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Convention on Road Traffic (1968):

Automated driving

Draft terms of reference for elaboration of a non-binding advisory instrument dedicated to the highly automated and/or driverless vehicles which would serve the Contracting Parties to the 1949 and 1968 Conventions on Road Traffic

Submitted by the Secretariat

This document is submitted at the request of the Global Forum for Road Traffic Safety (WP.1) which requested the secretariat prepare the draft terms of reference for elaboration of a non-binding advisory instrument dedicated to the highly automated and/or driverless vehicles which would serve the Contracting Parties to the 1949 and 1968 Conventions on Road Traffic (para 22, ECE/TRANS/WP.1/157).

Introduction:

As motorization grows and vehicles and technology develop, so does the system of road traffic rules necessary to regulate the increasing and changing road traffic. Given a significant trans-border dimension of transport, these domestic traffic rules are typically internationally harmonized through legally binding treaties (conventions). These conventions are constantly reviewed and periodically amended in order to keep them relevant and up-to-date. While the process of updating the traffic rules is continuous, it appears that a turning point in this process - induced largely by technological change - is being rapidly approached. This is so because until today, traffic rules have been developed for road users, among them for drivers who are meant to possess specific skills and knowledge, to be in control of their vehicles, as well as to possess the necessary physical and mental ability and be in a fit physical and mental condition. These legal provisions explicitly and implicitly assume that the driver is human, is inside the vehicle, and occupies the driver's position (ie. behind the ubiquitous steering wheel in front and having foot pedals below). With the arrival of highly automated and driverless vehicles, characterized by technical functions that allow a vehicle to be operated remotely and of those that may make a human driver superfluous, a question arises how suitable the existing traffic rules are for the purpose of regulating and facilitating the international traffic of tomorrow.

This document:

- A. Informs of the existing traffic rules as stipulated in the 1949 and 1968 Conventions on Road Traffic as well as specifies issues which should be regulated in order to ensure road safety and facilitate international traffic for years to come with regard to:
 - (i) highly automated vehicles,
 - (ii) driverless vehicles, and
 - (iii) technical functions for operating a vehicle from the outside.
- B. Proposes the contents for a non-binding advisory instrument dedicated to the highly automated and/or driverless vehicles.
- C. Suggests a process how to develop the non-binding instrument, including its possible future use as an annex or protocol applicable to the 1949 and 1968 Conventions on Road Traffic.

A. Existing traffic rules and issues to be regulated or clarified:

A(i) Highly automated vehicles:

The 1949 Convention on Road Traffic requires the driver to be in control of the vehicle at all times (Article 8, point 5). At the same time, there is no provision in the 1949 Convention that would require the driver to minimize the activities other than driving when being in control, nor is there any provision specifying whether a human driver can (or cannot) be supported by vehicle systems when driving.

The 1968 Convention on Road Traffic also requires the driver to be in control of a vehicle at all times. Nevertheless, based on its current provisions, the "operation" (driving) of highly automated vehicles in international traffic is in conformity with the Convention provided that:

"Vehicle systems which influence the way vehicles are driven shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when they

*are in conformity with the conditions of construction, fitting and utilization according to international legal instruments concerning wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles**

Vehicle systems which influence the way vehicles are driven and are not in conformity with the aforementioned conditions of construction, fitting and utilization, shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when such systems can be overridden or switched off by the driver” (paragraph 5bis of Article 8).”

These provisions appear not only to allow for a vehicle to be driven by vehicle systems but also allow for a human driver to engage in activities other than driving. That is, they make paragraph 6 of Article 8 not applicable to the human driver when his driving is supported by the vehicle system. In this regard, and to ensure common understanding of the provisions of Article 8 of the 1968 Convention, the Global Forum for Road Traffic Safety (WP.1) at its 74th session agreed on two principles stipulating conditions under which the human driver is able to perform activities other than driving:

“When the vehicle is driven by vehicle systems that do not require the driver to perform the driving task, the driver can engage in activities other than driving as long as:

Principle 1: these activities do not prevent the driver from responding to demands from the vehicle systems for taking over the driving task, and

Principle 2: these activities are consistent with the prescribed use of the vehicle systems and their defined functions.”

