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Convention on Road Traffic (1968):

Highly and fully automated vehicles

**Memorandum: Reconciling Outstanding Issues in the
Resolution on Highly and Fully Automated Vehicles through
Broader Initial Language**

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This memorandum provides potential alternative text for the draft Resolution on Highly and Fully Automated Vehicles (ECE/TRANS/WP.1/2018/4).

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
<p>The text below is a clean version of ECE-trans-WP1-2018-03-24 displayed to facilitate comparison with the alternative text. Text in red was agreed by WP.1 at the 76th session.</p>	<p>This memorandum provides potential alternative text for the Resolution on Highly and Fully Automated Vehicles.</p> <p>This alternative text is not a proposal. Retaining the current text (in the first column) may be prudent when that text is acceptable to the parties. However, when the current text is not acceptable, this alternative text might offer a path forward.</p> <p>In general, this alternative text is broader and simpler than the current text. Broader and simpler text may be appropriate because the Resolution (1) is a nonbinding legal document, (2) contains only recommendations, and (3) can be updated in the future as the technologies evolve.</p> <p>In some cases, this alternative text adapts text previously offered by delegates or by the secretariat, including in documents presented at the March 2018 session. Text that has already been accepted by WP.1 is marked in red, and minor suggestions for improving the clarity or consistency of that text are underlined.</p>
<p>I. Introduction</p>	<p>I. Preamble</p> <p>[Note: This format is more typical of a preamble]</p>
<p>The Global Forum for Road Traffic Safety (WP1) of the United Nations Economic Commission for Europe,</p>	<p>The Global Forum for Road Traffic Safety (WP.1) of the United Nations Economic Commission for Europe,</p>
<p>-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,</p>	<p>-Affirming that the 1949 Convention on Road Traffic and the 1968 Convention on Road Traffic (“the Conventions”) have significantly improved road traffic safety by informing domestic regulation and encouraging international cooperation,</p>
<p>-Noting the continuous progress of automotive and digital technological advances,</p>	<p>-Noting important advances in road traffic technologies since the Conventions entered into force, including substantial progress toward highly and fully automated vehicles,</p>
	<p>-Welcoming the potential contribution of highly and fully automated vehicles to road traffic safety and inclusive mobility (including for those who cannot currently drive a motor vehicle),</p>
	<p>-Emphasizing the importance of road traffic safety and inclusive mobility to achieving the United Nations Sustainable Development Goals,</p>

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
-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.	-Recognizing that the Conventions do not preclude and hence 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,	-Stressing the importance of applying road safety principles to new road traffic 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,	-Emphasizing that the safe systems approach to road traffic safety should both incorporate and inform these 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 promote the development of these technologies in a way that is socially beneficial, and [Note: See also above]
-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,	-Seeking to provide consistent recommendations that are useful to all Parties,
-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;	[Note: Covered by the first and last clauses in this section]
-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	-Encourages Parties to take into account the recommendations contained in this Resolution in adapting their road traffic frameworks for highly and fully automated vehicles, and
	-Further encourages Parties to continue their international cooperation on road traffic safety.
II. Preamble	II. Introduction

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
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.	1. This Resolution is intended to help Parties to facilitate the deployment of highly and fully automated vehicles in road traffic in a way that contributes to safety, mobility, and socioeconomic progress.
2.This Resolution does not supersede the legal obligations arising from the 1949 and 1968 Conventions and 1971 European Agreement.	2. This Resolution does not supersede the legal obligations arising from the Conventions.
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.	3. Rather, this Resolution provides complementary recommendations based on the principles of the Conventions.
<p>Comment: Paragraph 4 has not been agreed yet upon by WP.1. Two alternatives are provided below.</p> <p>Alternative 1:</p> <p>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.</p> <p>Alternative 2:</p> <p>4.The Resolution offers 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 if this is deemed necessary in the future.</p>	<p>4. These recommendations reflect the current state of knowledge about highly and fully automated vehicles.</p> <p>5. These recommendations are not exhaustive. The explicit inclusion of one topic should not be construed as the implicit exclusion of another.</p> <p>6. WP.1 may update these recommendations as road traffic technologies develop, experience with these technologies grows, and evidence about these technologies accumulates.</p> <p>7. These updates will provide an opportunity to further clarify how principles in the Conventions apply in the context of highly and fully automated vehicles.</p> <p>8. WP.1 may also facilitate other forms of international cooperation with respect to highly and fully automated vehicles. [This cooperation may include the development of new legal instruments on topics relevant to highly and fully automated vehicles.]</p>

