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**Global Forum for Road Traffic Safety**

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Item 3 (d) of the provisional agenda

**Proposal to develop a framework document of key principles  
for automated vehicle safety and human centered needs**

**Submitted by Canada and WP.1 Chair**

This document aims at ensuring that vehicle automation features are designed, developed and marketed with human capabilities, limitations and expectations in mind.

## Executive Summary

The Global Forum for Road Traffic Safety (WP.1) and the World Forum for Harmonization of Vehicle Regulations (WP.29) continue to advance work to support the safe use of automated vehicles (AVs) through the development of a variety of tools including resolutions, guidance, regulations, and other instruments. As this work progresses, a leading concern for contracting parties is to ensure that these safety tools sufficiently incorporate human factors related considerations in their development.

In March 2021, at the 82nd session of WP.1, a key item discussed was the importance of integrating human factors perspectives in the formulation of safety requirements for automated vehicles (AVs). At the 82nd session, the WP.1 Chair invited human factors experts from various academic institutions, to provide their insights on questions and challenges arising from the use of AVs. In light of the strong interest and engagement of contracting parties on the topic, Canada proposed that WP.1 consider developing a framework document that could help to inform further UNECE thinking about automated driving and human factors considerations.

To facilitate further discussion, this informal document provides additional context and some general considerations for developing a potential *“Framework of Key Principles for Automated Vehicle Safety and Human Centered Needs”*.

Notably, three key road safety issues are highlighted for consideration in such a framework: 1) human centered design of the vehicle and its interfaces; 2) safe interaction between the AV and other road users; and 3) consumer awareness and understanding of AVs including accurate depiction of the capabilities and limitations of AVs in marketing.

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The intent behind this proposal is to ensure that vehicle automation features are designed, developed and marketed with human capabilities, limitations and expectations in mind.

## Background

While safe road transportation is a shared priority for WP.1 and WP.29, their specific mandates are very different. WP.1 focuses on improving road safety through the harmonization of traffic rules. It oversees the application of the 1949 and 1968 Conventions on Road Traffic and the 1949 and 1968 Conventions on Road Signs and Signals, which govern the rules of the road, driver regulation, driver and rider behaviour, road user safety, and road signs and signals.

There has been a growing interest within WP.1 to address concerns related to automated driving, such as ensuring that existing international law is compatible with automated vehicles (AVs) and providing guidance to contracting parties on how to support road safety and the objectives of the conventions in the context of automated vehicles. In September 2018, WP.1 adopted a *Resolution on the deployment of highly and fully automated vehicles in road traffic*, which addresses general road safety considerations for automated driving. Currently, work is ongoing to develop an additional resolution regarding safety considerations for activities other than driving undertaken by the driver when the automated driving system is exercising dynamic control.

As part of their respective work, both WP.1 and WP.29 have an interest in advancing automated vehicle safety from the perspective of human factors. Given the complementary and interconnected nature of their

mandates (i.e. road safety, and vehicle safety), it would be beneficial for WP.1 and WP.29 to advance such work in a coordinated manner.

### **Rationale for developing a framework document**

Automated vehicle technology holds great potential to enhance road safety by reducing the risk of human error, either through the provision of assistance to the human driver, or by assuming the entire driving task. However, as the driving task becomes progressively more automated and the role of the human driver evolves, this can pose new risks for human occupants of the vehicle as well as other road users that may encounter this technology on public roadways.

While over time, automated vehicle technology may result in less driving responsibilities for humans, it is important not to lose sight of the fact that vehicle automation must still meet human needs, and foster safe use and interactions with vehicle occupants, and other road users.

There are many important safety issues associated with human use of vehicle automation that need to be considered by road safety and vehicle authorities, including:

- Consumer awareness and understanding of automated vehicles, including the accurate depiction of the capabilities and limitations of automation in vehicle marketing;
- Human centered design of the vehicle and its interfaces including intuitiveness, designs based on proper assessments of human needs and limitations, etc.; and,
- Fostering safe interactions with other road users (including human-operated vehicles and vulnerable road users such as pedestrians, cyclists etc.)<sup>1</sup>

A failure to properly account for these issues, either in the design and the regulation of the vehicles, and the road safety rules that guide their use, could limit the safety and usability of vehicle automation technologies.

It is recommended that WP.1 consider the development of a framework of principles on AV safety and human-centered needs that addresses these core issues (and any others that contracting parties/stakeholders may deem necessary as part of further discussions).

This intended scope of this proposal are vehicle technologies that meet SAE Levels of automation 1-5 (i.e. including both low automation SAE level 1-2 driver assistance technologies that are becoming increasingly prevalent on public roads today, as well as well as SAE level 3-5 systems that are still under development).

It is a recommended that such a framework, tabled and discussed in parallel by WP1 and WP 29, focus on the promotion of flexible and technology-neutral principles that draw on the aforementioned safety issues mentioned above.

Subject to further discussion and collaboration with WP29, such a document could serve as a joint reference document for both WP1 and WP29, as they develop more specific tools (e.g. guidance, resolutions, regulations, legal instruments etc.) on specific AV safety issues.

The ultimate goal of this document is to ensure that the development and deployment of AV technologies is conducted in a manner that prioritizes human-centered safety needs, ensuring that human factors

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<sup>1</sup> To note: this is not an exhaustive account of all human centered needs associated with automated vehicles. It serves as a starting point for discussion within WP1 and WP29 about the potential scope a framework document and the safety issues that could be addressed, in keeping with both Working Parties' mandates.

considerations are not neglected in the design of vehicles, and the safety requirements that support their use on public roads.

### **Questions for discussion and consideration by WP1 contracting parties and stakeholders**

*To facilitate further discussion, WP1 contracting parties and stakeholders are invited to consider the following questions during our discussion of this proposal:*

- Would a framework be a useful tool to inform WP.1/WP.29 work on human factors and vehicle automation?
  - What are contracting parties currently doing to address human centered needs associated with AVs? (E.g. to promote consumer awareness, etc.) What best practices could help to inform a potential framework?
  - Building on the three safety considerations discussed above [Consumer awareness; human centered design; safe interactions with other road users], are there additional safety issues associated with human use of vehicle automation that could be examined in a proposed framework?
  - Training requirements are generally greater for more complicated technologies, particularly those that have not prioritized human factors in their design process. Should industry have some obligations for driver training on their new and complex technology? Is there a need for industry to educate and inform other road users about their products?
  - How can human factors requirements be integrated in the AV development cycle to help vehicle manufacturers make better informed decisions about AV design and safety?
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