
FCAI Submission to NTC

Discussion paper: Changing driving laws to support automated vehicles



Federal Chamber of Automotive Industries
Level 1, 59 Wentworth Avenue
KINGSTON ACT 2604
Phone: +61 2 6229 8217
Facsimile: +61 2 6248 7673

Contacts:
Mr James Hurnall, Technical Director
Mr Ashley Wells, Policy Director
Mr Tony McDonald, Operations Director

(15 December 2017)

EXECUTIVE SUMMARY

The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing the importers of passenger vehicles, light commercial vehicles and motorcycles in Australia. The FCAI welcomes the opportunity to comment on the National Transport Commission's Discussion Paper on Changing driving laws to support automated vehicles.

The technology for automated driving systems to deliver levels 3, 4 and 5 (conditional driving automation, high driving automation and full automation) will continue to evolve rapidly over the next few years. Even with this rapid development, mass market introduction of vehicles with high or full driving automation systems (i.e. levels 4 or 5) are unlikely to be available until at least 2030. A small number of vehicles with level 4 or 5 systems may be introduced before 2030.

However, it is expected that these will be either niche products (e.g. Navya shuttle) and/or in limited numbers as part of a closed fleet. These vehicles will not be "mass market" (i.e. available to be purchased by the general public) and will be operated under restricted conditions. The proposed Safety Assurance System (SAS) which includes a non-standard type approval and conditional registration (with restricted operating conditions) by state/territory governments will be suitable for these vehicles.

An important driver to facilitate the introduction of increasing levels of automated driving systems, and especially high (level 4) and full (level 5) automated driving is the need for widespread compatible road infrastructure. It must be recognized that provision of the necessary infrastructure will require significant financial investment over long period of time and will need to be rolled out in conjunction with the introduction of highly and fully automated vehicles.

Road regulations and vehicle regulatory standards will be gradually developed, and regulatory authorities will develop the necessary regulatory approaches for automated driving over time. Development of both road and vehicle regulations is underway at the international level via the United Nations Working Party 1 (WP.1) and Working Party 29 (WP.29) with changes to the Vienna Convention and the UN Regulation on Steering Systems (UN R79).

In the case of driving/road rules the FCAI supports harmonisation with the Vienna Convention. The Vienna Convention, Article 8, has been amended to clarify that a human driver is in control of a vehicle, even if a vehicle system (that conforms to UN vehicle regulations or can be overridden or switched off by the driver) influences the way it is driven.

There will be a range of levels of vehicle automation introduced into the market during the next 5 to 10 years and any UN Regulations introduced during this time will also recognise the need for a human driver. During this time, the human driver should always be in control of a vehicle and therefore responsible for the actions of the vehicle, with all levels of automation, while the ADS is engaged.

The FCAI considers that a sensible approach to regulatory development is to introduce changes to driving laws that will be relevant for the immediate future (i.e. next 5 to 10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automation is better understood. Changes to driving laws will need to consider the principles for the development of vehicle regulatory standards (i.e. UN Regulations) that are based on the Vienna Convention.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
1.0 INTRODUCTION.....	4
2.0 OVERVIEW OF FCAI POSITION.....	5
2.1 <i>Background.....</i>	5
2.2 <i>International Harmonisation</i>	7
2.3 <i>Conclusions.....</i>	8
3.0 RESPONSES TO DISCUSSION PAPER	9
4.0 CONCLUSION	15
ANNEX A: ECE/TRANS/WP.29/2017/145.....	16

1.0 INTRODUCTION

The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing the importers of passenger vehicles, light commercial vehicles and motorcycles in Australia.

Modern vehicles are advanced machines with a range of sophisticated mechanical and electrical components and electronic modules that are integrated to deliver the performance, safety and emissions expected by customers and governments. Vehicle manufacturers are researching, developing and progressively introducing new technologies to make vehicles more automated and connected. Before the safety, environmental and mobility benefits of automated and connected vehicles can be realised several matters need to be considered - one of the most important of which is the regulatory environment.¹

The technology for automated driving systems to deliver levels 3, 4 and 5 (conditional automated driving, high automated driving and full automation) will continue to evolve rapidly over the next few years. Even with this rapid development, mass market introduction of vehicles with high or full driving automation systems (i.e. levels 4 or 5) are unlikely to be available until at least 2030.

A small number of vehicles with level 4 or 5 automated driving systems may be introduced before 2030. However, it is expected that these will be either niche products (e.g. Navya shuttle) and/or within closed fleets. The vehicle will not be “mass market” (i.e. available to be purchased by the general public) and will be operated under restricted conditions. The proposed Safety Assurance System (SAS) which includes a non-standard type approval and conditional registration (with restricted operating conditions) by state/territory governments will be suitable for these vehicles.

The FCAI considers that a sensible approach to regulatory development is to introduce changes to driving laws that will be relevant for the immediate future (i.e. next 5 to 10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automation is better understood. Changes to driving laws will need to consider the principles for the development of vehicle regulatory standards (i.e. UN Regulations) that are based on the Vienna Convention.

¹ In this submission, the term ‘vehicle’ refers to light vehicles (passenger cars, SUVs and light commercial vehicles) and motorcycles.

2.0 OVERVIEW OF FCAI POSITION

2.1 Background

There are challenges to achieve the right balance between allowing the introduction of automated vehicle technology and understanding the level of vehicle automation Australia is ready to accept for use on our road network.