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
<p>Comment: WP.1 has not yet agreed on the below paragraph 5 nor on its placement in the resolution.</p> <p>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.</p>	<p>9. Parties should take the recommendations in this Resolution into account as they prepare their road traffic frameworks for the safe deployment of highly and fully automated vehicles in road traffic.</p>
<p>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.</p> <p>Insert the text on relationship with the Conventions here.</p>	<p>[Note: This is addressed in paragraphs 2, 3, and 7—and can be further clarified in a future update]</p>
<p>III. Definitions</p>	
<p>Comment: WP.1 has so far agreed to include three definitions as provided below.</p>	
<p>For the purpose of this Resolution,</p>	<p>For the purpose of this Resolution,</p>
<p>(a) (Highly and fully) automated vehicle(s) refer to/mean vehicles equipped with an automated driving system that can exercise dynamic control (without the need for human intervention as a fall back to ensure road traffic safety), for which the system is a fall back?, for some or all of a journey (SAE 4-5)?.</p> <p>SPAIN</p> <p>Fully automated vehicles refer to vehicles equipped with an automated driving system that can exercise full dynamic control in any ODD ie. unconditionally. The system is a fall back (without any expectation that a user will respond to a request to intervene)</p> <p>Highly automated vehicles refer to vehicles equipped with an automated driving system that can exercise full dynamic control within a specific/limited/restricted ODD. The system is the fall back (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 (without any expectation that a user will respond to a request to intervene)</p>	
<p>(b) Automated driving system means the combination of hardware and software that exercises dynamic control of a vehicle on a sustained basis.</p>	<p>(a) “Automated driving system” refers to the combination of hardware and software that can exercise dynamic control of a vehicle on a sustained basis.</p>

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
(c) “Dynamic control” means carrying out all the real-time operational and tactical functions required to move the vehicle.	(b) “Dynamic control” refers to carrying out all the real-time operational and tactical functions required to move a vehicle in traffic. This includes controlling the vehicle’s lateral and longitudinal motion, monitoring the road environment, responding to events in the road traffic environment, and planning and signaling for maneuvers.
	(c) “Fully automated vehicle” refers to a vehicle equipped with an automated driving system that can operate without operational design domain limitations for some or all of a journey, without the need for human intervention as a fallback to ensure road safety.
	(d) “Highly automated vehicle” refers to a vehicle equipped with an automated driving system that can operate within a specific operational design domain for some or all of a journey, without the need for human intervention as a fallback to ensure road safety.
	(e) “Highly and fully automated vehicles” refers to highly automated vehicles and fully automated vehicles collectively.
	(f) “Minimal risk condition” refers to a condition to which an automated driving system may bring a vehicle in order to reduce the risk of a crash when a given trip cannot or should not be completed.
	(g) “Operational design domain” (ODD) refers to the environmental, geographic, time-of-day, traffic, infrastructure, and other conditions under which an automated driving system is specifically designed to function.
IV. Recommendations for automated driving systems in highly and fully automated vehicles	
Comment: WP.1 has so far agreed to include recommendations for vehicles as provided below.	
Automated driving systems in highly and fully automated vehicles should: [accepted]	Automated driving systems in highly and fully automated vehicles should: [accepted]
-Make road safety a priority, [accepted]	(a) Make road safety a priority, [accepted]
-Endeavour to safely tolerate detectable human errors of road users, inside and outside of the vehicle, and minimize potential effects of such errors,	(b) Endeavour to safely tolerate detectable errors of road users, whether inside or outside the vehicle, and to minimize the effects of such errors,
-Comply with applicable traffic rules, especially those referring to:	(c) Comply with applicable traffic rules, especially those referring to:
(a) Interacting safely with other road users, [accepted]	(1) Interacting safely with other road users, [accepted]

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
(b) Following instructions from authorized officials directing traffic /or (b) Following instructions from authorized officials directing traffic such as in the area of road works and location of road accidents	(2) Following instructions given by those authorized to direct traffic, and
(c) Maintaining smooth and safe flow of traffic [accepted]	(3) Maintaining smooth and safe flow of traffic. [accepted]
-Only function within their operational design domain. [accepted]	(d) <u>Function only</u> within their operational design domain. [accepted] [Note: “Only function” changed to “Function only”]
-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 [accepted]	(e) Provide appropriate notice before exiting the operational design domain. [Note: Text adapted and moved from section V]
	(f) 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 <u>operational design domain</u> . [accepted] [Note: “ODD” changed to “operational design domain”]
- React to system malfunctions and unforeseen situations in a way that minimizes danger to the vehicle’s occupants and other road users. [accepted]	(g) React to system malfunctions and unforeseen situations in a way that minimizes danger to the vehicle’s occupants and other road users. [accepted]
-Be capable of clearly communicating [relevant information such as about its status] with its users and other road users, in a way that is consistent and that enables an appropriate interaction. In addition, be capable of monitoring and interacting with the road traffic environment.	(h) Be capable of clearly and effectively communicating with their users and other road users in a way that is consistent, that provides sufficient information about their status, and that enables appropriate interactions.
	(i) Be capable of monitoring and interacting appropriately with the road traffic environment.
-Operate in a way that enables verification as to whether or not it is or was performing dynamic control [accepted]	(j) Operate in a way that enables verification as to whether <u>they are or were</u> performing dynamic control. [accepted] [Note: Agreed text altered to read in the plural to fit grammatically with the rest of this section and to delete the extraneous phrase “or not”]
-Enable its deactivation in a safe manner. [accepted]	(k) Enable <u>their</u> deactivation in a safe manner. [accepted] [Note: Agreed text altered to read in the plural to fit grammatically with the rest of this section]
V. Recommendations for users of automated driving systems in highly and fully automated vehicles	

