Cooperative Automated Transportation (CAT) Coalition

Research into Plain Language for Automated Driving Systems (ADS) Policies and Legislation – August 3, 2020

Background

The Policy, Legislation, Regulatory (PLR) Working Group of the Cooperative Automated Transportation (CAT) Coalition completed research to review and assemble information about Automated Driving Systems (ADS) terms used in legislation throughout the United States. There was concern that different terms were being used interchangeably when referring to the same thing and/or that the same term was being used to describe different things. It is important to note that this research was an initial step in providing an understanding of ADS terms used among states and it is not intended to create any guidelines or recommendations for nomenclature.

Research Approach

Initially, two documents were reviewed to understand terms and definitions related to automated driving systems. These included:

- The SAE J3016: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, available at the SAE International website; and
- The USDOT document titled Preparing for the Future of Transportation: Automated Vehicles 3.0, available at the USDOT website.

Based on this review, the research focused on the use of four key terms defined by the SAE J3016 and reinforced in AV 3.0. These terms are: automated driving systems (ADS), dynamic driving task (DDT), minimal risk conditions, and operational design domain (ODD).

The next step was an on-line review of 12 agencies' ADS policies and legislation, with an emphasis on the use of these four key terms as well as the specific terms that were used in the regulations within the legislation (i.e. the statements that describe what is allowed and what is not allowed). The intent of reviewing this sample of the state's legislation was to understand commonalities and differences in the terms used, both among the state agencies and between the states and the resources reviewed.

Summary of Findings

- There is consistency in the use of and definitions for the four key terms that were originally defined in SAE J3016 and reinforced in the AV 3.0 document. While some states excluded one or two of the terms, there was generally consistent use of the terms and inclusion of a definition that was very close to the definitions provided by SAE J3016 and AV 3.0.
- Where the states differed was in the regulations that describe the allowable or prohibited use of ADS. As illustrated in the example below, even these differences were less than anticipated at the onset of the research.

Description of Research and Findings

The research process consisted of on-line reviews of legislation or bills from Michigan, Iowa, Arizona, Arkansas, California, Colorado, Georgia, Louisiana, Nebraska, North Dakota, Washington D.C, and Florida.

Summaries of the reviews were shared with and discussed during CAT Coalition PLR Working Group webinars.

Use of Key Terms

The AV 3.0 document encourages state and local agencies to adopt terminology defined through voluntary technical standards and identifies examples of four key terms defined by the SAE J3016 Taxonomy report. The four terms, with the definitions included in the SAE J3016 and AV 3.0 reports are as follows (note: the definition of Operational Design Domain has slight differences, and both definitions are included for reference):

- **ADS:** The hardware and software that are collectively capable of performing the entire Dynamic Driving Task on a sustained basis, regardless of whether it is limited to a specific operational design domain. This term is used specifically to describe a Level 3, 4, or 5 driving automation system
- **Dynamic Driving Task (DDT):** All of the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints.
- **Minimal Risk Conditions:** A condition to which a user or an ADS may bring a vehicle after performing the DDT fallback in order to reduce the risk of a crash when a given trip cannot or should not be completed.
- **Operational Design Domain (ODD):** AV 3.0 definition: The specific conditions under which a given driving automation system or feature thereof is designed to function, including, but not limited to, driving modes. This can incorporate a variety of limitations, such as those from geography, traffic, speed, and roadways
- **Operational Design Domain (ODD):** SAE 3016 definition: Operating conditions under which a given *driving automation system* or *feature* thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics

There was general consistency of states legislation with four key terms defined by SAE J3016 and AV3.0:

- Automated Driving System
- Dynamic Driving Task
- Minimal Risk Conditions
- Operational Design Domain

The benefits of emphasizing these terms and publishing the clear definitions were obvious in that there is clearly consistent use of these four terms in the ADS legislation reviewed. While some states excluded one or two of the terms, there was generally consistent use of the terms and inclusion of a definition that was very close to the definitions provided by SAE J3016.