The NTC has been reviewing the regulatory system and identifying the reforms required to facilitate the entry of connected and automated vehicles into Australia. This is being done by a range of projects:²

- Guidelines for automated vehicle trials.
- National enforcement guidelines for clarifying control of automated vehicles; reached the conclusion that the driver remains in control for levels 0, 1 and 2 automated driving systems (i.e. no automation, driver assistance and partial automated driving).³
- Developing a safety assurance system to ensure the safe operation of automated vehicles; with systems that are outside the vehicle regulatory safety standards and certification system (i.e. Australian Design Rules).
- Review of compulsory third-party and national injury insurance schemes to identify any eligibility barriers for occupants of an automated vehicle or those involved in a crash with an automated vehicle.
- Government access to and use of data generated by automated vehicles.

The FCAI supported the development of enforcement guidelines to fill the gap between the current road rules (and driver being in control) and the future law that is still to be developed and aligned with international best practice for vehicles with conditional levels of automation (i.e. up to level 2). The FCAI supported national enforcement guidelines that are based on the human driver being in control of a vehicle with conditional automation, even when the automated driving system is engaged in the dynamic driving task.

The scope of the NTC Discussion Paper currently under consideration, *Changing driving laws to support automated vehicles* is to identify high level approaches and options for legislative reform to:⁴

- Ensure an ADS⁵ can legally perform the dynamic driving task when it is engaged
- Ensure a legal entity is responsible for the actions of the ADS when it is engaged
- Ensure the intent of existing driver obligations is maintained – in particular, for road safety.

The FCAI supports the NTC's review of driving laws to support the introduction of automated vehicles and notes that the any changes to the driving laws required now are to facilitate the introduction of new models with automated driving systems over the next 5 to 10 years.

² NTC Discussion Paper, *Changing driving laws to support automated vehicles*, October 2017, pp.11-12

³ Levels of automated driving as per SAE J3016, *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*, Sep 2016

⁴ NTC Discussion Paper, *Changing driving laws to support automated vehicles*, October 2017, p. 18

⁵ SAE J3016: *Automated Driving System (ADS)*: The hardware and software that are collectively capable of performing the entire DDT on a sustained basis regardless of whether it is limited to a specified operational design domain (ODD); this term is used to describe a level 3, 4 or 5 driving automation system.

The technology for automated driving systems to deliver levels 3, 4 and 5 (conditional automated driving, high automated driving and full automation) will continue to evolve rapidly over the next few years. Even with this rapid development, mass market introduction of vehicles with high or full automated driving systems (i.e. levels 4 or 5) are unlikely to be available until at least 2030. For example, the German vehicle manufacturers association, VDA, have an estimated timeline for introduction of various automated driving and parking systems (see Figure 2.1) through to 2030.⁶

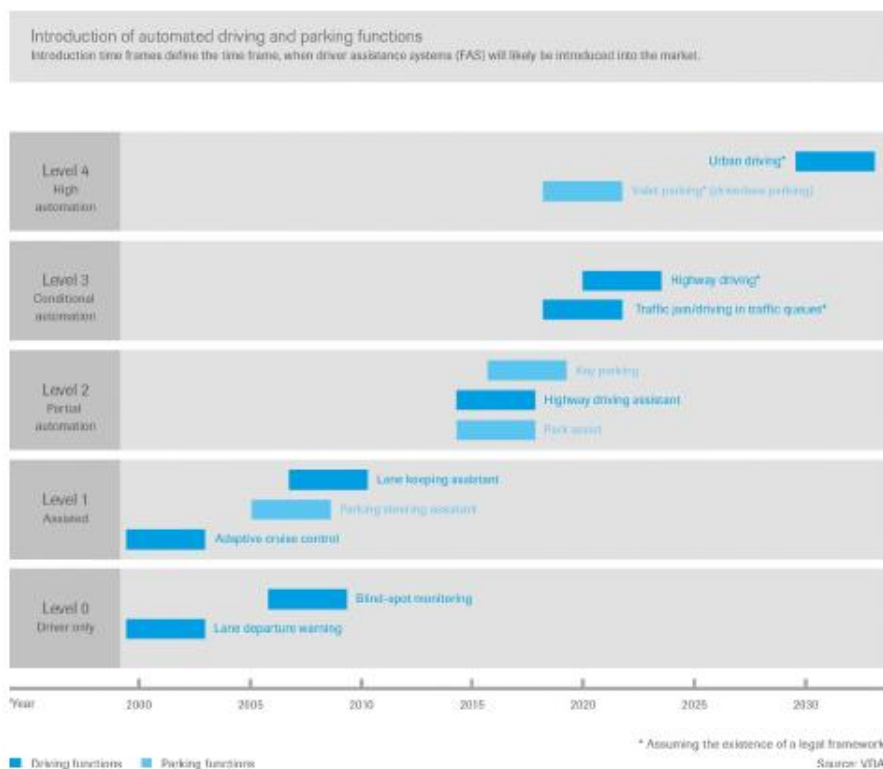


Figure 2.1 Introduction of Automated Driving Systems

With the average age of light vehicles, at just under 10 years, there will be a mixed (vehicles with varying levels of automation) in-service fleet for another 15 to 20 years (i.e. out to 2045-2050).

A small number of vehicles with level 4 or 5 systems may be introduced before 2030. However, it is expected that these will be either niche products (e.g. Navya shuttle) and/or within closed fleets. The vehicle will not be “mass market” (i.e. available to be purchased by the general public) and will be operated under restricted conditions. The proposed Safety Assurance System (SAS) which includes of a non-standard

⁶ <https://www.vda.de/en> [downloaded 20 Nov 2017]

type approval will and conditional registration (with restricted operating conditions) by state/territory governments will be suitable for these vehicles.

