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Convention on Road Traffic (1968):

Automated driving

Comments on Informal document No. 8 (March 2018)

Submitted by the secretariat

This informal document provides secretariat comments on Informal document no.8 (and coincidentally on ECE/TRANS/WP.1/2018/4 at the same time). The comments are highlighted in yellow (General comments are indicated as “general” while specific comments appear after the relevant text).

General comments: The secretariat believes that the text of this document should be revised to make it consistent with the language used in the 1949 and 1968 Conventions. It is also important to decide at the outset whether this document provides principles or recommendations (or both).

The document also needs to make it clear if its “recommendations/principles” are for automated driving systems. If so, then it needs to focus explicitly on the automated driving systems (as opposed to highly and fully automated vehicles).

I. Introduction

Comment: The text below was suggested by the WP.1 Chair and is still pending review by WP.1

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,
- “significant bearing...”: both Road Traffic Conventions have been used as foundations (basis) of domestic legislation and regulation in over 100 countries (as opposed to having bearing on domestic policies).
- “road traffic policies”: the term “policy” has a different meaning from prevailing law ie. legislation and regulation. The Conventions are not about policies.
- Noting the continuous progress of automotive and digital technological advances,
- “continuous progress of ... advances”: something appears missing in this sentence.
- Noting that the road safety principles in the 1949 Convention on Road Traffic and 1968 Convention on Road Traffic do not **preclude and hence do not** exclude the use of highly and fully automated vehicles in road traffic.
- “road safety principles”: the Conventions contain legal provisions (not principles).
- General comments: a phrase such as “do not preclude and hence do not exclude” is an example of interpretation of legal provisions (which are always open to interpretation). In contrast, principles are typically not open to interpretation (eg. it is self-evident that “all men are created equal”) while “one should not discriminate on the basis of race” is a recommendation. Domestic legislation may say: “it is unlawful to discriminate on the basis of ...”. It is important to be aware of these distinctions throughout the text.
- Acknowledging the importance of **encouraging setting global** road safety principles taking into account the continuous progress of automated **vehicle** technologies ,
- This point appears to use the term “principles” in the wrong way (how can one “encourage or set” principles?).
- 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,
- The term “crashes” should be replaced with “accidents” as this is the appropriate legal (Convention) term. The phrase “further obstacles” implies that there are “current obstacles”. If so, what are they? Moreover, the phrase “impede ... beneficial

technologies” is unclear as it is not well established that the current “innovative” vehicle technologies are “beneficial” (as opposed to providing merely more “comfort”). Also, one should not say or imply that (future) “innovative technologies” will always be beneficial.

- 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,
- There is no verb attached to “inclusive mobility” making this sentence unclear. It is also not clear what “strategies where ... safe ... mobility is a tool for ... governance” means.
- Desiring to establish ~~at global level uniformity in the principles~~ **for safely deploying** ~~relating to the governance of~~ **highly and fully** ~~automated~~ **V**vehicles in the road traffic environment, in order to improve road **traffic** safety at global level and facilitate **safe** international traffic,
- The term “principles” may warrant some attention (as discussed above). Also, “road traffic environment” is not a concept that is defined or immediately understood. What is it? How does “road traffic environment” relate to “roads”, “carriageways” or “sidewalks”? (The term “road traffic environment” is repeated throughout the text).
- ~~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.
- First, arguably there is not many true “principles” in this text. Second, if the text (ie., “principles”) are recommended to be incorporated into national legislation, then logically this text should amend the Conventions so the proposed “principles” are binding.

General comments: it is unclear why introduction and preamble are both necessary. The text available in the preamble below, supplemented by some additional background information, should be consolidate into one introduction/preamble. The resolution’s text should come directly under the title of the document ie. the text sequence should be: introduction, title, followed by resolution.

II. Preamble

Comment: The text of this preamble was adjusted to refer to highly and fully automated vehicles.

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 in traffic environment, to support the enhancement of road traffic safety, mobility and socio-economic progress.

- if this is a consolidated resolution, then it contains “recommendations”

- reference to “road traffic environment” to be explained

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

This appears superfluous as it is self-evident

3. Rather, this Resolution 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.

- rather “this Resolution provides complementary recommendations to legal provisions contained in the 1949 andto facilitate the safe deployment of ... on public roads...”

Comment: Paragraph 4 has not been agreed yet upon by WP.1. Two alternatives are provided below.

Alternative 1:

~~4. These principles 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 2:

4. The Resolution offers **principles and** recommendations which will evolve as technology develops and as experience and evidence accumulate regarding the deployment of highly and fully automated vehicles. Therefore, the explicit inclusion of a principle in this Resolution should not be construed as the implicit exclusion of any other. Moreover, this Resolution may facilitate the development, under the guidance of the Global Forum for Road Traffic Safety, of ~~binding legal instruments on similar topics~~ **future actions related to the deployment of highly and fully automated vehicles** if this is deemed necessary in the future.