While the common understanding is useful, it would be desirable that “activities” as introduced with the two principles were further defined. To this end, it seems necessary to elaborate on the following:

- Prohibition of certain human driver activities as a function of the capabilities of the vehicle systems,
- Start and end points of human driving versus driving by vehicle systems, and
- Human driver training in view of capabilities of the technology used (given that those systems would drive most of the time, human drivers required to be in control, might gradually degrade their driving skills and thus lose the capability to be in control when required).
- Driving of highly automated vehicles and the role of human driver when driving such a vehicle under the 1949 Convention.

The elaboration of the above issues should result in formulation of legal provisions, which once prepared, can either be introduced into the Conventions or alternatively be introduced into an ancillary instrument supporting the 1949 and 1968 Conventions.

A(ii) Driverless vehicles:

The 1949 and 1968 Conventions on Road Traffic prescribe rules for drivers driving vehicles or guiding animals. At the same time, the driver is defined as a person, undoubtedly originally meant as a “human person”, even if the word “human” is not used in the Conventions. While it is clearly possible to stretch the legal interpretation of a “driver” to include “non-human drivers”, it is equally inconceivable that the drafters of the 1968 Convention envisaged drivers other than “human drivers”. Moreover, any interpretation of the driver being other than “human” makes the Conventions difficult to understand. If the driver could be something other than a human person, e.g. a legal person, that legal person

would be required – illogically – to minimize activities other than driving as per paragraph 6 of Article 8 of the 1968 Convention. Similarly, if the driver were vehicle systems, as per the 1968 Convention, there would be vehicle systems supporting a driver (ie. vehicle systems) which the driver (ie. vehicle systems) could switch off.

It appears therefore more productive to agree that the Conventions regulate the driving by a human driver who needs to be in control (as per the understanding and conditions stipulated under section A(i)). If this is so, there are thus no rules for driverless driving, ie. driving by vehicle systems in control at all times with humans having the role of vehicle occupants only.

Certainly, there is no need to revise the traffic rules related to vehicle maneuvers such as position on the carriageway, overtaking, passing or changing direction, slowing down and/or giving way on the intersection. A driverless vehicle can be programmed to drive according to these rules and so assume many of the roles of the human driver. At the same time, are there any functions and/or legal obligations arising from the existing rules that a driverless vehicle cannot assume on behalf of the human driver? Would those rules continue to be valid or should they cease to apply? Shall we expect that technology be in position to deliver any solution needed? Alternatively, are there any new rules and regulations required for safe travel in such circumstances?

Therefore, it seems desirable that the following is considered:

- Vehicle occupants/passenger behaviour during rides – should and can vehicle systems of a driverless vehicle provide instructions for any case of situations, including emergency stops and necessary alighting of occupants from the vehicle, and/or an occupant of a driverless vehicle should have a minimum (certified) level of knowledge of road traffic rules for using such vehicles?
- Transporting children/under-age – should and can vehicle systems of a driverless vehicle transport children/under-age without them being accompanied by an adult person?
- Loading of cargo – should and can vehicle systems of a driverless vehicle react to inappropriately stowed cargo/load or too many passengers?
- System or mechanical faults – what should be expected from the vehicle systems of driverless vehicle and from its passenger when a system or mechanical fault occurs?
- Obligatory warning and/or other portable devices on motor vehicles – should and can vehicle systems of a driverless vehicle transport passengers when any of the obligatory portable devices are missing on the vehicle?
- Behaviour in case of accident – should and can vehicle systems of a driverless vehicle instruct vehicle occupants to assist the injured?
- Transformation of traffic rules – should vehicle systems of automated vehicles be connected resulting in each vehicle to vehicle communication? In such a situation, which are the traffic rules to be altered and what kind of infrastructural changes are needed to improve traffic flows (e.g. no traffic signals at intersections)? How these changes should be approached taking into account the coexistence of driverless vehicles and non-automated users: pedestrians or bicyclists or coexistence with highly automated vehicles?

In addition, the following may also need to be considered:

- The use of “hybrid steer” vehicles (a hybrid steer vehicle is one in which gear such as a steering wheel or foot pedals could be temporarily deactivated or removed)

and a transition phase between human driving and vehicle systems driving in a hybrid steer vehicle, and

- Obligations of human drivers using hybrid steer vehicles (application of the Conventions to driving a hybrid steer vehicle by authorized drivers, including the human driver responsibility for not engaging in certain activities (as referred to in section A(i)).

The elaboration of the above should result in legal provisions. These “driverless provisions” should not be introduced into the Conventions (which shall continue to be focused on a human driver) but to assemble them in an ancillary instrument (annex/protocol) applicable to both Conventions. This approach would be easier to follow while it would have additional benefits of new rules being applicable to both 1949 and 1968 Conventions (considering how challenging it is to amend the 1949 Convention).

