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**Economic Commission for Europe**

Inland Transport Committee

**Global Forum for Road Traffic Safety**

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Item 3(c) of the provisional agenda

**Automated driving**

**Submitted by the secretariat**

This document is an original (i.e., unedited and unchanged) version of ECE/TRANS/WP.1/2018/4 as created at the special WP.1 session in December 2017. WP.1 may wish to consult this document while discussing ECE/TRANS/WP.1/2018/4.

## Introduction:

The Global Forum for Road Traffic Safety (WP1) of the United Nations Economic Commission for Europe,

- Noting that the 1949 Convention on Road Traffic and 1968 Convention on Road Traffic have had significant bearing in the definition of domestic road traffic policies and have noticeably improved road safety ,
- Noting the continuous progress of automotive and digital technological advances,
- Noting that the road safety principles in the 1949 Convention on Road Traffic and 1968 Convention on Road Traffic do not exclude the use of highly and fully automated vehicles in road traffic.
- Acknowledging the importance of setting global road safety principles taking into account the continuous progress of automated road technologies ,
- Recognizing the potential for innovative safety technologies to improve social well-being by preventing motor vehicle crashes, both in ways that can now be foreseen and in ways that cannot yet be predicted, and desiring to avoid further obstacles that could impede the development of such beneficial technologies”,
- Recognizing the potential for the mentioned technologies to improve road traffic safety, inclusive mobility, that could help to deliver the United Nations Sustainable Development Goals, and accomplish strategies where safe and efficient mobility is a tool for socio- economic growth and governance,
- Desiring to establish at global level uniformity in the principles relating to the governance of Highly Automated Vehicles in road traffic environment, in order to improve road safety at global level and facilitate international traffic,
- Recommends Governments, which have not done so yet, to ratify or accede to the Convention on Road Traffic done at Geneva on 19 September 1949, and the Convention on Road Traffic done at Vienna on 8 November 1968, that have contributed, and will continue , significantly and promisingly, reduce the number of fatalities and injuries caused by collisions;
- Recommends Governments to take into account for their national legislations relating to traffic and road safety, the principles incorporated in the above mentioned Conventions on Road Traffic and the principles incorporated in this Resolution.

## Preamble

1. The Consolidated Resolution is intended to guide Parties to the Convention on Road Traffic done at Geneva on 19 September 1949, and the Convention on Road Traffic done at Vienna on 8 November 1968, as well as the European Agreement Supplementing the 1968 Convention on Road Traffic done at Geneva on 1 May 1971 with respect to the safe deployment of highly and fully automated vehicles **and their automated driving systems** in traffic environment, to support the enhancement of road traffic safety, mobility and socio-economic progress.

~~Option 1~~

~~the safe deployment of fully automated vehicles and their automated driving~~

~~Option 2~~

~~the safe deployment of automated vehicles and their automated driving~~

~~Option 3~~

~~the safe deployment of highly and fully automated vehicles and their automated driving~~

2. This Resolution does not supersede the legal obligations arising from the 1949 and 1968 Conventions and 1971 European Agreement.

3. ~~Rather, This Resolution represents an innovative approach, complements the principles of the 1949 and 1968 Conventions and 1971 European Agreement in the context of facilitating the safe deployment of highly and fully automated vehicles in the road traffic environment. It also makes further recommendations on issues linked to technological automotive advances not in the scope of the Conventions at the time when they were drafted.~~

4. These provisions will evolve as technology develops, and as experience and evidence accumulate regarding the deployment of automated vehicle technologies. As this Resolution is continually under development, the explicit inclusion of a principle or topic should not be construed as the implicit exclusion of any other. Nor does it prevent the development of binding legal instruments on similar topics if this is deemed necessary in the future.

**Alternative to 4**

The Resolution offers a flexible legal platform of globally shared principles and is meant to recommendations which will evolve as technology develops, and as experience and evidence accumulate regarding the deployment of highly and fully automated vehicles. **As this Resolution will be continually developed,** Therefore, the explicit inclusion of a principle **in this resolution** or topic should not be construed as the implicit exclusion of any other.