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
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:	Users of automated driving systems in highly and fully automated should:
-Be aware/informed of the proper use of the vehicle prior to starting the journey [accepted].	(a) Be aware <u>and</u> informed of the proper use of the vehicle prior to starting the journey. [accepted] <i>[Note: Changed “/” to “and”]</i>
- Be able to communicate with the systems or -Possess the necessary capability to use the vehicle including being able to communicate with it.	(b) <i>Meet requirements for safely using the vehicle.</i> <i>[Note: This formulation includes communication—but not every occupant needs to be able to communicate with the system.]</i>
-Be able to follow the procedures for safe use of the vehicle [accepted]	(c) <u>Follow</u> procedures for safe use of the vehicle. [accepted] <i>[Note: “Follow” may be more direct and relevant than “Be able to follow”]</i>
- Comply with traffic rules pertaining to users of the vehicle including, when appropriate, those applying to users exercising dynamic control such as holding a driving permit for part of a journey /or -Hold any necessary driving permit and comply with traffic rules when exercising dynamic control for part of a journey	(d) Hold any necessary driving permit and comply with traffic rules when exercising dynamic control for part of a journey. <i>[Note: This option (from the current document) provides a clear formulation that appropriately applies only to the user who may become the driver and not to every occupant]</i>
-Be aware/informed when the vehicle leaves its ODD	<i>[Note: Moved to the previous section in response to March discussion]</i>
-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.	<i>[Note: Covered by previous provision]</i>
- 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.	(e) Understand whether exercising dynamic control during a journey may be necessary. (f) Only undertake a journey if it can be lawfully completed by the system or by a user.
-Adapt their behaviour [based on the functionalities] of the vehicle and applicable traffic rules. (Comment: to be further developed on whether this	(g) Behave in a way that is reasonably safe with respect to other road users.

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
recommendation should refer to functionalities or rather continuation of a journey as a driver).	
VI. Further 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.	Parties should:
<p>Comment: There has been alternative text proposed as below regarding performance monitoring/inspection and registration:</p> <p>Alternative 1</p> <p>Governments should:</p> <ul style="list-style-type: none"> -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 <p>Alternative 2:</p> <p>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.</p>	<p>(a) Review and if necessary update their relevant regulatory frameworks to facilitate the safe deployment of highly and fully automated vehicles in road traffic. [Potentially relevant frameworks may cover vehicle certification and registration, performance monitoring and reporting, driver training and permitting, and rules of the road, among others.] <i>[Note: The bracketed text is provided in case the parties want more detail. However, this detail may not be necessary or desirable, particularly if it confuses rather than illuminates.]</i></p>
<p>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.</p> <p>Governments should:</p> <p>Alternative 1:</p> <ul style="list-style-type: none"> -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. <p>Alternative 2:</p>	<p>(b) Develop domestically appropriate approaches for credibly ascertaining an automated driving system's role in a traffic rule violation, a crash, or another serious traffic incident.</p>

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
<p>-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.</p>	
<p>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.</p> <p>Governments should:</p> <p>Alternative 1:</p> <p>-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.</p> <p>Alternative 2:</p> <p>-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.</p> <p>Comment: The recommendation below has not been discussed in the context of formulation of recommendations for user of highly and fully automated vehicles.</p> <p>Governments should:</p> <p>Adapt the requirements for issuing driving permits to align with technological progress.</p>	<p>(c) Evaluate the relationship between highly and fully automated vehicles and road traffic safety.</p> <p><i>[Note: Covered by VI(a), above]</i></p>
	<p><i>[Note: The paragraphs below address additional topics raised in discussion]</i></p>
	<p>(d) Emphasize the importance of security and cybersecurity to the safe deployment of highly and fully automated vehicles.</p>

<i>Current text following WP.1 76th session</i>	<i>Potential alternative text to reconcile comments</i>
	(e) Adopt strategies with respect to potential misuse and abuse of highly and fully automated vehicles.
	(f) Publicize rules applicable to highly and fully automated vehicles in order to facilitate international road traffic and increase road safety.
	(g) Coordinate the development of new or adapted rules for highly and fully automated vehicles where desirable.
	(h) Adopt strategies to increase public understanding of highly and fully automated vehicles.
	(i) Involve industry and civil society in facilitating the safe deployment of highly and fully automated vehicles in road traffic.
