FCAI Response to NTC Consultation RIS: Safety Assurance System for Automated Driving Systems

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 Leigh Obradovic, Policy Director
Mr Tony McDonald, Operations Director

6 July 2018

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 (NCT) Consultation Regulation Impact Statement on a Safety Assurance System for Automated Driving Systems (ADSs).

The NTC consider that Australia's current laws and regulations do not recognise automated vehicles or provide assurances for their safe design or operation. Therefore, the NTC's objective is to have an "end-to-end" regulatory system in place by 2020 to support the safe deployment of automated vehicles. As part of the end to end regulatory system,the NTC propose a safety assurance system (SAS) for automated vehicles to support the uptake and safe operation of automated vehicles on Australia's roads.

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.

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 recognised that provision of the necessary infrastructure will require significant financial investment over a very long period of time and will need to be rolled out in conjunction with the introduction of highly and fully automated vehicles. Clearly the wide-spread introduction of the necessary infrastructure in regional and rural areas of Australia will be a challenge which in turn means that operation of vehicles with high or full automation system (i.e. levels 4 or 5) in regional and rural areas are also unlikely in the short term.

Road regulations and vehicle regulatory standards will gradually develop on the back of the lead from the international market, 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 (UN) Working Party 1 (WP.1) and Working Party 29 (WP.29) with changes to the Vienna Convention and the UN Regulations. The focus to date by WP. 29 has been on automated steering systems (UN R79).

The Consultation Regulatory Impact Statement (RIS) provides four options:

- Option 1: Current approach – this is the baseline option, using existing legislation and regulatory instruments, with no specific legislation of ADSs.
- Option 2: Administrative safety assurance system – A safety assurance system based on mandatory self-certification that relies on the existing legislation and regulatory instruments. The safety assurance system will be implemented through administrative means.

- Option 3: Legislative safety assurance system – A safety assurance system based on mandatory self-certification. This would include new or amended legislation to allow for the inclusion of specific offences and compliance and enforcement options, and a regulatory agency with responsibility for administering automated vehicle safety.
- Option 4: Legislative safety assurance system plus a primary safety duty – A safety assurance system that includes all the elements of option 3, plus a primary safety duty on automated driving system entities (ADSEs).

The RIS recommends Option 4. The FCAI does not support the NTC's recommendation and proposes a revised Option 2:

- Introduce an administrative safety assurance system as part of the current regulatory regime with the introduction of ADR 90/01. As part of the approval to ADR 90/01, a self-certification statement of compliance will need to be submitted for Levels 3, 4 or 5 automated driving systems that are not covered by the '02' series of UN R79, that will be included in ADR 90/01.
- The statement of compliance would be submitted to the Federal Government (DIRDC) as evidence of compliance to ADR 90/01 with the vehicle type approval application and would be included in the vehicle type approval.
- The ADSE will be the type approval holder.
- The existing state transport/traffic legislation (e.g. vehicle standards rules), recall provisions to be introduced with the new Road Vehicle Standards Act and the Australian Consumer Law (ACL) provisions all ensure automated driving systems to be supported in the market and the owner/operator's responsibility to maintain the vehicle.

It must be recognised that the Australian government (NTC and DIRDC) are developing a regulatory system for "commercial deployment" of vehicles fitted with high levels (SAE levels 3, 4 or 5) ADS. Therefore, the existing vehicle certification system (that accepts approvals under the 1958 Agreement) must be utilised to provide the best avenue for early introduction of new technology.

The FCAI does not support creation of another "national body" to undertake vehicle certification. An additional body will add complexity and administrative cost to the process and will result in evaluation of vehicle technology by people without sufficient expertise in vehicle technology. In essence, this will be a paperwork exercise and will not add value or otherwise address the road safety aspects of automated driving systems. If the shortcoming in the current system is a lack of compliance and enforcement actions at either the Federal or State Government level, creating another national body will not address the shortcoming.

The assessment of the options in Section 6 of the Consultation RIS requires a substantial review due to the mis-understanding of the vehicle certification system and linkages to in-service legislation. Detailed comments on the assessment criteria and qualitative analysis is provided in Section 3.0 of this response.

If the general safety duty is introduced without an agreed standard, there is the potential to stifle introduction of new technology as brands may be reluctant to introduce new systems due to legal risk.

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.

TABLE OF CONTENTS

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 complex 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[2] (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.

[1] In this submission, the term 'vehicle' refers to light vehicles (passenger cars, SUVs and light commercial vehicles) and motorcycles.
[2] 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

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:[3]

- Automated vehicle trial guidelines.
- Automated vehicle exemption powers review.
- Clarifying control of automated vehicles.
- Safety assurance system for automated vehicles.
- Changing driving laws to support automated vehicles.
- Automated compulsory third party insurance review.
- Regulating government access to C-ITS and automated vehicle data.

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 FCAI also supported the NTC's review of driving laws to support the introduction of automated vehicles. In our response to NTC Discussion Paper on Changing Driving Laws to Support Automated Vehicles, the FCAI advised that any changes to the driving laws required now should be aimed at facilitating the introduction of new models with automated driving (steering) systems over the next 5 to 10 years. Also, 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.

