

Distr.: General  
13 May 2022

Original: English

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**Economic Commission for Europe**

Inland Transport Committee

**Global Forum for Road Traffic Safety**

**Group of Experts on drafting a new legal instrument  
on the use of automated vehicles in traffic**

**Third session**

Geneva, 16 May 2022

Item 4 of the provisional agenda

**Substantive Activities**

**Road Safety Challenges Posed by the Use of Automated  
Vehicles**

**Submitted by the experts from European Transport Safety Council**

The text below was prepared by the experts from European Transport Safety Council (ETSC), invited by the Chair of the Group of Experts (GoE) on drafting a new legal instrument on the use of automated vehicles in traffic (LIAV) also called WP.1/GE.3.

## I. Introduction

1. The informal note is provided in response to a request from the Chair of GoE on LIAV for a short document summarising ETSC's major concerns on the road safety challenges posed by the use of Automated Vehicles (AVs). It should not be taken as covering the full range of ETSC's safety concerns, but rather as highlighting the most salient ones.

## II. Vehicle user related

### A. Lack of commonality in Human Machine Interface

2. If users were expected to drive with only one vehicle, then commonality to allow users to shift readily from one vehicle to another would perhaps not be a requirement. Here the example of airline pilots can be noted: Airbus and Boeing use very different designs for the cockpit interfaces and pilots are trained only for one family. Even within an aircraft family, pilots normally have to be retrained to fly a different model. Boeing's desire to avoid imposing the need for such retraining was a contributory factor to the 737 MAX crashes. No such retraining is feasible for car drivers who wish to switch from one model to another. In addition a requirement for high-level commonality in interface design would make the approval process far more straightforward as the approval authorities and testing house would have merely to verify conformity to the common principles as opposed to requiring that the Human Machine Interface (HMI) of a particular vehicle model undergo a full validation process. The requirement for commonality in HMI is being discussed in the Working Party on Automated/Autonomous and Connected Vehicles (GRVA) Informal Working Group (IWG) on Functional Requirements (FRAV), but there is no existing specification of the recommended design.

### B. Mode confusion

3. Users need to know what role is expected of them as a result of the currently enabled assistance and/or automation features. Crucially important here is the supervisory responsibility as a driver in Level 2 operation as opposed to the user role (e.g. fallback user) role in Automated Driving System (ADS) operation at Level 3 and above. A core requirement in HMI design is the need to convey those different roles and consequent responsibilities. That requirement implies that HMI design needs to be holistic and encompass all levels of automation so that, when a driver first encounters ADS, the operation of and role in using the ADS is clearly distinguishable from interaction with manual driving and driving with Advanced Driver Assistance System (ADAS) vehicle control. This issue is being discussed in FRAV.

### C. Overtrust

4. A consequence of a failure to distinguish between Level 0, Level 2 and Level  $\geq 3$  driving is that users may well interpret Level 2 systems as providing automated driving and therefore be convinced that they no longer need to attend to the driving scene. Confusing product names such as "Autopilot", "Full Self Driving" and "Connected Pilot" can convey the impression that assistance systems have automated driving capabilities. This can lead to user overtrust and appears to have been a factor in a number of crashes of vehicles operating at Level 2.<sup>1</sup>

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<sup>1</sup> A recent letter from ETSC and the Dutch Safety Board to the European Commission summarizing some of the risks of these Level 2 systems can be found [here](https://etsc.eu/etsc-and-dutch-safety-board-want-improvements-to-assisted-driving-standards/) (https://etsc.eu/etsc-and-dutch-safety-board-want-improvements-to-assisted-driving-standards/). The full report by the Dutch Safety Board on the results of their investigation into the safety of Level 2 systems can be found [here](https://www.onderzoeksraad.nl/en/page/4729/who-is-in-control-road-safety-and-automation-in-road-traffic) (https://www.onderzoeksraad.nl/en/page/4729/who-is-in-control-road-safety-and-automation-in-road-traffic).