An important driver to facilitate the introduction of increasing levels of automated driving systems, and especially high (level 4) and full (level 5) automation is the need for widespread compatible road infrastructure. It must be recognized that provision of the necessary infrastructure will take a significant period of time and will need to be rolled out in conjunction with the introduction of highly and fully automated vehicles.

The FCAI considers that a sensible approach is to develop changes to driving laws that will be relevant for the immediate future (5-10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automation is better understood. Changes to driving laws will need to consider the principles for the development of vehicle regulatory standards (i.e. UN Regulations) that are based on the Vienna Convention.

2.2 International Harmonisation

As a basic principle, to facilitate the adoption of new technology at lowest cost, the FCAI supports harmonisation with international regulations and standards.

Road regulations and vehicle regulatory standards will be gradually developed, and regulatory authorities will develop the necessary regulatory approaches for automated driving over time. Development of both road and vehicle regulations is underway at the international level via the United Nations Working Party 1 (WP.1) and Working Party 29 (WP.29) with changes to the Vienna Convention and the UN Regulation on Steering Systems (UN R79).

In the case of driving/road rules the FCAI supports harmonisation with the Vienna Convention. The Vienna Convention, Article 8, has been amended to clarify that a human driver is in control of a vehicle, even if a vehicle system (that conforms to UN vehicle regulations or can be overridden or switched off by the driver) influences the way it is driven.⁷

As noted in the Discussion Paper, the Vienna Convention was changed based on a recommendation from the Informal Working Group on Automated Driving (IWG-AD), a working group set up by WP.1. Representatives from both WP.1 and WP.29 participate in the IWG-AD to ensure consistency between the road rules and vehicle regulatory standards (i.e. United Nations Regulations). Similarly, WP.29 has an Informal Working Group on Intelligent Transport Systems/Automated Driving (IWG-ITS/AD) where representatives from WP.1 participate. The Australian Government (through the Department of Infrastructure and Regional Development) is an active participant in these United Nations working groups.

The global vehicle industry, through the global manufacturer's association, OICA, participate in WP.29 and are very active in the IWG-ITS/AD to develop the necessary vehicle technical regulatory standards (i.e. UN Regulations) and certification procedures for automated driving systems. The IWG-ITS/AD have submitted a paper to be considered to November 2017 meeting of WP.29 on "Proposals for the Definitions of

⁷ NTC Discussion Paper, *Changing driving laws to support automated vehicles*, October 2017, pp. 35-36

Automated Driving under WP.29 and the General Principles for developing a UN Regulation on automated vehicles.”^{8,9}

The IWG-ITS/AD paper proposes general principles and definitions for automated driving systems to be treated as guidelines for developing new UN Regulations for automated driving systems. The paper (copy at Annex A) provides an overview of the various “Vehicle Tasks” and “Driver Tasks” required under each of the SAE J3016 levels of automated driving. Importantly this document proposes definitions of “Driver Tasks” at Levels, 3, 4 and 5.

This paper, if accepted by WP.29, will form the basis for the development of any future UN Regulations for vehicle standards. The FCAI expects that the Australian government will adopt the relevant UN Regulations (as they are developed) as Australian Design Rules and incorporated into the Australian vehicle certification procedures (which accept the UN vehicle regulation type approvals) under its obligations as a signatory to the “1958 Agreement.”

2.3 Conclusions

The FCAI recommends that Australia follows these developments and harmonises the Australian regulatory regime for automated vehicles, in both the Australian Road Rules and vehicle regulations (i.e. Australian Design Rules) with the Vienna Convention and UN Regulations (respectively) as they are developed to accommodate automated vehicles. The Australian Government has representatives involved in this process and it is imperative that the international considerations are not pre-empted by any Australian specific measures.

Unique Australian requirements may act to limit the availability of these next-generation vehicles in Australia and restrict the uptake of these new technologies by Australian consumers.

⁸ ECE/TRANS/WP.29/2017/145 <http://www.unece.org/trans/main/welcwp29.html> [downloaded 20 Nov 2017]

⁹ This paper was presented to WP.29 meeting held 14-17 November 2017.

3.0 RESPONSES TO DISCUSSION PAPER

To facilitate the adoption of new technology at lowest cost, the FCAI supports harmonisation with international regulations and standards. In the case of driving/road rules the FCAI supports harmonisation with the Vienna Convention.

The answers to the questions are based on harmonization with the Vienna Convention, i.e. a human driver is in control of a vehicle, even if a vehicle system (that conforms to UN vehicle regulations or can be overridden or switched off by the driver) influences the way it is driven.

The FCAI considers that a sensible approach is to develop changes to driving laws that will be relevant for the immediate future (5-10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automated driving systems is better understood.

Question 1. Do you agree that reform to existing driving laws is required to:
(i) allow an ADS to perform the dynamic driving task when it is engaged?
(ii) ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged?

The FCAI agrees with the NTC that it is essential to clarify in legislation that the ADS is legally permitted to perform the dynamic driving task, when it is engaged, for a vehicle with conditional, high and full levels of automation (i.e. Levels 3, 4 and 5 as defined in SAE J3016).

The FCAI agrees that a legal entity needs to be identified to be legally responsible for the actions of an ADS when it is engaged, including compliance with road rules.

The FCAI also supports use of the terms from SAE J3016 (e.g. ADS) as outlined in the Discussion Paper.¹⁰

Question 2. Do you agree that if the ADS is engaged, legislation should provide that the ADS is in control of the vehicle at conditional, high and full levels of automation? If not, do you think a human in the vehicle should be considered in control of the vehicle, and at what levels?

The NTC's preferred approach was option 3; to recognise the ADS as being in control of the vehicle at conditional, high and full levels of automation.

