LEA+ELLIOTT, INC.

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cc: Diane Woodend Jones, AIA, AICP, LEED AP
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