A(iii) Technical functions for operating a vehicle from the outside:

The Conventions with the existing provisions do not explicitly specify the positioning of the human driver vis-à-vis the vehicle. In other words, the Conventions are silent whether the human driver can be driving from both the inside and outside. At the same time, many provisions of the Conventions would become unclear if the driver were meant as “driving” the vehicle from the inside and outside. This supports the premise that the Conventions with their existing provisions only apply to drivers driving vehicles from the inside. Therefore, for highly automated vehicles, which can be used under the existing provisions of the Conventions, to enable their operation by human drivers from the outside would require that such a possibility is incorporated into the provisions of the Conventions or alternatively such provisions are introduced into an ancillary instrument applicable to the Conventions.

B. Non-binding advisory instrument dedicated to the highly automated and/or driverless vehicles

In view of the issues discussed above, it is proposed that a non-binding instrument be developed which is solely dedicated to highly automated and/or driverless vehicles. The instrument would serve the Contracting Parties to the 1949 and 1968 Conventions on Road Traffic (by being applicable to both).

This instrument should be developed through a two-step approach. First, answers should be formulated on the policy issues identified in section A above as well as on any other issues, as appropriate. Second, legal provisions should be drafted based on the agreed policy answers.

This instrument, even if originally developed as non-binding, should be prepared in such a way as to allow its use as an ancillary, binding instrument linked to the 1949 and 1968 Conventions on Road Traffic.

In this regard, it is proposed that the instrument consists of three sections, each to contain legal provisions developed in the two-step approach above and linked to the issues described respectively in A(i), A(ii) and A(iii)

Responsibility for vehicle control	Human driver	Vehicle systems	Human driver
Type of vehicle	Highly automated vehicle, including hybrid steer vehicles (with takeover function available)	Driverless vehicle and hybrid steer vehicles (takeover function temporarily unavailable)	Highly automated vehicles
Legal framework	Application of 1949 and 1968 Conventions on Road Traffic, additional provisions could be useful	No international legal framework available yet	No international legal framework available yet
Section of an ancillary instrument	Section 1	Section 2	Section 3

Section 1 is to provide provisions that could be useful and offer the necessary guidance to policy makers and regulators (and human drivers when driving highly automated vehicles). To this end, Section I is to define the activities that should be prohibited to a human driver of a highly automated vehicle when the vehicle is driven by the vehicle systems, ie. when such activities would compromise human driver’s readiness for resuming driving when instructed to do so as well as such activities that would compromise human driving in general. Section 1 may elaborate these activities as per the capabilities of the vehicle systems. It may clarify the start and end points of phases of human and vehicle systems driving. This section may further define the requirements for training and re-training for human drivers using highly automated vehicles.

Section 2 is to regulate driverless driving, transition from driverless to highly automated vehicle and vice-versa (for hybrid steer vehicles), rules for riding, if any, for vehicle occupants to make these occupants responsible users. It may also prescribe infrastructural changes, if any, to environments in which driverless vehicles would be operated.

Section 3 is to prescribe provisions for operating a highly automated vehicle from the outside by a human driver. Section 3 should also define functions to be accepted for operation of a highly automated vehicle from the outside by a human driver e.g. a remote parking function or a “short-distance” summon function so as to clarify what is operation of a vehicle from the outside by human driver which should not be mixed with driverless driving (e.g. “long-distance” summon function).

C. Process to develop the non-binding instrument

It is recommended that the following process is followed to develop the non-binding instrument. The Global Forum (WP.1) mandates the informal group of experts on automated driving to elaborate policy issues, and on this basis, it develops provisions for Sections 1 and 3. For section 2, it is proposed that a process similar to the one which

resulted in developing the 1968 Convention on Road Traffic is used. The Global Forum (WP.1) mandates the secretariat (with support of a lawyer/consultant and with assistance of no more than five country experts, with the latter as needed seeking policy and legal assistance within their home institutions) to elaborate policy issues and to draft legal provisions for Section 2.

Both the informal group of experts and the secretariat will present policy papers and subsequently draft legal provisions to the Global Forum (WP.1) for consideration and possible adoption.

For situations, where there is no clear answer to the policy questions, the Global Forum (WP.1) will organize round tables or brainstorming sessions involving interested stakeholders, including from the private sector and academia.