The FCAI does not support the NTC's preferred approach as it is not consistent with the Vienna Convention, (as outlined under Option 1); that the human driver is always in control of a vehicle with all levels of automation even if the ADS is engaged.

¹⁰ NTC Discussion Paper, *Changing driving laws to support automated vehicles*, October 2017, pp. 7-8

Question 3. Do you agree that the proper control offence should not apply to the ADS, provided there are appropriate ways to hold the ADSE to account for the proper operation of its ADS?

The FCAI supports the NTC's preferred approach that the Rule 297 proper control offence should not apply to an ADS because the offence is not relevant to an ADS. As outlined in Section 2.0 (above) there will be a range of levels of vehicle automated driving systems introduced into the market during the next 5 to 10 years and any UN Regulations introduced during this time will also recognise the need for a human driver.

During this time, the human driver should always be in control of a vehicle with all levels of automated driving even if the ADS is engaged. Therefore, the human driver, should still exercise "proper control" of the vehicle.

Question 4. Do you agree that if a safety assurance system is approved that requires an ADSE to identify itself, the identified ADSE should be responsible for the actions of the vehicle while the ADS is engaged? If the ADSE is not identified through the safety assurance system, how should the responsible entity be identified in legislation?

The FCAI does not support the NTC preferred option; Option 5 that the entity responsible for the ADS is the ADSE identified through the safety assurance system.

As outlined in Section 2.0 (above) there will be a range of automated driving systems introduced into the market during the next 5 to 10 years and any UN Regulations introduced during this time will also recognise the need for a human driver.

During this time, the human driver should always be in control of a vehicle and therefore responsible for the actions of the vehicle, with any level automation, while the ADS is engaged.

Question 5. Do you agree that when the ADS is engaged:

- (i) an ADSE should be responsible for compliance with dynamic driving task obligations?**
- (ii) obligations that are part of the dynamic driving task that the ADS cannot perform should be modified where appropriate, or the ADS exempted from the obligation?**
- (iii) an ADSE should not be responsible for existing driver duties and obligations that are not part of the dynamic driving task?**

The NTC preferred approach is that the ADSE is only made responsible for things within its control. Therefore, it should only be responsible for the dynamic driving task obligations.

As outlined in Section 2.0 (above) there will be a range of levels of automated driving systems introduced into the market during the next 5 to 10 years and any UN Regulations introduced during this time will also recognise the need for a human driver.

During this time, the human driver should always be in control of a vehicle and therefore responsible for the actions of the vehicle, with any level of automation, while the ADS is engaged.

In the discussion paper, the NTC has identified various obligations of the “registered operator” (p. 30). The FCAI considers that the following obligations identified will continue for the next 5 to 10 years with the introduction of vehicles with increasing levels of automated driving systems:

- registration requirements, including payment of registration and keeping records of registration
- carriage and production of documents required
- ensuring the vehicle compliances with vehicle standards, and is roadworthy (i.e. safe to operate).

These obligations will need to be met by a “human” registered operator.

Questions 6. How should legislation recognise an ADS and an ADSE? In assessing the options in section 5.6, please consider the following factors:

- (i) legislative efficiency**
 - (ii) timeliness**
 - (iii) impact on compliance and enforcement**
 - (iv) impacts on other schemes such as compulsory third-party insurance**
- Are there other options that you prefer? Please provide details of how it would work.**

The FCAI does not agree that the ADSE should be responsible for the dynamic driving task when the ADS is engaged. A human driver should always be in control of the vehicle and therefore responsible for the actions of the vehicle, with any level of automation, while the ADS is engaged.

Question 7. Do you agree that driver obligations need to be assessed to ensure there are no obligations that cannot be fulfilled if an ADS is in control? If gaps are identified, should other appropriate entities—such as fallback-ready users, other vehicle occupants, registered operators and operators—be made responsible for the obligation?

The FCAI agrees with the NTC that the intent of the existing driver obligations need to be maintained both to ensure safety and to ensure a party who can fulfill the obligations has responsibility for it. As the FCAI’s position is that a human driver should always be in control of the vehicle and therefore responsible for the actions of the vehicle, there is a human driver who will be able to fulfill the existing driver obligations.

Question 8. Do you agree that obligations on a fallback-ready user of a vehicle with conditional automation, who will be required to take over driving if requested by the ADS should include:

- (i) sufficient vigilance to acknowledge warnings and regain control of the vehicle without undue delay, when required?**
- (ii) holding the appropriate license for the vehicle type?**
- (iii) complying with drug, alcohol and fatigue driver obligations?**

Do you agree that the fallback-ready user should be allowed to perform secondary activities?

The FCAI supports the NTC position that a fallback-ready user should have legal obligations to ensure they are alert and ready to take control if required.

As outlined in Section 2.0, the paper to be presented to WP.29 on “Proposals for the Definitions of Automated Driving under WP.29 and the General Principles for developing a UN Regulation on automated vehicles” (Annex A), outlines the driver tasks expected for levels of automated driving including:

- Level 3 – “Shall remain sufficiently vigilant as to acknowledge the transition demand and, acknowledge vehicle warnings, mechanical failure or emergency vehicles (increased lead time compared to level 2).”
- Level 4 – “May be asked to take over upon request within lead time. However, the system does not require the driver to provide fallback performance under the ODD11.”
- Level 5 – “Determine waypoints and destinations.”¹²

The FCAI’s position is that a human driver should always be in control of the vehicle and therefore responsible for the actions of the vehicle, and will be required/able to take over driving if requested by the ADS. The obligations of the fallback-ready user (i.e. driver) should include:

- Sufficient vigilance to acknowledge warnings and regain control of the vehicle.
- Hold the appropriate license for the vehicle type.
- Comply with drug, alcohol and fatigue driver obligations.