Terms Used in Regulations

Further review of the legislation from these 12 agencies beyond the definitions of key terms and specifically into the regulations contained in the legislation is where differences were identified. For example, there were examples were the terms “autonomous”, “driverless”, or “self-driving” were used without clear distinction between the definitions. The following three examples illustrate the differences observed in the regulations included in the legislation.

Example #1: Use of "Driverless capable vehicle"
A regulation in one state's legislation includes the text *"A **driverless-capable vehicle** may operate on the public roads of this state without a conventional human driver physically present in the vehicle, as long as the vehicle meets the following condition…".*

States differed in their legislation authorization statements that described the use of ADS.

Example #2: Use of "Fully Autonomous"
A regulation included in legislation from another state includes the text: "Testing or operation of vehicles on public roads that do not have a person present in the vehicle shall be allowed only if such vehicles are ***fully autonomous***".

Example #3: Use of "Automated Driving System"
A regulation included in another state's legislation includes the text: "A person may use an ***Automated Driving System*** to drive a motor vehicle or to control a function of a motor vehicle if the system is capable of complying with every state and federal law that applies to the function that the system is operating.

Table 1 summarizes the number of states that used each term when describing the authority to test or operate ADS.

Table 1: Summary of the number of states using various terms in ADS legislation

Terms in Authority Statement	Number of states reviewed – use this term for regulations & statements in the legislation
Autonomous Vehicle	3
Fully Autonomous Vehicle	2
Driverless capable vehicle	2
Fully autonomous ("…if such vehicles are fully autonomous")	1
Automated driving system	1
Autonomous vehicle with automated driving systems engaged	1
Fully autonomous vehicle with automated driving systems engaged	1

The bullets below illustrate the different terms used, and representative definitions of each.

- **Driverless-capable vehicle**: a motor vehicle equipped with an automated driving system capable of performing all aspects of the dynamic driving task within its operational design domain, if any, including achieving a minimal risk condition, without any intervention or supervision by a conventional human driver

- **Autonomous vehicle:** a vehicle equipped with an automated driving system that can drive the vehicle for any duration of time without the active physical control or monitoring of a human operator;
- **Fully autonomous vehicle:** A motor vehicle that is equipped with an automated driving system designed to function as a level four or five system under SAE J3016.
- **Automated motor vehicle** means a motor vehicle on which an automated Driving System has been installed….
- **Autonomous commercial motor vehicle** means a motor vehicle used in commerce and equipped with an automated driving system, including those designed to function without a driver.
- **On-demand autonomous vehicle network** means a transportation service network that uses a software application or other digital means to dispatch or otherwise enable the prearrangement of transportation with autonomous vehicles for purposes of transporting persons or goods, including for-hire transportation, transportation for compensation, and public transportation.

Conclusions

Based on the review of the 12 agencies' legislation regarding ADS, in general it was found that the legislations generally include common definitions of key terms that are largely based on the earlier work of SAE and reinforcement from the AV 3.0 document.

While the taxonomy used in the regulations appeared to be where inconsistencies were occurring, the research conducted by the PLR Working Group recognized that the differences are slight and most likely illustrate local preferences to one or more terms.

Consistent ADS terms are being used in state legislation. The differences are slight and specific to terms referring to autonomous vehicles.

Next Steps and Related Research

Content that the differences in terms used for ADS legislation are not as extreme as once feared, the CAT Coalition PLR Working Group decided not to pursue further investigation into the use of specific terms within state ADS legislation. The PLR Working Group pursued presentations by outside groups researching broader aspects of ADS legislation.

The two presentations are identified below:

- University of Washington School of Law Research – Professor William Covington and his team presented research conducted by the University of Washington Law School Technology Law and Public Policy Clinic.
- UC Davis – Technology is Outpacing State Automated Vehicle Policy. Kelly Fleming (UC Davis) and her team presented on research conducted by the UC Davis Policy Institute for Energy, Environment, and the Economy. The report was published in April 2020 and is available on the UC Davis website