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Submitted by the Chair of the ITU FG-AI4AD

This document, submitted by the Chair of ITU Focus Group on AI for Autonomous and Assisted Driving (FG-AI4AD), provides observations on “Developing Two Independent Regulatory Systems for Drivers”.

Developing Two Independent Regulatory Systems for Drivers?

Driver Learning

1. Implicit in the Convention on Road Traffic is the assumption that drivers have both continual learning and transfer learning capabilities. It's these cognitive skills that enable drivers to adapt to different cars, roads, weathers and traffic situations beyond those assessed in a one-time licensing test.
2. The continual and transfer learning capabilities of drivers also underpin the Contracting Parties safety assumptions in the agreement on international driving permits. It's implicit that a driver assessed on a right-hand drive vehicle in London's city streets can adapt to drive safely in international traffic using a left-hand drive vehicle on San Francisco's US-101 four lane highway.
3. These learning capabilities cannot be assumed for automated driving algorithms and must still be proven to be true.
4. One-time approval processes, no matter how many scenarios or ODD variations are presented, will never provide full coverage for infinite situations and conditions experienced in real world international traffic.
5. As such, a one-time type approval process can never validate the "reasonable and prudent" driving behaviour target expected within the 1948 Convention on Road Traffic, where such behaviours can only be judged upon the appropriateness of a specific response to a unique traffic situation.

Equivalence between all drivers

6. Implicit in the Convention on Road Traffic is also equivalence between all drivers. Equivalence in behavioural expectations between all drivers is the foundation for safety in a shared traffic environment. It enables behavioural prediction of other road users and compensatory actions to accommodate others mistakes.
7. The principle of equivalence applies equally to "automated driving algorithms" and "humans" which are both responsible for situational awareness, risk assessment and appropriate action required for safe execution of the dynamic driving task in road traffic.
8. The objective of holding "automated driving algorithms" to the same "reasonable and prudent" account as human drivers defines the need for continual behavioural evaluation during execution of the dynamic driving task. This is the core need around which the ITU FG-AI4AD was established.

Two independent regulatory systems for drivers

9. SAE J3016 definitions lack of clear separation between the "automated driving algorithms" responsible for driving behaviour and the underlying "automated driving system" that provides sensors, actuators, communications, computers and operating systems as part of an "automated vehicle".
10. To be succinct; "automated driving algorithms" drive, while "automated vehicles" are driven.
11. This distinction is imperative within global regulatory frameworks. It creates a clear foundation for the continued independence between "driver" and "vehicle" which leads to an open, flexible market where an "automated driving algorithm" can be licensed to drive specific "automated vehicle" classes based upon a matching of the automated driver's requirements and the automated vehicle's capabilities.

12. Modifications to the Convention of Road Traffic which position “automated driving systems” or “automated vehicles” as not requiring a “driver”, thereby defining as something “other” than a “driver” as responsible for executing the dynamic driving task, violate the principle of equivalence on the road and risk leading towards two independent regulatory systems for drivers;

- Drivers (humans) comply to a "Safety by Design" regulatory system, with common acceptance of the Safe System approach and guided by the Global Forum for Road Traffic Safety (WP.1).
- Drivers (Automated Vehicles) comply to a “Liability by Design” regulatory system guided by the World Forum for Harmonization of Vehicle Regulations (WP.29).

13. Where “liability by design” is defined in the *Legal Aspects of Automated Driving* paper, by Dutch researcher Nynke Vellinga, to describe the evolving WP.29 type approval regulations for automated driving where technical specifications define new "justified expectations of users" for the “product” (where stakeholders include manufacturers, road authorities and even vehicle authorities).

14. In terms of “safe mobility” as the “product” the “justified expectation of users” should be set by the Convention on Road Traffic and Safe System approach to road safety.

15. As an example of expectation differences;

- WP.1 Resolution (ECE/TRANS/WP.1/165). Recommendation: "React to unforeseen situations in a way that minimises danger to the vehicle’s users and other road users.
- WP.29/GRVA-05-40e: "Under reasonably foreseeable conditions and where preventable the vehicle in automated driving mode should not cause collisions or other events resulting in destruction of property, injury, or death."

16. As similar expectation is a requirement under consideration by WP.29/GRVA Informal Working Group on Functional Requirements for Automated and Autonomous Vehicles (FRAV) within (FRAV-02-05/Rev.2);

4.4.1. The Automated Driving System (ADS) shall react to unforeseen situations in a way that minimizes risk.

17. However, as an example of the move towards two independent regulatory systems for “drivers”, FRAV-02-05/Rev.2 makes no reference to the Convention on Road Traffic or the Resolution on the Deployment of Highly and Fully Automated Vehicles in Road Traffic (ECE/TRANS/WP.1/165).