The fallback-ready user (i.e. human driver) should be allowed to perform secondary activities as outlined in the paper to be presented to WP.29 including:

- Level 3 – “May turn his attention away from the complete dynamic driving task in the ODD but can only perform secondary activities with appropriate reaction times. It would be beneficial if the vehicle displays were used for secondary activities.”
- Level 4 – “May perform a wide variety of secondary activities in the ODD.”
- Level 5 – “May perform a wide variety of secondary activities during the whole trip.”

Question 9. Do you think it is necessary to impose readiness-to-drive obligations on humans who will take over driving when a vehicle with high automation that includes manual controls reaches the limit of its operational design domain?

The FCAI supports the NTC proposal that no additional obligations be placed on human occupants of vehicles operating with a high automated driving system (i.e. levels 3-5) engaged beyond those obligations that currently apply to the human driver, i.e. the human driver is in control of the vehicle.

Question 10. Do you agree that no readiness-to-drive obligations should be placed on passengers in dedicated automated vehicles (designed to be ‘driverless’)?

The NTC proposes that humans in dedicated vehicles that are designed to be “driverless” (i.e. without human controls) should be regarded as passengers and no additional readiness to drive obligations are necessary.

The FCAI considers that this review should consider changes to driving laws that will be relevant for the immediate future (5-10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automated driving is better understood.

¹¹ ODD is Operational Design Domain as defined in SAE J3016

¹² ECE/TRANS/WP.29/2017/145 <http://www.unece.org/trans/main/welcwp29.html> [downloaded 20 Nov 2017]

The FCAI would support the NTC's proposal under limited ODD that are relevant to "driverless" shuttles operating at low speeds on dedicated routes. The existing conditional registration processes managed by state/territory governments can allow operation of "driverless" shuttles within controlled conditions (i.e. within a defined ODD).

Question 11. Should exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting, or who is a passenger in, a dedicated automated vehicle?

The NTC considers there should be clear exemptions from drink- and drug-driving offences for a person who is a passenger in a dedicated automated vehicle.

The FCAI considers that this review should consider changes to driving laws that will be relevant for the immediate future (5-10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automation is better understood. Changes to driving laws will need to consider the principles for the development of vehicle regulatory standards (i.e. UN Regulations) that are based on the Vienna Convention

Question 12. Should exemptions from the drink- and drug- driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting a vehicle with high or full automation that includes manual controls?

The NTC considers that provisions relating to drink- and drug-driving offences should apply to a person who is starting and setting in motion a vehicle with high or full automation that allows manual driving. As the FCAI's position is that a human driver should always be in control of the vehicle and therefore responsible for the actions of the vehicle, the FCAI supports the NTC's proposal.

Question 13. How do you think road traffic penalties should apply to ADSEs?

The FCAI does not agree that the ADSE should be responsible for the dynamic driving task when the ADS is engaged. A human driver should always be in control of the vehicle and therefore responsible for the actions of the vehicle, with all levels of automation, while the ADS is engaged.

Therefore, existing traffic penalties aimed at influencing the behavior of drivers should continue at least in the immediate future (5-10 years). If traffic penalties should apply to an ADSE should be considered in the next review (in 3 to 5 years) when the rate of introduction of the level of automation is better understood. Changes to driving laws will need to consider the principles for the development of vehicle regulatory standards (i.e. UN Regulations) that are based on the Vienna Convention.

Question 14. Do you think obligations and penalties on ADSEs in the safety assurance system should complement, or be an alternative to, road traffic offences?

The FCAI does not agree that the ADSE should be responsible for the dynamic driving task when the ADS is engaged. A human driver should always be in control of the vehicle and therefore responsible for monitoring and if necessary taking control of the vehicle, with all levels of automated driving, while the ADS is engaged.

As noted by the NTC, a primary safety duty for parties is to provide safe automated vehicles at both first supply to the market and also ongoing throughout the service life of the vehicle. Therefore, the safety assurance system should complement the road traffic offenses.

4.0 CONCLUSION

The FCAI welcomes the opportunity to provide a submission to the NTC's Discussion Paper: National guidelines for automated vehicle trials. The FCAI and member companies recognise the potential for automated and connected vehicles to provide significant safety, environmental and mobility benefits to Australia through reductions in crashes and congestion.

Development of both road and vehicle regulations are underway at the international level via the United Nations Working Party 1 (WP.1) and Working Party 29 (WP.29) with changes to the Vienna Convention and the UN Regulation on Steering Systems (UN R79).

In the case of driving/road rules the FCAI supports harmonisation with the Vienna Convention. The Vienna Convention, Article 8, has been amended to clarify that a human driver is in control of a vehicle, even if a vehicle system (that conforms to UN vehicle regulations or can be overridden or switched off by the driver) influences the way it is driven.

As outlined in Section 2.0 there will be a range of levels of vehicle automated driving systems introduced into the market during the next 5 to 10 years and any UN Regulations introduced during this time will also recognise the need for a human driver. During this time, the human driver should always be in control of a vehicle and therefore responsible for the actions of the vehicle, with all levels of automated driving systems, while the ADS is engaged.

Even though there will be rapid development of automated driving systems, mass market introduction of vehicles with high or full driving automation systems (i.e. levels 4 or 5) are unlikely to be available until at least 2030. A small number of vehicles with level 4 or 5 automated driving systems may be introduced before 2030.