- it is needed to separate principles and recommendations in this point

Comment: WP.1 has not yet agreed on the below paragraph 5 nor on its placement in the resolution.

~~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.~~

This Resolution takes into consideration the role of human beings in the context of automated driving technological progress, and offers recommendations to achieve a safe interaction between human beings and highly and fully automated vehicles.

- Not clear what this refers to. “The role of human beings in ... progress” is obvious. The progress is fully due to human beings. Also, the text seems to be about the interaction between humans and automated driving systems (see below) and not between humans and fully and highly automated vehicles.

Comment: WP.1 agreed that a paragraph on the relationship between the resolution and the conventions should be included in the preamble. However, it has not formulated any text to that end.

~~Insert the text on relationship with the Conventions here.~~

III. Definitions

Comment: WP.1 has so far agreed to include three definitions as provided below.

For the purpose of this Resolution,

(a) **“Highly- and fully automated vehicles”** refers to a-vehicles equipped with an automated driving system that **can** exercises full dynamic control (without the need for human intervention **to ensure road traffic safety**), for which the system is a fall back, for some or all of a journey.

- what is the difference between exercising “full dynamic control” and only “dynamic control”? Does “full dynamic control” include intervention by humans other than “to ensure road traffic safety”?

(b) **“Automated driving system”** ~~means~~ **refers to** the combination of hardware and software that exercises dynamic control of a vehicle on a sustained basis.

- unclear why the phrase “on a sustained basis” is relevant here. After all, “dynamic control” is defined below to be about “all functions in real time”

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

- it is suggested to re-consider this point and to provide the definitions of “operational and tactical functions”

(d) **“Operational Design Domain”** **refers to the environmental, geographic, time-of-day, traffic, infrastructure, and other conditions under which an automated driving system is specifically designed to function.**

- it would appear self-evident that the reference to ODD is unnecessary as by definition automated driving system could not be initiated by a human being (or continue to operate) outside of its own ODD. However, it may be useful to say that it is government’s task/responsibility to establish ODDs in some cases. For example, it is inconceivable to imagine that a manufacturer would design an ODD that only works on Thursdays between 7.00 and 9.00 as implied above.

General comments: the “recommendations/principles” appear to be for automated driving systems, so it is unclear why highly and fully automated vehicles are defined in the document. Moreover, the system serving as fall back to itself needs to be included in the definition of the automated driving system, so as to exclude systems for which human driver is the fall back. For the latter systems the Article 8, para 5bis should apply. It is suggested to delete point (a) and replace point (b) by:

Automated driving system refers to the combination of hardware and software that exercises dynamic control of motor vehicles with the software remaining a fall back in the system’s operational design domain when engaged.

IV. Principles/recommendations for *automated driving systems in highly and fully automated vehicles*

General comments: this section provides recommendations rather than principles. It is thus suggested to change the title to: “Recommendations for automated driving system exercising dynamic control over a motor vehicle”. Alternatively, the preamble can explain what the status of this entire document is. If done, then this section can simply say: “Automated driving systems in highly and ...”.

Comment: WP.1 has so far agreed to include recommendations for vehicles as provided below.

Automated driving systems in Hhighly and fully automated vehicles should:

Systems or system? The reference to “highly and fully automated vehicles” does not appear to be necessary. Perhaps, it is more suitable to say: “exercising dynamic control over a motor vehicle”

- Prioritize road safety

The phrase “prioritize road safety” may imply the existence of different elements of road safety which need to be ranked in order of priority. It is suggested to revise to: “Make road safety a priority in any circumstances”

- Endeavour to **safely tolerate** ~~compensate for~~ **detectable** human errors of road users **and minimize potential effects of such errors** (inside and outside of the vehicle),

What does “tolerate” refer to? It is suggested to revise to say: “Endeavour to detect errors of other road users and minimize potential effects of such errors (inside and outside of motor vehicle, including occupants of this vehicle over which the system exercises dynamic control)”

- Comply with applicable domestic traffic rules, including those referring to:

The phrase “domestic traffic rules” should be replaced by “international” (or by “the rules contained in the Conventions”). This text is “international” so it appears that the objective is to agree internationally on the minimum “principles/recommendations”. Thus, the text should not have references to domestic provisions. What is the point of internationally agreeing to having automated driving systems comply with domestic traffic rules?

- (a) Safe interaction with other road users, road **infrastructure operators** ~~traffic safety agencies~~, law enforcement authorities; and

This point should begin with a verb to be consistent with all other points. The reference to “infrastructure operators” is not clear.