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.[4]

[3] NTC Consultation Regulation Impact Statement, Safety Assurance for Automated Driving Systems,May 2018, pp.11-12
[4] https://www.vda.de/en [downloaded 20 Nov 2017]

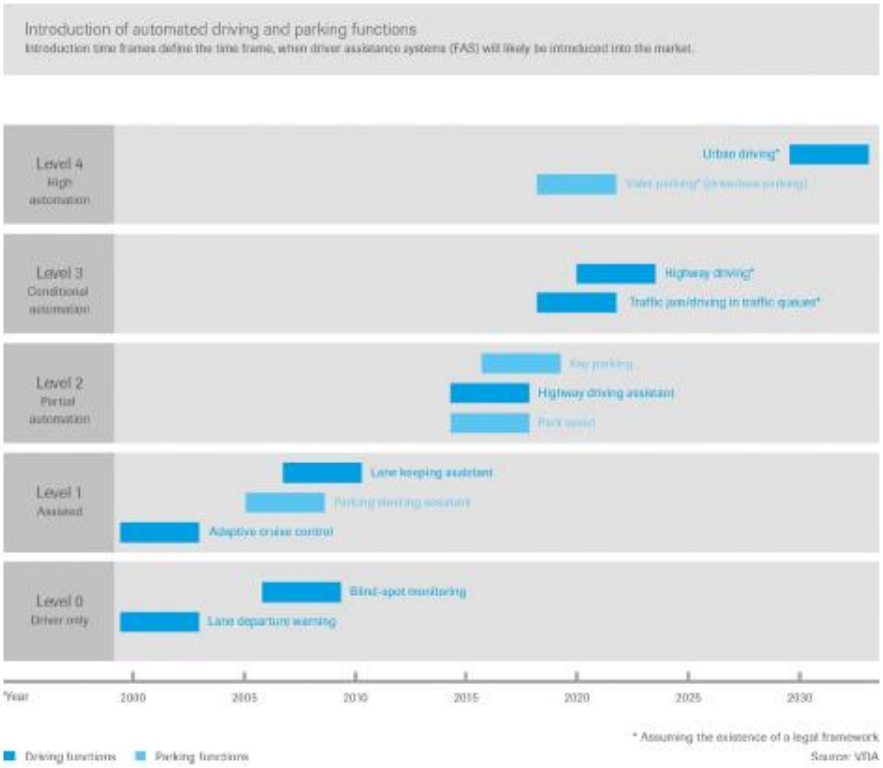

Figure 2.1 Introduction of Automated Driving Systems

With the average age of light vehicles in Australia, at just under 10 years,[5] 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.

An important enabler in facilitating 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.

[5] Australian Bureau of Statistics, 9309.0 – Motor Vehicle Census, Australia, 31 Jan 2017

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.

The international vehicle regulations (i.e. UN Regulations) are developed under "The 1958 Agreement" of which Australia is a Contracting Party.[6] This means that any UN Regulation developed, will need to be considered by the Australian Government for adoption under the Australian Design Rules (ADRs). The FCAI supports harmonisation of ADRs with the UN Regulations, where it has been demonstrated the introduction of a vehicle regulatory standard is required.

Development of vehicle regulatory standards for automated vehicle systems is underway at the international level via the United Nations Working Party 29 (WP.29) with changes to the UN Regulation on Steering Systems (UN R79). Similarly, Working Party 1 (WP.1) is reviewing the driving laws and has amended the Vienna Convention, Article 8, 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]

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, Regional Development and Cities [DIRDC]) is an active participant in WP.29 and the relevant 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 March 2018 meeting of WP.29 adopted the paper "Proposals for the Definitions of Automated Driving under WP.29 and the General Principles for developing a UN Regulation on automated vehicles" put forward by the IWG-ITS/AD.[8] The paper provides 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 will form the basis for the development of any future UN Regulations for automated driving systems (e.g. regulatory standards for automated steering systems will be included in future updates of UN R79).[9]

The FCAI recommends that Australia follows these developments and harmonises the Australian regulatory regime for automated vehicles (i.e. Australian Design Rules) with the UN Regulations as they are developed to accommodate automated vehicles. The Australian Government has representatives involved in this

---

[6] Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations, Revision 3 (including the amendments which entered into force on 14 September 2017).

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

[8] ECE/TRANS/WP.29/2018/2 http://www.unece.org/trans/main/welcwp29.html [downloaded 20 June 2018]

[9] UN Regulation No. 79, *Uniform Provisiosn Concerning the Approval of Vehciles with Regard to Steering Equipment*, is already set up to include regulatory standards for Advanced Driver Assistance Systems (ADAS) and Automatically Controlled Steering Function (ACSF). Appendix B contains extract from R79 that includes definitions of ADAS and ACSF.

process and it is imperative that the international considerations are not pre-empted by any Australian specific measures.

The internationally-recognised classification levels of vehicle automation, SAE J3016,[10] has recently been updated (issued in June 2018) to include new terms and definitions, correct a few errors, and add further clarification (especially in Section 8) to address frequently misunderstood concepts. SAE J3016 provides a taxonomy describing the full range of levels of driving automation in on-road motor vehicles and includes functional definitions for advanced levels of driving automation and related terms and definitions.