However, it is expected that these will be either niche products (e.g. Navya shuttle) and/or within closed fleets. These vehicles will not be "mass market" (i.e. available to be purchased by the general public) and will be operated under restricted conditions. The proposed Safety Assurance System (SAS) which includes of a non-standard type approval and conditional registration (with restricted operating conditions) by state/territory governments will be suitable for these vehicles.

The FCAI considers that a sensible approach is to develop changes to driving laws that will be relevant for the immediate future (i.e. next 5 to 10 years) and schedule another review in 3 to 5 years when the rate of introduction of the level of automation is better understood.

United Nations

ECE/TRANS/WP.29/2017/145



Economic and Social Council

Distr.: General
11 October 2017

English only

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

173rd session

Geneva, 14-17 November 2017

Item 2.3 of the provisional agenda

1958 Agreement:

Intelligent Transport System and automated vehicles

Proposal for the Definitions of Automated Driving under WP.29 and the General Principles for developing a UN Regulation on automated vehicles

**Submitted by the Informal Working Group on Intelligent Transport
Systems / Automated Driving***

The text reproduced below was prepared by the experts from Informal Working Group (IWG) on Intelligent Transport Systems / Automated Driving (ITS/AD). It is based on Working Paper ITS/AD-12-05-3, distributed during the twelfth session of the IWG on ITS/AD.

* In accordance with the programme of work of the Inland Transport Committee for 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

A proposal for the Definitions of Automated Driving under WP.29 and the General Principles for developing a UN Regulation on automated vehicles

1. The following table reflects the general principles and definitions for automated driving systems as relevant for WP.29. These principles are expected to be treated as guidelines for developing a new Regulation related to automated driving systems at WP.29 if appropriate. Please note that:

(a) The control systems that intervening in case of emergency (AEB, ESC, Dead man, etc.) are not included in these definitions of automated driving;

(b) The control functions that avoid dangers caused by unpredictable traffic conditions (goods/luggage dropping, frozen road, etc.) or other drivers' illegal driving behaviours are not considered in this table.

2. A Regulation on automated driving would need to have new specific performance requirements and verification tests under various conditions as appropriate depending on each level.

3. In discussing system requirements, it is desirable to organize them by level as well as by roadway type and to include the range of vehicle types (1: parking area; 2: motorway; 3: urban and interurban road, and both automated vehicles (i.e. existing vehicle classes) and low-speed shuttle buses, pod cars, etc (i.e. new classes of vehicles).

4. The following table shows the distinguish way of distinctive criteria level of automated driving for the purpose of WP.29 activities to date, considering the results of discussions so far and the assumed use cases. This table should be reconsidered appropriately in accordance with each concept of automated driving system to be placed on the market in the future.

	<p><i>Object and Event Detection and Response (OEDR) by the driver</i></p> <p><i>The driver may not perform secondary activities</i></p>		<p><i>Object and Event Detection and Response (OEDR) by the system</i></p> <p><i>The driver may perform secondary activities</i></p>			
	<p><i>Monitor by Driver</i></p>	<p><i>Monitor by Driver (a)</i></p>	<p><i>Monitor by Driver (b)</i></p>	<p><i>Monitor by System (Return to Driver Control on System Request)</i></p>	<p><i>Monitor by System Full Time under defined use case</i></p>	<p><i>Monitor by System only</i></p>
<p>Ref. SAE Level (J3016)</p>	<p>1</p>	<p>2</p>	<p>3</p>	<p>4</p>	<p>5</p>	
<p>Outline of Classification</p>	<p>System takes care of longitudinal or lateral control.</p> <p>Monitoring by the driver.</p>	<p>The system takes care of both longitudinal and lateral control.</p> <p>Monitoring by driver necessary because the system is not able to detect all the situations in the ODD.</p> <p>The driver shall be able to intervene at any time.</p>	<p>The system is able to cope with all dynamic driving tasks within its Operational Design Domain (ODD)* or will otherwise transition to the driver offering sufficient lead time (driver is fallback).</p> <p>The system drives and monitors (specific to the ODD) the environment.</p> <p>The system detects system limits and issues a transition demand if these are reached.</p> <p>*The Level 3 system is e.g. not expected to provide a corridor for emergency vehicle access or to follow hand signals given by traffic enforcement officers. The driver needs to remain sufficiently vigilant as to acknowledge and react on these situations (e. g. when he hears</p>	<p>The system is able to cope with any situations in the ODD (fallback included).</p> <p>The driver is not necessarily needed during the specific use-case, e. g. Valet Parking/ Campus Shuttle.</p> <p>The system may however request a takeover if the ODD boundaries are reached (e.g. motorway exit).</p>	<p>The system is able to cope with any situations on all road types, speed ranges and environmental conditions.</p> <p>No driver necessary.</p>	

			the sirens of an emergency vehicle in close vicinity).		
Vehicle Tasks	1. Execute either longitudinal (acceleration/braking) or lateral (steering) dynamic driving tasks when activated. The system is not able to detect all the situations in the ODD.	1. Execute longitudinal (accelerating, braking) and lateral (steering) dynamic driving tasks when activated. The system is not able to detect all situations in the ODDs.	1. Execute longitudinal (accelerating/braking) and lateral (steering) portions of the dynamic driving task when activated. Shall monitor the driving environment for operational decisions when activated.	1. Execute longitudinal (accelerating/braking) and lateral (steering) portions of the dynamic driving task when activated. Shall monitor the driving environment for any decisions happening in the ODD (for example Emergency vehicles).	1. Monitor the driving environment.
	2. System deactivated immediately at the request of the driver.	2. System deactivated immediately upon request by the human driver.	2. Permit activation only under conditions for which it was designed. System deactivated immediately at the request of the driver. However the system may momentarily delay deactivation when immediate human takeover could compromise safety.	2. Permit activation only under conditions for which it was designed. System deactivated immediately at the request of the driver. However the system may momentarily delay deactivation when immediate human takeover could compromise safety.	2. Execute longitudinal (accelerating/braking) and lateral (steering).
		3. No transition demand as such, only warnings.	3. System automatically deactivated only after requesting the driver to take-over with a sufficient lead time; may – under certain, limited circumstances – transition (at least initiate) to minimal risk condition if the human driver does not take over. It would be beneficial if the vehicle displays used for the	3. Shall deactivate automatically if design/boundary conditions are no longer met and must be able to transfer the vehicle to a minimal risk condition. May also ask for a	3. Execute the OEDR subtasks of the dynamic driving task- human controls are not required in an extreme scenario.