- (b) **Optimizing the M**aintenance of smooth traffic flow and safe performance of any manoeuvre **while allowing for reasonable exceptions for the benefit of safety.**

This point should begin with a verb to be consistent with all other points. However, if revised to say “Optimize the maintenance...”, it would still be unclear. It is not clear whether “smooth traffic flow” and “safe performance” belong together or whether they are unrelated.

It appears unnecessary to refer to “safe performance of any “manoeuvre” as there are already many Convention provisions on safe manoeuvres. Are these different from those in the above point (b)? What does the “exception for the benefit of safety” mean? Does this mean that what is contained in the Conventions is not safe? Does this point attempt to say: “Smooth traffic flow unless it performs a minimum risk manoeuvre in case of malfunction or an emergency situation”?

- Only operate within their operational design domain.
- **Be capable of achieving a minimal risk condition when necessary, for example in case of a failure in the automated driving system or other vehicle system, or in case the vehicle exits the ODD.**

As per point above, vehicles must not exit ODD without the change of a “driving mode”. What about changing it to: “Perform minimum risk manoeuvre in case of its malfunction or any other technical failure on the motor vehicle over which it exercises dynamic control”

- React to system malfunctions in a way that minimizes danger to the vehicle’s occupants and other road users.

This recommendation repeats the previous one.

- ~~— Be equipped with appropriate, consistent and [preferably internationally standardised] Human Machine Interfaces/displays and controls for communication with their users, other road users, road traffic safety agencies and law enforcement authorities.~~
- **Be capable of clearly communicating with its users about its status, and also with other road users, in such a way as to enable an appropriate response. In addition, be capable of monitoring and interacting with the traffic environment as well as with information provided by road infrastructure operators and law enforcement authorities.**

It is suggested to revise the first sentence to say: “Communicate clearly with the occupants of the motor vehicle over which the system exercises dynamic control, as well as with other road users, in such a way as to enable an appropriate response.”

With respect to the second sentence, it appears that this part is already covered in points above. At the same time, it will be useful to add a recommendation that the system should only undertake to exercise the dynamic control when it is capable of monitoring and interacting with other road users. If for example the weather conditions (heavy rain or snow) prevent the system from the necessary monitoring or interaction, it should not undertake to exercise the dynamic control. Possibly, this should be a recommendation to start this section.

- **Operation of the system should enable verification as to whether the dynamic control was performed by the system or by the user of the system.**

This recommendation does not belong to this section but to “further recommendations” section below.

- **enable the possibility of safe manual system deactivation, without lowering the system safety performances.**

This recommendation should be revised to say: “Perform a minimum risk maneuver in case it is deactivated manually by an occupant of the vehicle over which the system exercises dynamic control, unless deactivation by the occupant is done with the purpose of taking over the dynamic control”.

It may be useful to add a recommendation that the system should verify the ability of an occupant to take over the dynamic control either when the occupant is deactivating the system manually with the aim to exercise the dynamic control or when the occupant is obliged to take over just before leaving the system’s ODD. In case when the system cannot confirm the occupant’s ability to take over in accordance with legislation in force, it should perform the minimum risk maneuver.

(Comment: This point is to be further developed)

V. Principles/recommendations for users of automated driving systems in of highly and fully automated vehicles

For consistency reasons, it is suggested to say: “Recommendations for occupants of motor vehicles over which dynamic control is exercised by automated driving system”.

Comment: WP.1 has so far agreed to include recommendations for users as provided below.

Users of **automated driving systems in** highly and fully automated vehicles, **depending on the functionalities offered by the system**, should:

For consistency reasons, it is suggested to say: “An occupant of the motor vehicle over which dynamic control is exercised by automated driving system should:”

- Be aware/informed of the proper use of the automated driving system prior to starting the journey.
- Possess the necessary capability to use the automated driving system including ~~being able~~ **the capability** to communicate with it.
- **Follow procedures for safe use of the vehicle.**

It is unclear what these procedures are. Is it the idea here to follow instructions provided by the automated driving system? If so, then the occupant must follow them.

- **Comply with traffic rules pertaining to users of the vehicle including, when appropriate, those applying to users exercising dynamic control for part of a trip.**

What are the traffic rules referred here to? Are these applicable domestic traffic rules? It should then be reformulated to follow the consistent language. Moreover, the second part should be deleted, while the notion of compliance with applicable domestic or better international traffic rules be added to the recommendation starting with “Be able to...”

- **use an automated driving system only within its operational design domain**

The automated driving system would not be available outside of ODD, thus, as such, there will only be a possibility of using it in its ODD. Should it be necessary to add a recommendation about activation of the system in its ODD only, maybe this notion should be added to the first recommendation on proper use of the system?

- 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.