The scope of SAE J3016 is very clear on what is and is not covered in the levels of driving automation:[11]

- *This SAE Recommended Practice describes* motor vehicle driving automation systems *that perform part or all of the* dynamic driving task (DDT) *on a sustained basis.*

- Active safety systems*, such as electronic stability control and automated emergency braking, and certain types of driver assistance systems, such as lane keeping assistance, are excluded … because they do not perform part of all of the* DDT *on a* sustained *basis and, rather, merely provide momentary intervention during potentially hazardous situations. Due to the momentary nature of the actions of* active safety systems*, their intervention does not change or eliminate the role of the driver in performing part of all of the DDT, and thus are not considered to be* driving automation*.*

Table 2.1 (following) is an extract from SAE J3016 providing a summary of the levels of driving automation in terms of the amount of the DDT performed by the human driver or the ADS.

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."

[10] SAE Surface Vehicle Recommended Practice, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, J3016, June 2018.
[11] SAE J3016, Scope, p.2 of 35

Level	Name	Narrative definition	*DDT*		*DDT fallback*	*ODD*
			Sustained lateral and longitudinal vehicle motion control	***OEDR***		
Driver* performs part or all of the *DDT						
0	**No driving Automation**	The performance by the *driver* of the entire *DDT*, even when enhanced by *active safety systems.*	*Driver*	*Driver*	*Driver*	n/a
1	**Driver Assistance**	The *sustained* and *ODD*-specific execution by a *driving automation system* of either the *lateral* or the *longitudinal vehicle motion control* subtask of the DDT (but not both simultaneously) with the expectation that the *driver* performs the remainder of the *DDT.*	*Driver and System*	*Driver*	*Driver*	Limited
2	**Partial Driving Automation**	The *sustained* and *ODD*-specific execution by a *driving automation system* of both the *lateral* and *longitudinal vehicle motion control* subtasks of the DDT with the expectation that the *driver* completes the OEDR subtask and *supervises* the *driving automation system.*	***System***	*Driver*	*Driver*	Limited
***ADS ("System")* performs the entire *DDT* (while engaged)**						
3	**Conditional Driving Automation**	The *sustained* and *ODD*-specific performance by an *ADS* of the entire DDT with the expectation that the *DDT* fallback-ready user is *receptive* to ADS-issued requests to intervene, as well as to *DDT* performance-*relevant system failures* in other vehicle systems and will respond appropriately.	*System*	***System***	*Fallback-ready user (becomes the driver during fallback)*	Limited
4	**High Driving Automation**	The *sustained* and *ODD*-specific performance by an *ADS* of the entire *DDT and DDT fallback* without any expectation that a *user* will respond to a *request to intervene*	*System*	*System*	***System***	Limited
5	**Full Driving Automation**	The *sustained* and unconditional (i.e., not *ODD*-specific) performance by an *ADS* of the entire *DDT* and *DDT fallback* without any expectation that a *user* will respond to a *request to intervene*	*System*	*System*	*System*	**Unlimited**

Table 2.1 Summary of Levels of Automated Driving from SAE J3016 – June 2018

2.3 FCAI Position

The NTC consider that Australia's current laws and regulations do not recognise automated vehicles or provide assurances for their safe design or operation. Therefore, the NTC's objective is to have an "end-to-end" regulatory system in place by 2020 to support the safe deployment of automated vehicles. As part of the end to end regulatory system the NTC propose a safety assurance system (SAS) for automated vehicles to support the uptake and safe operation of automated vehicles on Australia's roads.

The Consultation Regulatory Impact Statement (RIS) provides four options:

- Option 1: Current approach – this is the baseline option, using existing legislation and regulatory instruments, with no specific legislation of ADSs.
- Option 2: Administrative safety assurance system – A safety assurance system based on mandatory self-certification that relies on the existing legislation and regulatory instruments. The safety assurance system will be implemented through administrative means.
- Option 3: Legislative safety assurance system – A safety assurance system based on mandatory self-certification. This would include new or amended legislation to allow for the inclusion of specific offences and compliance and enforcement options, and a regulatory agency with responsibility for administering automated vehicle safety.
- Option 4: Legislative safety assurance system plus a primary safety duty – A safety assurance system that includes all the elements of option 3, plus a primary safety duty on ADSEs.

The RIS recommends Option 4. The FCAI does not support this recommendation.

While there is currently no ADR for an automated driving (steering) system, the FCAI understands that the DIRDC intend to introduce a new ADR 90/01 – Steering Systems that will allow ADS to be included in the current vehicle type approval system. DIRDC's intention is to introduce a new ADR 90/01 that includes:

- Appendix A – UN R79/02 – Uniform provisions concerning the approval of vehicles with regard to steering equipment.
- Appendix B – Statement of Compliance Safety Criteria Requirements

Then a vehicle fitted with an ADS will need to be certified to ADR 90/01 by either:

1. Meeting requirements of Appendix A, i.e. UN R79/02, or
2. Submitting a self-certification "Statement of Compliance Safety Criteria Requirements" (for those systems where a R79/02 does not apply as outlined in Section 1.2 of R79/02)

This will then allow the vehicle to receive a full volume type approval and the ADSE will be the type approval holder. An "exemption from ADRs" will not be required.[12]

It must be recognised that the Australian government (NTC and DIRDC) are developing a regulatory system for "commercial deployment" of vehicles fitted with high levels (SAE levels 3, 4 or 5) ADS. Therefore, the existing vehicle certification system (that accepts approvals issued under the 1958 Agreement) must be utilised to provide the most efficient avenue for early introduction of new technology.