			secondary activities were also used to improve the human takeover process.	transition demand before deactivating.	
		4. A driver engagement detection function (could be realized, for example, as hands-on detection or monitoring cameras to detect the driver's head position and eyelid movement etc.) could evaluate the driver's involvement in the monitoring task and ability to intervene immediately.	4. Driver availability recognition shall be used to ensure the driver is in the position to take over when requested by the system. Potential technical solutions range from detecting the driver's manual operations to monitoring cameras to detect the driver's head position and eyelid movement.	4. Driver availability recognition shall be used to ensure the driver is in the position to take over when requested by transition demand. This can however be lighter solutions than for level 3 because the system is able to transfer the vehicle to a minimal risk condition in the ODD.	4. System will transfer the vehicle to a minimal risk condition.
			5. Emergency braking measures must be accomplished by the system and not expected from the driver (due to secondary activities).	5. Emergency braking measures must be accomplished by the system and not expected from the driver (due to secondary activities).	
Driver Tasks	1. Determine when activation or deactivation of assistance system is appropriate.	1. Determine when activation or deactivation of the system is appropriate.	1. Determine when activation or deactivation of the automated driving system is appropriate.	1. Determine when activation/deactivation of the automated driving system is appropriate.	1. Activate and deactivate the automated driving system.
	2. Monitor the driving environment. Execute either longitudinal (acceleration/braking) or lateral (steering) dynamic driving task.	2. Execute the OEDR by monitoring the driving environment and responding if necessary (e.g. emergency vehicles coming).	2. Does not need to execute the longitudinal, lateral driving tasks and monitoring of the environment for operational decisions in the ODD.	2. Does not need to execute the longitudinal, lateral driving tasks and monitoring of the environment in the ODD.	2. Does not need to execute the longitudinal, lateral driving tasks and monitoring of the environment during the whole trip.

	<p>3. Supervise the dynamic driving task executed by driver assistance system and intervening immediately when required by the environment and the system (warnings).</p>	<p>3. Constantly supervise the dynamic driving task executed by the system. Although the driver may be disengaged from the physical aspects of driving, he/she must be fully engaged mentally with the driving task and shall immediately intervene when required by the environment or by the system (no transition demand by the system, just warning in case of misuse or failure).</p>	<p>3. Shall remain sufficiently vigilant as to acknowledge the transition demand and, acknowledge vehicle warnings, mechanical failure or emergency vehicles (increase lead time compared to level 2).</p>	<p>3. May be asked to take over upon request within lead time. However the system does not require the driver to provide fallback performance under the ODD.</p>	<p>3. Determine waypoints and destinations .</p>
	<p>4. The driver shall not perform secondary activities which will hamper him in intervening immediately when required.</p>	<p>4. The driver shall not perform secondary activities which will hamper him in intervening immediately when required.</p>	<p>4. May turn his attention away from the complete dynamic driving task in the ODD but can only perform secondary activities with appropriate reaction times. It would be beneficial if the vehicle displays were used for the secondary activities.</p>	<p>4. May perform a wide variety of secondary activities in the ODD.</p>	<p>4. May perform a wide variety of secondary activities during the whole trip.</p>
	<p>Consideration points on development of vehicle regulation</p>	<p>1. Consider whether regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary.</p>	<p>1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary including the monitoring of the driving environment.</p>	<p>1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary including the monitoring of the driving environment for any decisions happening in</p>	<p>Note: Preliminary analysis only- subject further review.</p> <p>1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are</p>

				the use case (for example Emergency vehicles).	necessary including the monitoring of the driving environment for any decisions (for example Emergency vehicles).
		2. Consider regulatory provision to ensure the system is deactivated immediately upon request by the human driver.	2. Consider regulatory provision to ensure the system: i) Permits activation only under conditions for which it was designed, and ii) Deactivates immediately upon request by the driver. However the system may momentarily delay deactivation when immediate driver takeover could compromise safety.	2. Consider regulatory provision to ensure the system: i) Permits activation only under conditions for which it was designed, and ii) Deactivates immediately upon request by the driver. However the system may momentarily delay deactivation when immediate driver takeover could compromise safety.	2. Depending upon the vehicle configuration, consider regulatory provision to ensure the system: i) Permits activation only under conditions for which it was designed, and ii) Deactivates immediately upon request by the driver. However the system may momentarily delay deactivation when immediate driver takeover could compromise safety.
		3. Consider the warning strategy to be used. This might include warning/informing the driver in due time when an	3. Consider regulatory provision to ensure the system automatically deactivates only after requesting the driver to take-over with a sufficient lead time; including – under certain,	3. Consider regulatory provision to ensure the system automatically transfer the vehicle to a minimal risk condition preferably outside of an	3. Consider regulatory provision to ensure the system automatically transfer the vehicle to a minimal risk