This Resolution may facilitate the development, under the guidance of the Global Forum for Road Traffic Safety, of binding legal instruments on similar topics if this is deemed necessary in the future.

~~Therefore, as this Resolution is continually offer new legal insight, the explicit inclusion of a principle or topic should not be construed as the implicit exclusion of any other. Nor does it prevent the development under guidance of the Global Forum for Road Traffic Safety of a new comprehensive binding legal instrument on similar topics in the future.~~

[5. Therefore, governments [including those at a sub national level] should work with civil society and industry to ensure that the principles outlined in this Resolution are incorporated into their domestic traffic frameworks in a way that recognises their specific context] – to be worked on.

Relation to the Conventions ?

**Definitions**

(a) **Highly and fully automated vehicle** refers to a vehicle equipped with automated driving system that exercise full dynamic control (without the need for human intervention), for which the system is a fall back, for some or all of a journey.

(b) **Automated driving system**” means the combination of hardware and software that **(can)** exercise **(full)** dynamic control of a vehicle on a sustained basis, ~~regardless of whether it is limited to a specific operational design domain;~~

(c) “Dynamic control” means (safely) carrying out all the real-time operational and tactical functions required to move the vehicle.

**Alternative 1**

(e) “Dynamic control” refers to carrying out all the real-time lateral and longitudinal functions and decisions to respond to other road users and the road environment so that the vehicle can be moved in traffic.

**Alternative 2**

**Dynamic control**” means safely operating the vehicle that does not necessarily include decision on routing or re-routing.

**User .....**

**User or operator** refers to a human role with respect to the strategic control of the vehicle for the decisions to engage or disengage the automated driving system (?)

~~Highly or fully automated vehicle~~ refers to a vehicle equipped with automated driving system that exercise full dynamic control (without the need for human intervention for which the vehicle is a fall back), for which the system is a fall back, for some or all of a journey.

**Principles for situations when the dynamic control function is performed by automated driving systems**

**Alternative:**

**(Principles for highly and fully automated vehicles)**

- ~~Automated driving systems should be designed to behave as to /~~ (Highly and fully automated vehicles should be designed so as to):
  - prioritize road safety
  - endeavour to compensate for human errors including those of other road users (whether inside and outside of the vehicle), as far as possible
  - comply with applicable domestic traffic rules, including those referring to
    - (a) safe interaction with other road users, road traffic safety agencies, law enforcement authorities ; and
    - (b) maintenance of smooth traffic flow and safe performance of any manoeuvre.
  - ~~not be able to be activated outside of the (only be used in) areas or conditions where it is designed to be used (drafting note: retain but relocate to an appropriate section)~~—only function within their operational design domain
  - record and store the necessary data to determine whether the automated driving system is engaged in the event of an incident which can be retrieved subject to regional or domestic privacy regulations
  - perform a manoeuvre in the event of the system malfunctioning that minimizes danger to the vehicle’s occupants and other road users.

- React to system malfunctions in a way that minimizes danger to the vehicle's occupants and other road users
- ~~— Be equipped with system monitoring function~~
- ~~— Conform with any applicable domestic or international law for their construction and technical certification.~~
- Be equipped with appropriate, consistent and (preferably internationally standardised), ~~{user friendly} [certified/type approved]~~ Human Machine Interfaces/displays and controls for communication with their users, other road users, road traffic safety agencies and law enforcement authorities. *(to be further developed)*
- ~~— Interact (/communicate) effectively and consistently with their users, other road users, road traffic safety agencies and law enforcement authorities.~~
- ~~Users of automated driving systems should~~ **(Users of highly and fully automated vehicles should):**
  - Be aware/informed ~~notified~~ of the proper use of the **vehicle** prior to starting the journey.
  - Possess the necessary capability to use the **vehicle** including being able to communicate with it.
  - Be able to, and hold the necessary driving permits, to exercise dynamic control so as to begin or complete a journey where the automated driving system is only engaged for some of the journey, unless another user does so.