[12] Consultation RIS, Section 3.3.1

If a vehicle is fitted with a system that is outside the scope of ADR 90/01, a vehicle brand can still apply for a non-standard approval. This will be needed if brands are going to seek a type approval to supply vehicles with those types of high level ADS where exemptions from mandatory vehicle equipment such as brake pedals as part of an ADR 31 (R13-H) complying braking system or rear vision mirrors meeting ADR 14 (R46) may be required. For example, a full level 5 system without provision for a human driver (e.g. steering wheel, brake/accelerator pedals and rear vision mirrors). The FCAI expects that DIRDC will accept an exemption from another government (e.g. US, EU, and UN type approval authority) for evidence to provide a similar exemption from an ADR for these vehicles.

Additionally, the FCAI expects that the UN Regs (e.g. R79, R13-H, R46 and others) will continue to evolve to recognise any changes required for those high-level ADS. Accordingly, as these UN Regs are included in the IWVTA[13], the updated UN Regs will automatically be reflected in the relevant ADR.

On this understanding the FCAI proposes a revised Option 2:

- Introduce an administrative safety assurance system as part of the current regulatory regime with the introduction of ADR 90/01. As part of the approval to ADR 90/01, a self-certification statement of compliance will need to be submitted for Levels 3, 4 or 5 automated driving systems that are not covered by the '02' series of UN R79, that will be included in ADR 90/01.
- The statement of compliance would be submitted to the Federal Government (DIRDC) as evidence of compliance to ADR 90/01 with the vehicle type approval application and would be included in the vehicle type approval.
- The ADSE will be the type approval holder.
- The existing state transport/traffic legislation (e.g. vehicle standards rules), recall provisions to be introduced with the new Road Vehicle Standards Act and the ACL provisions all ensure automated driving systems to be supported in the market and the owner/operator's responsibility to maintain the vehicle.

The FCAI does not support creation of another "national body" (i.e. in addition to Vehicle Safety Standards Branch of DIRDC) to undertake vehicle certification. An additional national body will add complexity and cost to the process and will result in evaluation of vehicle technology by people without the necessary expertise. In essence, this will be a paperwork exercise and will not add value or otherwise address the road safety aspects of automated driving (steering) systems.

If the shortcoming in the current system is a lack of compliance and enforcement actions at either the Federal or State Government level, creating another national body will not address the shortcoming.

The assessment of the options in Section 6 of the Consultation RIS requires a substantial review to more accurately reflect the vehicle certification system and linkages to in-service legislation.

If the general safety duty is correctly described, and without an agreed standard, there is the potential to stifle introduction of new technology as brands may be reluctant to introduce new systems due to legal risk.

[13] As part of the obligations under the 1958 Agreement Australia has agreed adopt the International Whole of Vehicle Type Approval (IWVTA)

2.4 Conclusions

The FCAI does not support the NTC's recommendation and proposes a revised Option 2:

- Introduce an administrative safety assurance system as part of the current regulatory regime with the introduction of ADR 90/01. As part of the approval to ADR 90/01, a self-certification statement of compliance will need to be submitted for Levels 3, 4 or 5 automated driving systems that are not covered by the '02' series of UN R79, that will be included in ADR 90/01.
- The statement of compliance would be submitted to the Federal Government (DIRDC) as evidence of compliance to ADR 90/01 with the vehicle type approval application and would be included in the vehicle type approval.
- The ADSE will be the type approval holder.
- The existing state transport/traffic legislation (e.g. vehicle standards rules), recall provisions to be introduced with the new Road Vehicle Standards Act and the Australian Consumer Law (ACL) provisions all ensure automated driving systems to be supported in the market and the owner/operator's responsibility to maintain the vehicle.

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.

3.0 RESPONSES TO CONSULTATION REGULATION IMPACT STATEMENT

The proposed Safety Assurance System (SAS) for automated driving systems (ADS) is intended for commercial deployment of vehicles with systems that provide conditional automation, high automation or full automation (SAE Levels 3, 4 or 5) of the vehicle. This could include;

- Vehicles provided under type approval with level 3, 4 or 5 systems.
- After-market devices or software upgrades that add automated driving features (levels 3 or 4) to existing type approved (and registered) vehicles.

The proposed SAS is not intended for:

- Vehicle systems that provide lower levels of automation (SAE levels 1 or 2) on vehicles that are supplied to the market with type approval, and/or
- Vehicle systems that provide conditional automation, high automation or full automation (SAE Levels 3, 4 or 5) of the vehicle that are used on controlled trials.

The following responses to the Consultation RIS questions are based on the FCAI's position outlined in Section 2 and support for the introduction of ADR 90/01.

3.1 Problem Statement and need for government intervention

In the draft RIS, the NTC outlines the problem as:

In our current environment, when automated vehicles become ready for deployment there are risks that:

- *ADSs may fail to deliver reasonable safety outcomes*
- *A lack of consumer confidence in the safety of ADSs may reduce or delay their uptake*
- *ADSEs may face inconsistent and/or uncertain regulation to supply ADSs to the Australian market.*

Question 1. To what extent has the consultation RIS fully and accurately described the problem to be addressed? Please provide detailed reasoning for your answer.

The FCAI supports the work being undertaken by the NTC to develop an end-to-end post-trial regulatory system for automated vehicles and vehicles fitted with automated driving/steering systems. The main impediment to the introduction of vehicles with Levels 3, 4 or 5 automated systems is an inconsistent or uncertain regulatory environment in Australia.