		intervention by the driver is needed.	limited circumstances – transition (at least initiate) to minimal risk condition if the driver does not take over. It would be beneficial if the vehicle displays used for the secondary activities were also used to improve the human takeover process.	active lane of traffic if design/boundary conditions are no longer met.	condition preferably outside of an active lane of traffic.
		4. Consider the driver availability recognition function to evaluate the driver’s involvement in the monitoring task and ability to intervene immediately. For example, as hands-on detection or monitoring cameras to detect the driver’s head position and eyelid movement etc.	4. Consider regulatory provision for driver availability recognition is used to ensure the driver is in the position to take over when requested by the system.	4. Consider regulatory provision for driver availability recognition is used to ensure the driver is in the position to take over when requested by the system transition demand at the end of the ODD.	
			5. Consider regulatory provision for emergency braking measures by the system.	5. Consider regulatory provision for emergency braking measures by the system.	4. Consider regulatory provision for emergency braking measures by the system.

<i>Examples of the necessary system performance requirements</i>						
Override (e.g. steering, braking, accelerating) function by the driver	Necessary in general				Unnecessary when driverless mode. Otherwise necessary in general. However the system may momentarily delay deactivation when immediate human takeover could compromise safety.	Unnecessary
Aspects of arrangement that ensures the driver's involvement in dynamic driving tasks (driver monitoring, etc.)	Detection of hands-off when Level 1 addresses LKAS.	Detection of hands-off.	Detecting the driver availability recognition function to evaluate the driver's involvement in the monitoring task and ability to intervene immediately (e.g. hands off detection, head and/or eye movement and/or input to any control element of the vehicle).	Detection of driver's availability to take over the driving task upon request or when required: e.g. seated/unseated, driver availability recognition system (e.g. head and/or eye movement and/or input to any control element of the vehicle).	Unnecessary when driverless operation/use case. Necessary when driver is requested to take over at the end of ODD. In these circumstances, this can be lighter solutions than for level 3 because the system is able to transfer the vehicle to a minimal risk condition in the ODD.	Unnecessary
Aspects of arrangement that ensures	not applicable			Consideration of the methods used to reengage the driver following system request (including minimal	Unnecessary when driverless operation/use case but level 3	Unnecessary

<p>the driver's resumption of dynamic driving tasks (transition periods to the driver, etc.)</p> <p>Aspect of transition demand procedure.</p>				<p>risk maneuver and cognitive stimulation- if applicable the vehicle infotainment system showing non-driving relevant content to be deactivated automatically when transition demand is issued).</p>	<p>requirement when the end of the ODD is reached.</p>	
<p>System reliability</p>	<p>Consideration shall be given to evaluation of the system reliability and redundancy as necessary.</p>					
<p>Comprehensive recognition of surrounding environment (sensing, etc.)</p>	<p>The area to be monitored (depends on the system function).</p>	<p>The area to be monitored necessary for lateral and longitudinal control (depends on the system function, while recognizing it is the task of the driver to perform OEDR).</p>	<p>The area to be monitored necessary for lateral and longitudinal control (depends on the system function, while recognizing it is the task of the driver to perform OEDR). Additionally the system may perform OEDR function.</p>	<p>The area to be monitored depends on the system function (Lateral and longitudinal directions). It is the task of the system to perform OEDR.</p>		

Recording of system status (inc. system behavior) (DSSA-Data Storage System for ACSF, EDR, etc.)	Unnecessary	Unnecessary	The driver's operations and the system status (incl. system behavior).	The driver's operations and the system status (incl. system behavior).	The system status (incl. system behavior)).	
Cyber-Security	Necessary if the information communication in connected vehicles, etc. affects the vehicle control					
Compatibility with traffic law (WP.1)	Yes	Yes	Yes	[WP.1-IWG-AD recommends WP.1 to state that the use of these functions remain within the requirements of the Conventions.]	[WP.1-IWG-AD recommends WP.1 to state that the use of these functions remain within the requirements of the Conventions. These are functions whereby a driver is still available at the end of the ODD. Functions that do not require a driver (e.g. campus shuttle) at all (driverless) are still in discussion – except for those that do not interact on/with public roads.]	Further consideration necessary to reflect driverless systems before a conclusion can be made.
Summary of the current conditions and the issues to be discussed (specific use cases)						
Parking area	Already put into practice:	<ul style="list-style-type: none"> Automated parking by the driver's remote control (monitoring) (RCP-Remote Control Parking, CAT. A under ACSF amendment of R79) 		Requirements need to be developed		

Roads exclusively for motor vehicles with physical separation from oncoming traffic (e.g. motorway)	<ul style="list-style-type: none"> • Parking Assist • LKA (draft standards) • ACC (no specific performance requirements) • ACSF Cat.B1 (Steering Function hands-on) 	<p>Under discussion:</p> <ul style="list-style-type: none"> • Categories [B2], C, D and [E] under ACSF (amendment of R79) • Category B1 in combination with longitudinal control 	<p>Under discussion :</p> <ul style="list-style-type: none"> • Categories B2, B2+E under ACSF (amendment of R79) 	<p>Requirements need to be developed</p>
Urban and interurban roads		<ul style="list-style-type: none"> • ACC+ACSF (Cat.B1, Cat.C [Basic Lane Change Assist], Cat.D [Smart LCA]) 	<ul style="list-style-type: none"> • [ACSF Cat. B2] • [ACSF Cat.E] (Continuous Lane Guidance hands-off) 	
		<ul style="list-style-type: none"> • Category B1 in combination with longitudinal Control • To be discussed by R79 IWG ACSF: Cat. B1 in combination with C, D 	<p>Requirements need to be developed</p>	