~~Ensure, that if the ADS will be engaged for only part of the journey, at least one person be able to hold the necessary permit to exercise dynamic control so as to begin or complete a journey~~

  - Only use a highly and fully automated vehicle within its operational design domain, if they are not able to, or do not hold the necessary permits, to operate the vehicle, unless another user does so.

~~— Use highly and fully automated vehicles only in their operational design domain when no other user is able to or holds the necessary permits to operate the vehicle~~

~~— If highly and fully automated vehicles should continue its journey outside of their ODD there should be a person [inside or outside of the vehicle] to be able to take over the dynamic control~~

  - Adapt their behaviour [based on the functionalities] of the vehicle and applicable traffic rules. *(to be further developed)*
  - be able, and hold the necessary driving permits, to take over dynamic control of the vehicle if the vehicle begins or continues its journey outside of its operational design domain.

~~If highly and fully automated vehicles should continue its journey outside of their ODD there should be a person [inside or outside of the vehicle] to be able to take over the dynamic control~~ SWE

**UK Alternative:**

**Be able to, and hold the necessary driving permits to, exercise dynamic control so as to begin or complete a journey where the automated driving system is only engaged for some of the journey.**

Only use a highly and fully automated vehicle within its operational design domain, if they are not able to, or do not hold the necessary permits, to operate the vehicle.

- adapt their behaviour based on the functionalities of the vehicle and applicable traffic rules.

If the user does not adapt their behaviour to these functionalities, the automated driving system should be able to continue operating safely. *(Drafting note: move second sentence to section above on systems)*

- ~~possess the necessary capability to use automated driving systems (highly and full automated vehicles) / be able to communicate with the system (highly and full automated vehicles).~~

~~If the vehicle should begin or continue its journey outside of their ODD, there should be a person (inside or outside of the vehicle) to be able to take over the control~~

- ~~Vehicles with automated driving systems must (move to the first bullet or make this as additional recommendations):~~

- ~~— conform with any applicable international law for the construction, technical certification,~~
- ~~— Conform with international law for registration of vehicles.~~
- ~~— Be equipped with appropriate, and consistent, certified/type-approved Human Machine Interfaces [for communication with both the driver, and occupants of automated vehicles, and with other road users~~

Further recommendations

Fully and highly automated system:

- Include a performance monitoring function

Alternative:

Governments should:

- Adapt vehicle safety performance monitoring (e.g. periodic inspection) regimes/policies to accommodate incorporate assessment for highly and fully automated vehicles as necessary
- work (with industry) so that highly and fully automated vehicles record the necessary data to determine if the automated driving system is engaged-related to the automated driving system, especially in case of an unexpected event that could impact road traffic safety, such as a collision or violation of traffic rules. This data should be recorded, secured and made available, in accordance with regional or domestic privacy regulations, as necessary. *(to be further developed)*

- ~~— Adopt/ensure compliance/ with international law for registration of vehicles.~~

- Adapt policies for the registration of highly and fully automated vehicles as necessary

Alternatively:

- Governments may need to adapt their legislation to accommodate highly and fully automated vehicles that conform with any applicable international law for the construction, technical certification and registration of vehicles.
- Adapt the requirements for issuing driving permits to align with technological progress
- ~~— Start assessing the need for modifying the domestic provisions for registration of highly and fully automated vehicles~~  
~~vehicle registration and other requirements as appropriate for highly and fully automated vehicles~~
- adopt policies for recording and sharing of data by highly and fully automated vehicles related to the functioning of automated driving system, especially in case of an unexpected event that could impact road traffic safety, such as a collision or violation of traffic rules. This data should be recorded, secured and made available, in accordance with regional or domestic privacy regulations, as necessary.

**Alternative**

- ~~— Adapt domestic regulation/legislation to accommodate highly and fully automated vehicles as necessary~~
  - ~~— [undergo periodic inspections and road worthiness compliance policies]  
(drafting note: retain but relocate to an appropriate section)~~
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