The regulatory environment must include the regulations for both new vehicle type approvals (for supply of the vehicle to the market) and also the necessary in-service regulations for operation of the vehicle including registration to demonstrate initial and on-going compliance with standards.

The FCAI acknowledges that the SAS is intended to address this aspect.

The FCAI considers that the SAS should utilise and build on the existing vehicle regulatory system, rather than create and implement an additional vehicle certification system. The FCAI acknowledges that there are compliance and enforcement shortcomings in the existing system that should be addressed. The new Road

Vehicle Standards Act has been designed to provide greater flexibility for government's compliance and enforcement regime.

Question 2. What other factors should be considered in the problem statement?

To facilitate the adoption of the automated vehicle systems at lowest cost, the Australian regulatory system must be harmonised with international regulations and standards. In this case, it means harmonisation with the United Nations Regulations (UN Regs) for vehicle standards.

Administrative burden to both industry and government should be minimized by having a single national body (a Federal Government Department) responsible for vehicle certification.

Question 3. Has the consultation RIS provided sufficient evidence to support the case for government intervention? What else should be considered and why?

The FCAI does not consider that the consultation RIS has provided sufficient evidence that the current regulatory system for vehicles including type approval of new vehicles under the Federal Motor Vehicle Standards Act, and in-service standards under the Australian Vehicle Standards Rules (as replicated in each State/Territory legislation) will not deliver a safe outcome.

Section 2.2.2 in the consultation RIS outlines there have been "some crashes, including a small number of fatalities" during vehicle trials and early commercial deployment. The paper notes that the fatality in the Telsa Model S accident of 7 May 2016 occurred while the vehicle was operating outside the OEMs operating instructions. Also, it is questionable if these automated driving systems meet the SAE level 3, 4 or 5 requirements recently agreed by WP.29 (see Section 2.2 above).

Although crashes involving highly automated vehicles receive extensive media coverage, the consultation RIS (p. 18) points out that the crash rate for Google's self-driving car is 1.99 per million km which is lower than the US national crash rate of 2.61 per million km.

The results of the Waymo trials, as reported in the consultation RIS (p. 18) demonstrate the benefits of trials, i.e. reporting of accidents that allow analysis of the circumstances and subsequent action.

As the consultation RIS addresses consideration of a SAS for commercial deployment of highly automated vehicles, the Waymo trials are not directly relevant to the analysis.

Question 4. To what extent have the community and industry expectations of a regulatory response been accurately covered?

The industry expectations of a regulatory response have not been accurately covered as the consultation RIS does not accurately reflect the vehicle certification (type approval) process, the in-service legislation requiring a vehicle to continue to meet the type approval and also the Australian Consumer Law obligations to supply and support a product in the market.

3.2 Options to address the problem

The draft RIS outlines four options:

Option 1: Current approach; does not introduce a SAS and uses the existing regulatory processes to manage the safety of automated vehicles.

Option 2: Administrative safety assurance system; introduces a SAS using administrative arrangements under the existing regulation. It requires an ADSE to self-certify against principles-based safety criteria.

Option 3: Legislative safety assurance system; introduces a SAS with a dedicated national agency for automated vehicle safety, with specific offences and compliance and enforcement tools.

Option 4: Legislative safety assurance system with a primary safety duty; in addition to the elements of Option 3, includes a primary safety duty on ADSEs.

Question 5. Are the four options clearly described? If not, please elaborate.

Option 1: Current approach; does not introduce a SAS and uses the existing regulatory processes to manage the safety of automated vehicles.

Option 1 (Section 3.3 of the Consultation RIS) has not been correctly described.

The consultation RIS does not accurately reflect the vehicle certification (type approval) process, the in-service legislation requiring a vehicle to continue to meet the type approval and also the Australian Consumer Law obligations to supply and support a product in the market.

While there is currently no ADR for an automated driving (steering) system, the FCAI understands that the DIRDC intend to introduce a new ADR 90/01 – Steering Systems that will allow ADS to be included in the current vehicle type approval system. DIRDC's intention is to introduce a new ADR 90/01 that includes:

- Appendix A – UN R79/02 – Uniform provisions concerning the approval of vehicles with regard to steering equipment; and
- Appendix B – Statement of Compliance Safety Criteria Requirements

Then a vehicle fitted with an ADS will need to be certified to ADR 90/01 by either:

1. Meeting requirements of Appendix A, i.e. UN R79/02; or
2. Submitting a self-certification "Statement of Compliance Safety Criteria Requirements" (for those systems where a R79/02 does not apply as outlined in Section 1.2 of R79/02).

This will then allow the vehicle to receive a full volume type approval and the ADSE will be the type approval holder. An "exemption from ADRs" will not be required (Section 3.3.1).

Option 2: Administrative safety assurance system; introduces a SAS using administrative arrangements under the existing regulation. It requires an ADSE to self-certify against principles-based safety criteria.

The FCAI does not consider that option 2 has been correctly described.

As outlined above, an exemption from ADRs would not be required under Option 2. The ADSE could also provide self-certification to their Levels 3, 4 or 5 automated driving systems that are outside the scope of the ADR 90/00 or 90/01 (as in force at time of certification) as part of their application to the Federal Government for vehicle certification type approval.

The existing mechanisms for new vehicle type approvals, state/territory registration processes and in-service (state/territory) performance would be available. The sanctions and penalties for a non-complying ADSE would then be the same sanctions and penalty regime that currently exists for supplying a vehicle (or an aftermarket vehicle product/component) to the market and providing on-going support for the vehicle or aftermarket product/component.

