CATES
Center for Advanced Transportation and Energy Solutions

Statement from CATES on the March 18 Uber-caused pedestrian fatality in Tempe, Arizona

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On Sunday evening March 18, 2018, after sunset, a specially-equipped Volvo XC90 sport utility vehicle owned, equipped, and operated by Uber and running at 38 mph in automated mode – with an Uber safety driver at the controls tasked to take over driving responsibility if necessary – struck and killed a 49 year old female pedestrian named Elaine Hertzberg. She was walking a bicycle across a Tempe, Arizona multi-lane road in front of the vehicle. She was not in a crosswalk, but the street was well lighted. Video recorded at the time of the incident reveals the safety driver was not consistently paying close attention to the road ahead, was not alerted to the presence of the pedestrian, and showed a startled demeanor when the pedestrian was struck. Whatever automated pedestrian detection the car may have had and whatever automated braking the car in theory may have been designed to activate, utterly failed to operate. The car did not slow down or swerve to a different lane, and did not attempt to stop before hitting and killing Elaine Hertzberg.

Many pedestrians are struck and killed by cars every day throughout the U.S. but this event was the first involving an automated vehicle that employs technological features that are designed to keep such a tragedy from happening. Such cars, said to be close to deployment by some private companies, are a step in a technological evolution that hold the promise of eventually reducing car-induced pedestrian injuries and fatalities worldwide. The physical scenario that led to this accident – a jaywalking pedestrian in the path of a moving car -- is not an unusual one. According to "simple arithmetic" calculations by Professor Alain Kornhauser of Princeton University, the dynamics of pedestrian and vehicle movement reveal in this case that an alert human driver having no automated detection and only ordinary human-activated braking available could have detected and reacted to the circumstances in a manner that would have stopped the Volvo or altered its course before it hit the pedestrian. Furthermore, the current expectations of car-industry observers for vehicle automation technology are that the Uber automation capability should have detected Elaine Hertzberg and made the car stop before striking her.

Specialists from the U.S. Government's National Transportation Safety Board are investigating to determine the reason this accident occurred. Quite apart from whatever turns out to be the technical causes of this fatality, the fact that this shocking incident occurred compels CATES to recommend a particular focused action to the ACES Northwest Network and the new legislatively mandated Washington State Autonomous Vehicle Working Group.

CATES' recommended action is that the State of Washington create and implement a legal requirement for a competent authority to assess, test, validate, and certify automated vehicle performance across a

defined range of vehicle life-safety performance requirements for any make and model that would be permitted to operate on public roads in the State.

The particular performance requirement pertinent to the recent Arizona tragedy is Object and Event Detection and Response (OEDR). Consistent with the CATES recommendation, USDOT has issued the following voluntary guidance about OEDR on page 7 in its September 2017 report "Automated Driving Systems 2.0, A Vision for Safety," issued by the National Highway Traffic Safety Administration.

> Object and Event Detection and Response (OEDR) refers to the detection by the driver or ADS [automated driving system] of any circumstance that is relevant to the immediate driving task, as well as the implementation of the appropriate driver or system response to such circumstance. For the purposes of this Guidance, an ADS is responsible for performing OEDR while it is engaged and operating in its defined ODD [operational design domain].
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> Entities are encouraged to have a documented process for assessment, testing, and validation of their ADS's OEDR capabilities. When operating within its ODD, an ADS's OEDR functions are expected to be able to detect and respond to other vehicles (in and out of its travel path), pedestrians, bicyclists, animals, and objects that could affect safe operation of the vehicle.

The CATES recommendation with respect to this voluntary guidance is not intended to suggest the State of Washington itself embrace the function of verifying that (for example) a Volvo XC90 owned and operated by Uber is capable of detecting and responding to pedestrians in the car's path instead of hitting them. But somebody should!

An international standard for pedestrian detection and collision mitigation systems (ISO 19237) is now available, based on years of focused work in Japan.

The recommendation here means that the State should prohibit operation on public roads of automated motor vehicles that have not been certified for object and event detection and response by a competent process of inspection and verification carried out by somebody with appropriate skills and legal authority. This recommendation is meant as a reasonable step to protect human life in Washington State from a patently avoidable tragedy like experienced with Uber's Volvo in Arizona. CATES, ACES Northwest Network, and the AV Working Group need to step up to the task of determining and deciding who in America should exercise that authority to protect the citizens of Washington.

We can be sure that Washington State won't be the only home location of professionals working on fixing the problems brought to the surface by the tragedy on March 18. CATES stands ready to work on motor vehicle safety policy with others who are thinking along with us in the same direction.

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