As per comments above, it appears sensible to add after “Be able to” “in accordance with the applicable international traffic rules”. Moreover, the notion here could be about taking the control over at any time of the journey within the ODD, which should possibly be reflected.

- ~~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.~~

There should be a recommendation addressing the case when the journey continues outside of automated driving system’s ODD. A formulation as follows could be considered: “Continue the journey in the motor vehicle outside of the operational design domain of the automated driving system only when (s)he possess the ability to take over the dynamic control in accordance with applicable traffic rules in force.”

- Adapt their behaviour ~~[based on the functionalities]~~ **to the automated driving system** of the vehicle and **the** applicable traffic rules. (*Comment: to be further developed on whether this recommendation should refer to functionalities or rather continuation of a journey as a driver*).

The above recommendation does not seem necessary. These issues are covered by other recommendations already.

There should also be a recommendation suggesting manual deactivation of the automated driving system only in emergency situations unless deactivation is done by an occupant to take over the dynamic control of the motor vehicle. Also, it will seem sensible to add a recommendation saying that occupant may not have the abilities mentioned in these recommendations but still use a vehicle over which dynamic control is exercised by automated driving system when another occupant has such abilities. This should cover the case when one of the occupants is a child but is accompanied by an adult with the required abilities or when a journey should continue outside of ODD for all occupants when only one of them can take over the dynamic control in accordance with applicable traffic rules in force.

VI. Further principles/recommendations

Comment: WP.1 has not agreed yet on any recommendation under this section. There has been only ideas proposed for which alternative text exists.

Comment: There has been alternative text proposed as below regarding performance monitoring/inspection and registration:

Alternative 1

Governments should:

- ~~Adapt vehicle safety performance monitoring to accommodate highly and fully automated vehicles as necessary~~
- ~~Adapt policies for the registration of highly and fully automated vehicles as necessary~~

Alternative 2:

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.

Comment: The text below regarding recording and sharing of data has not been agreed upon. Alternatives are provided as basis to further develop the recommendation on data recording and sharing.

Governments should:

Alternative 1:

- ~~Work [with industry] so that highly and fully automated vehicles record the necessary data related to exercising the dynamic control by 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.~~

— *Alternative 2:*

~~Adopt policies for recording and sharing of data by highly and fully automated vehicles related to the functioning of their 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.~~

Governments should review their relevant regulatory frameworks, and where necessary adapt or add rules to support the safe use of highly and fully automated vehicles, including provisions for monitoring their system safety performance.

What makes this point (and all other points below) unusual is that an internationally agreed text (ie. this resolution) recommends national actions instead of proposing common/harmonized international ones.

Should it not be useful to include some fundamentals on “provisions on monitoring first” and only in this point ask governments to do it?

In any case, this point should be reformulated to make it consistent with others: Governments should review their relevant regulatory frameworks, and where necessary adapt or add traffic rules to support the safe use of motor vehicles over which dynamic control is exercised by automated driving system, including provisions for monitoring the performance of the automated driving system.

Governments should consider concerted actions to increase public awareness and acceptance. Such actions could include introducing updated requirements for issuing driving permits in order to align user requirements with technological progress.

First sentence, it appears essential to clarify in this recommendation the subject about which public awareness and acceptance should increase.

Second sentence: does this not ask governments (contracting parties) to individually revise the Conventions and introduce change to Domestic Driving Permits?

As in the point above, this text should first establish what these changes must be and only then recommend their implementation.

Comment: The recommendation below has not been discussed in the context of formulation of recommendations for user of highly and fully automated vehicles.

Governments should:

~~Adapt the requirements for issuing driving permits to align with technological progress.~~

Governments should adopt policies regarding the necessary data for the purposes of the following:

Does this recommendation refer to the necessary collection, storage and use of data?

enable the evaluation of the safety impact of the use of highly and fully automated vehicles;

This point should not refer to highly and fully automated vehicles but to automated driving system.

- **enable the evaluation of the causal factors involved in of road traffic safety incidents, such as collisions, traffic rule violations or driver interactions with highly and fully automated vehicles.**

This point should not refer to highly and fully automated vehicles but to automated driving system, so the second part of the sentence should be reformulated e.g. as follows:

“...violations and the interaction between the systems and the occupants of motor vehicles over which the dynamic control is exercised by automated driving systems and between the systems and other road users.”

Governments should work on measures concerning security and cybersecurity, in order to safeguard the functioning of automated driving systems in ~~highly and fully automated motor~~ vehicles from misuse, or from use for any unintended purposes.

Governments, industry and the civil society are encouraged to work together to ensure that the principles outlined in this Resolution are incorporated into their domestic traffic frameworks.

This last recommendation should be placed in the preambular part of the resolution text, at the beginning of this document. The expression “principles” for consistency should be replaced, as appropriate, by “recommendations”.