This will also negate the need for another national body to certify ADS (and develop the necessary certification processes and compliance regime).

Option 3: *Legislative safety assurance system; introduces a SAS with a dedicated national agency for automated vehicle safety, with specific offences and compliance and enforcement tools.*

The FCAI does not support the introduction of another "dedicated national agency" for automated vehicle safety.

The FCAI considers that the SAS should utilise and build on the existing vehicle regulatory system, rather than create and implement an additional vehicle certification system. The FCAI acknowledges that there are compliance and enforcement shortcomings in the existing system and should be addressed. The new Road Vehicle Standards Act has been designed to provide greater flexibility for government's compliance and enforcement regime.

Option 4: *Legislative safety assurance system with a primary safety duty; in addition to the elements of Option 3, includes a primary safety duty on ADSEs.*

The consultation RIS does not adequately outline why the existing regulatory regime with state transport/traffic legislation and the Australian Consumer Law (ACL) do not already provide the same level of a primary safety duty.

Introducing a "primary safety duty" that is not prescriptive and allows "more proactive enforcement" has the potential to discourage innovation and introduction of new technology. Many vehicle OEMs will not introduce new automated driving systems into Australia without more definitive guidance on the standards the systems must meet due to legal risks.

The FCAI considers that Option 4 would not encourage the uptake of automated vehicles.

3.3 Proposed safety criteria for the Statement of Compliance

The NTC has proposed 11 principles-based safety criteria that ADSEs would be required to self-certify in a Statement of Compliance:

1. Safe system design and validation processes
2. Operational design domain (ODD)
3. Human-machine interface (HMI)
4. Compliance with relevant road traffic laws
5. Interaction with enforcement and other emergency services
6. Minimal risk condition
7. On-road behavioral competency
8. Installation of system up-grades
9. Testing for the Australian road environment
10. Cybersecurity
11. Education and training

In addition, the NTC have proposed three further obligations on the ADSE for the Statement of Compliance:

1. Data recording and sharing
2. Corporate presence in Australia
3. Minimum financial requirements

Question 6. Are the proposed safety criteria and obligations on ADSEs (detailed in chapter 4 and Appendix C) sufficient, appropriate and proportionate to manage the safety risk?

The FCAI notes that the proposed safety criteria and obligations on ADSEs are predominately harmonised with those proposed in the US. Provided, the national approval body (i.e. DIRDC) accepts the same evidence that has been provided to the US Government (i.e. NHTSA), the requirement for a Statement of Compliance should not add significant additional administrative burden.

Question 7. Are there any additional criteria or other obligations that should be included?

The FCAI has not identified any additional criteria or obligations that should be included.

3.4 Method for assessing the options

The NTC have assessed the four options against;

- Road safety
- Uptake of automated vehicles
- Regulatory costs to industry
- Regulatory costs to government
- Flexibility and responsiveness

Question 8. Do you agree with the impact categories and assessment criteria? If not, what additional impact categories or assessment criteria should be included?

The following assessment criteria should be included in the relevant impact categories:

- Road Safety – Manage vehicle end of life
- Regulatory costs to industry – International harmonisation to minimize cost impost on industry when introducing new automated driving system.

The following assessment criteria should be removed from the relevant impact categories:

- Flexibility and responsiveness – Allows for regulation of the ADS separate from the vehicle.

Question 9. Has the consultation RIS captured the relevant individuals or groups who may be significantly affected by each of the options? Who else would you include and why?

Vehicle OEMS should be included as relevant groups in the following impact categories:

- Road safety
- Uptake of automated vehicles
- Flexibility and responsiveness

3.5 Assessment of the options

The NTC's assessment of the options show;

- Option 4 has the most positive impacts, with large improvements to road safety and flexibility and responsiveness, as well as moderate improvements to the uptake of AVs
- Option 3 has similar results to Option 4, however, with lesser improvements to road safety and flexibility and responsiveness. However, the NTC found that Option 3 had greater certainty around regulatory costs than Option 4.
- Option 2 had similar impacts to Option 3, but to an equal or lesser extent.
- Option 1 was the base case, and all other options showed an overall benefit compared to Option 1.

Question 10. Does our analysis accurately assess the road safety benefits for each reform option? Please provide any further information or data that may help to clearly describe or quantify the road safety benefits.

The analysis does not accurately assess the road safety benefits in the following:

- Assessment Criteria a. Covers ADS safety over the vehicle lifecycle, including at first supply and in-service
    - Options 1 and 2 need to be revised to 'green' as the existing in-service legislation covers ADS safety in-service.

- Assessment Criteria b. Covers parties that have not sought approval under the safety assurance system, but who would be an ADSE if they sought approval:
    - Options 2, 3 and 4 should all have equal status (i.e. green), as they all would provide the same outcome.

- Assessment Criteria c. ensures there is always a clearly recognised legal entity responsible for risks associated with automated vehicles:
    - Options 2 and 3 should be green as they ensure there is a clearly recognised legal entity responsible for risks associated with automated vehicles.

- Assessment Criteria d. ensures responsibility sits with the party best able to manage the risk:
    - Options 2 and 3 should be green as they ensure there is a clearly recognised legal entity responsible for risks associated with automated vehicles.

