

WG2 conclusions/recommendations on road safety:

I. Conclusions

- 1) The 1968 Vienna Convention on road traffic as recently amended seems sufficient for upcoming systems. Member States are discussing in UNECE if these provisions of the Vienna and Geneva Conventions include levels 3 or 4 as defined by the SAE as long as there is a driver able to take the control of the car. The final conclusion on this issue remains in the remit of UNECE.
- 2) There is a strong need to assess the performance of upcoming systems as regard to road safety, and especially to assess system performance in collaboration with the human driver. In that respect Level 3 Driving is a special challenge especially for HMI.
- 3) Respective driving tasks of the vehicle and the driver shall be clarified and if necessary regulated in the relevant instruments (e.g. vehicle legislation, driving licence and traffic rules). This clarification probably requires a common classification of use cases, for which SAE classification is not sufficient.
- 4) The vehicle shall be designed to ensure that the driver is active/aware if needed. The driver shall be made aware of the limits of the system.
- 5) Human Machine Interface (HMI) is very important for levels 2 to 4 automated vehicles, particularly in relation to the level of attention required for a safe operation of an automated function and for the safe transfer of control between vehicle and driver.

II. Recommendations

- 1) For international traffic rules and vehicle Regulations, the issues mentioned above shall be clarified preferably in the relevant groups of UNECE (WP1 for the Vienna Convention /WP29 for vehicle regulations). The UNECE discussions shall be finalized as soon as possible especially for levels 3 and 4 vehicles which are expected by 2020. Alternative solutions may have to be considered at the EU level if it is expected that the UNECE will not deliver on time. Pending the finalization of fully harmonized UNECE/EU requirements for vehicle Regulations, manufacturers can already use the current EU framework which provides for the mutual recognition of a national ad-hoc safety assessment for new technologies (Article 20 of Directive 2007/46/EC).
- 2) The rules to cover the issues for upcoming systems mentioned above could be drafted around the following main principles:
 - a) There is an expectation by the public that automated vehicles at SAE Levels 2 and 3 will be safer than manually driven vehicles. At higher levels of automation (SAE Levels 4 and 5), there will be an expectation of far higher safety.
 - b) When operating under vehicle control (vehicle replacing the driver), vehicles shall obey all relevant traffic rules. This would include, for example, speed limits (fixed, variable and

dynamic), access restrictions, lane restrictions, traffic signal instructions, road works regulations and passenger restraint use. They would also, if operating in urban areas, have to comply with rules for zebra and other crossings.

c) The clarification of driving tasks between the driver and the vehicle requires a case-by-case analysis, depending on automated functions, driving environment, modalities through which automated systems receive and give back control from / to the driver, available minimum risk manoeuvres.

d) The vehicle shall be designed so that it is clear to the person in the driving seat what is the operational capability (authority) of the automated mode or modes currently enabled. A level of standardisation of HMI indications will be required, so as to reduce the possibility of misunderstanding and confusion and at the same time limit heterogeneity of HMIs' functionalities ("look and like") for drivers among cars and when crossing borders.

e) The vehicle from SAE level 3 shall be capable of appropriate indication of its intentions in interactions with other road users. This for example may include using its indicators where a human driver should activate the indicators or sounding the horn to alert other road users, or other indications to replace those of the human if it is not expected that the driver is going to carry out this task.

f) Automation shall not be enabled on roads, in situations or in circumstances that it is not capable of handling. Traffic rules may need to be adapted for that.

g) The vehicles from level 3 shall therefore restrict the use of automation to road types, road layouts and road geometry that it can handle. It shall also recognise performance degradations which prevent safe operation, such as reduced visibility, lack of connectivity, sensor failure, etc. On encountering situations that it cannot handle, it shall hand over driving to the human or automatically perform a minimum risk manoeuvre.

h) The vehicle shall ascertain that the driver is ready to take over when a take over by the driver is required by the system, this includes driver availability, engagement, and attention to the road and traffic situation. If the vehicle determines that the human is not able or willing to resume control when required to do so, then the vehicle shall take appropriate action. Depending on the SAE level, the vehicle shall warn the driver and/or perform a minimum risk manoeuvre in which it secures as little danger as possible to the vehicle occupants and other road users.

i) Further research may be needed to further develop these rules. Existing calls in Horizon 2020 (e.g. call on automated road transport) are foreseen for some of the issues listed above and could be used.

3) The Commission should ensure that the UN-ECE working groups (WP1 and WP29) are aware of these principles and work on the coordination of the different Member State positions in these working groups.