## **D. Driver monitoring**

5. UN Regulation No. 157 requires the fitment of a driver monitoring system to detect user availability for response to a requested takeover. The regulation stipulates that the system shall detect availability as follows: “The driver shall be deemed to be unavailable unless at least two availability criteria (e.g. input to driver-exclusive vehicle control, eye blinking, eye closure, conscious head or body movement) have individually determined that the driver is available in the last 30 seconds.” (paragraph 6.1.3.1) It also states, in paragraph 6.1.3: “The manufacturer shall demonstrate to the satisfaction of the technical service the vehicle’s capability to detect that the driver is available to take over the driving task.” But how that demonstration is to be done is not specified. There is good reason to doubt that current driver monitoring systems are highly accurate and highly reliable. This means that one crucial element in ensuring the safe operation of Level 3 systems may be lacking. There is a need to verify that driver monitoring works reliably in the full range of expected conditions. We are not aware of any work in UNECE on a test procedure for driver monitoring systems.

## **III. Interaction with vulnerable road users**

6. Safe interaction with all potential Vulnerable Road User (VRU) groups is a prerequisite for ADS operation on urban and rural roads. On motorways, automated driving systems need to recognise motorcyclist presence at long ranges to the rear, given that relative velocities may be high.

### **A. External HMI**

7. A consensus is now building that, for most circumstances, there is little justification for external HMI on vehicles with an ADS for the indication of vehicle intention and that it is better to use a combination of existing HMI and implicit vehicle movement. Additional HMI for the indication of ADS intention could cause confusion and overload for VRUs interacting with automated vehicles, particularly in circumstances where the VRU needs to act when encountering multiple vehicles.

### **B. Interaction with motorcyclists and cyclists**

8. Most of the research on interactions between ADS and VRUs has focused on interaction with pedestrians. Interaction with cyclists and motorcyclists is likely to be more challenging. Motorcyclists are able to accelerate very rapidly, filter through traffic and often approach other vehicles at high relative velocities. Cyclists can suddenly enter the roadway, can change path abruptly (e.g. to avoid potholes) and, rather like motorcyclists, can filter through traffic on either side. They also can travel at quite high speeds with the consequence of low times to collision. Safe interaction with all relevant VRUs needs to be assured. For urban areas for example, the legal framework should ensure that safe interaction is not only guaranteed for pedestrians, cyclists and motorcyclists, but all the different types of VRUs that can be encountered, including wheelchair users, cargo bikes, personal light electronic vehicles (PLEVs, such as e-scooters), etc.

## **IV. Traffic-related**

9. An automated vehicle stopping in a live traffic lane as a result of an ADS failure or of the non-response of the user to a takeover request poses a significant threat to the safety of the vehicle’s occupants and to following traffic. The minimal risk condition is not “minimal” if in fact it raises the risk of a severe outcome. Stopping in lane on a high-speed road is never a safe manoeuvre.

## **V. Remote operation as backup**

10. Remote operation is being proposed as a backup for ADS. For example, the recent Informal Group of Experts on Automated Driving (IGEAD) draft discussion document from the United Kingdom of Great Britain and Northern Ireland (UK) on situations when a driver operates a vehicle from the outside of the vehicle proposes a set of requirements for remote driving systems. However, there is paucity of evidence to verify that such operation can be performed safely and there are many challenges to that need to be overcome in the development and operation of remote driving systems (see ECE-TRANS-WP1-SEPT-2020- Informal-8e). A backup can only be offered if it can be proven to be robust, and that is far from the case here.

## **VI. Learning from collisions**

11. Automated vehicles are inevitably going to be involved in collisions, as a result of both their own mistakes and those made by others. It is therefore of the utmost importance that we learn from them, so that changes can be made based on the lessons learned — whether it is to the automated vehicle’s systems or the road traffic system, or indeed both. A regime of robust oversight and investigation for when things go wrong is highly necessary. Today we have no data on the number or type of crashes that occur when Level 2 systems are active. This situation cannot continue for systems that are responsible for driving the vehicle. In-service monitoring of the automated driving systems/vehicles is being discussed at the IWG on Validation Method for Automated Driving (VMAD). However, that would only be a part of a robust regime of oversight and investigation.

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