- Assessment Criteria e. addresses safety risks that may not have been specifically considered at first supply:
    - Option 2 should also be green as the existing legislation and regulatory instruments (such as recall provisions under the ACL and soon to be included in the Road Vehicle Standards Act) are able to address safety risks that may not have been specifically considered at first supply.

- Assessment Criteria f. proactively addresses emerging ADS risks before the safety issue eventuates.
    - Options 1and 2 should also be green as the existing processes used by vehicle OEMs to identify and address risks before the safety issue eventuates have proven effective and will continue to be used.

- Assessment Criteria g. supports the introduction of targeted compliance and enforcement options, including sanctions and penalties for non-compliance.
    - All options will be able to have compliance and enforcement options.
    - The existing regulatory environment, including in-service standards and the ACL, have penalties and sanctions for non-compliance with standards.
    - The new Road Vehicle Standards Act will introduce targeted compliance and enforcement options, including sanctions and penalties for non-compliance similar to those proposed in the primary safety duty.

- Assessment Criteria h. allows the national body responsible for the ADS to monitor and respond to in-service ADS safety.
    - All options should be red.
    - With commercial deployment of vehicles fitted with automated driving (steering) systems the state/territory road and traffic laws (including vehicle standard regulations) have jurisdiction for in-service use and safety.
    - To allow a national body to monitor and respond to in-service ADS safety will require significant investment in systems/resources and may also require state/territory governments to transfer some of their legal responsibility.

Question 11. What additional safety risks do you consider the primary safety duty in option 4 would address compared with option 3?

It is not expected that the introduction of a primary safety duty will address any additional safety risks when the ADSE is a vehicle OEM.

There may be benefit for aftermarket products, but vehicle OEMs will not support fitting of an aftermarket product to one of their vehicles to create introduce a level 3, 4 or 5 automated driving (steering) system into a vehicle already in-service due to the substantial safety risk.

Question 12. Does our analysis accurately assess the uptake benefits for each reform option? Please provide any further information or data that may help to clearly describe or quantify the uptake benefits.

The analysis does not accurately assess the road safety benefits in the following:

- Assessment Criteria a. provides community assurance that automated vehicle safety risks have been comprehensively addressed.
    - Option 1 should be amber. The current approach provides community assurance that vehicle safety risks have been comprehensively addressed. It is expected that the relevant ADRs will be updated and/or new ADRs introduced; e.g. ADR 90/01 to include UN R79/02 for automated steering systems. The current approach will then continue to provide community assurance that the safety risks of the automated driving (steering) systems covered by the ADRs (UN Regs) have been comprehensively addressed.
- Assessment Criteria b. provides clear and consistent regulatory expectations to facilitate market entry, including national consistency and alignment with international requirements.
    - Option 4 should be amber. Without a clearly defined primary safety duty, that may lead to legal proceeding to interpret, the regulatory expectations are not clear and consistent.

Question 13. Does our analysis accurately assess the regulatory costs to industry for each reform option? Please provide any further information or data that may help to clearly describe or quantify the regulatory costs.

The analysis does not accurately assess the regulatory costs to industry in the following:

- Assessment Criteria a. results in low upfront and ongoing compliance, administrative and delay costs.
    - Option 1 should be green. With no change to the current approach there is no increase in costs for the industry.
    - Option 4 should be red.
        - The administrative costs to the ADSE are expected to be higher than the other options if the ADSE is expected to have an ongoing role in crash investigation under a primary safety duty.
        - The introduction of a non-prescriptive primary safety duty that may lead to legal proceedings to interpret, with inconsistent application across the jurisdictions is expected to delay the commercial deployment of highly automated vehicles by vehicle OEMs.

- Assessment Criteria b. provides clear and consistent regulatory expectations to industry about its responsibility and what is required to comply.
    - Option 1 should be green. With the current approach to vehicle regulation the industry has a clear and consistent expectation of its responsibility and what is required to comply.
- Assessment criteria c. supports an approach that is consistent across all jurisdictions and is aligned with international requirements.
    - Option 1 should be green.
        - The current approach to vehicle regulation has provided a consistent approach across all jurisdictions.
        - The current approach is also consistent with international requirements as the relevant ADRs will be updated and/or new ADRs introduced (e.g. ADR 90/01) to include UN Regulations for automated driving (steering) systems.
    - Option 4 should be amber.
        - The introduction of a non-prescriptive primary safety duty may lead to legal proceedings to interpret with inconsistent application across the jurisdictions is expected to delay the commercial deployment of highly automated vehicles by vehicle OEMs.
        - The FCAI questions if Option 4 is consistent with international requirements.

Question 14. Are there any specific regulatory costs to industry that we have not considered?

The FCAI makes the following comments on the preliminary conclusions to the qualitative assessment Section 6.4.2 Summary of regulatory costs to industry impact assessment;

- Do not agree that under Option 1 the ongoing administrative and delay costs are uncertain and potentially higher than the other options.
    - The vehicle industry has worked within the current regulatory system since the introduction of the Motor Vehicle Standards Act in 1989 and consequently are well aware of the administrative procedures and expectations.
    - Introduction of additional administrative procedures, especially if these will be assessed by another “national body” (as in Options 3 and 4) will introduce higher administrative costs and uncertainties than the current system.
- Agree that Option 4 introduces additional administrative costs relating to the ADSE’s role as duty holder under the primary safety duty.
    - As noted above, this will introduce administrative costs and uncertainties with the potential to delay the commercial deployment of highly automated vehicles by vehicle OEMs.
    - Introduction of excessive costs are disincentives to vehicle OEMs to introduce highly automated vehicles.
- Agree that Options 2, 3 and 4 all have higher costs for industry to meet regulatory requirements. These costs can be more effectively managed by the revised Option 2 proposed by the FCAI.
- Agree that Options 2 and 3 are likely to result in a consistent approach across all jurisdictions, while option 4 is likely to have inconsistent application due to different interpretations of the primary safety duty.
- Do not agree that Options 2, 3 and 4 are aligned with international requirements. The principles-based safety criteria proposed for the Statement of Compliance are consistent with the US

approach, but the Consultation RIS does not indicate these are consistent with other major markets including the EU and Japan.

Question 15. Does our analysis accurately assess the costs to government for each reform option? Please provide any further information or data that may help to clearly describe or quantify the costs to government.

The FCAI is not in a position to comment in detail on the costs to government.

However, we would note that the NTC have recognised that "the overall government costs are largely uncertain at this time." The NTC have recognised that any government fees and charges will be passed along to the ADSE. The FCAI's revised Option 2 should minimise cost to governments.

Question 16. Does our analysis accurately assess the flexibility and responsiveness for each reform option? Please provide any further information or data that may help to clearly describe or quantify the flexibility and responsiveness of the options.

The FCAI has the following comments on the assessment of the flexibility and responsiveness for each reform option in the following:

- Assessment Criteria a. can be implemented by 2020:
    - Option 4 should be red. If the NTC's recommended option (i.e. option 4) was agreed by Ministers at their meeting in November, it would leave only 12 months (i.e. 2019) to implement the approach by 2020. Based on past history of such significant regulatory change, and also noting the vehicle certification system is undergoing significant change during this time with the introduction of the new Road Vehicle Standards Act, a new system regulatory and administrative system could not be introduced in this time period.
- Assessment Criteria b. allows for transition as international approaches evolve:
    - No objection to all options being depicted as "green."
- Assessment Criteria c. allows flexibility for industry by focusing on safety outcomes, minimizing prescriptive requirements, remaining technology-neutral and allowing innovative solutions:
    - Options 1 and 2 should also be shown as green. The regulated standards for automated driving (steering) systems, i.e. UN Regulations, will be performance based and therefore non-prescriptive and technology-neutral. For commercial deployment, outcome based standards are required to provide vehicle OEMs with the certainty needed to supply vehicles fitted with innovative systems.
- Assessment Criteria d. allows flexibility for government in addressing emerging safety risks.
    - Options 1 and 2 should be shown as green. Government already has the necessary regulatory tools to address emerging safety risks. Additional flexibility in compliance and enforcement powers will be provided under the new Road Vehicle Standards Act.
    - The FCAI questions if more "flexibility" is required.
- Assessment Criteria e. allows for regulation of the ADS separate to the vehicle.
    - The FCAI does not agree that the ADS should be regulated separate from the vehicle as this approach introduces a safety risk.

- The current state legislation that manages in-service vehicle safety recognises that vehicle modifications need to be controlled to ensure a vehicle continues to meet the relevant safety standard (i.e. ADR) applicable.
- The revised option 2 with the introduction of ADR 9/01 will identify the ADSE as the type approval holder.

3.6 Summary of assessment and preferred option

The NTC found that Option 4 had the most positive impacts.

Question 17. Do you consider the relevant factors and conditions for government in choosing an option to be valid? Are there any factors and conditions you do not agree with?

The key to the FCAI View in the following tables is:

FCAI View	
✓	The FCAI agrees with the NTC comment
?	The FCAI considers the NTC comment requires additional justification
✗	The FCAI does not agree with the NTC comment

Option 2

would be preferable if governments consider that:	FCAI View	Comment
• it is appropriate to take a cautious, incremental approach to regulation because of the uncertainty about the future including international regulatory approaches	✓	
• a more robust Australian regulatory regime could be perceived as a disincentive for suppliers/operators to enter the market	✓	
• the ability to recall or deregister vehicles is sufficient to mitigate uncertain future risks, at least initially	✓	
• a self-certification system that does not include specific sanctions and penalties and does not cover in-service safety would be successful to achieve an acceptable level of safety, at least initially	✗	The current vehicle certification system already includes sanctions and penalties. The new Road Vehicle Standards Act has been designed to provide greater flexibility for the government's compliance and enforcement regime and has included recall provisions
• there would be sufficient time to implement additional regulatory measures (for example, options 3 or 4) if need is shown once the	✓	

technology is introduced into the Australian market		
• the public will accept this regime as providing sufficient reassurance about the safety of automated vehicles so as not to undermine the uptake of the technology.	✓	

Option 3

would be preferable if governments consider that:	FCAI View	Comment
• self-certification on its own is insufficient to achieve an acceptable level of safety	✗	As part of ADR 90/01 the certification of an ADS will be included in the vehicle type approval.
• the deregistration or recall powers under option 2 are inadequate because they have the potential to punish the wrong party (end consumers)	✗	The current recall powers under the ACL have proven effective in ensuring in-service safety of vehicles. The new Road Vehicle Standards Act will also include recall provisions.
• consumer law is insufficient to ensure ADSEs are held to account for safety failures without additional offences and penalties being imposed	✗	The current recall powers under the ACL have proven effective in ensuring in-service safety of vehicles. The new Road Vehicle Standards Act will also include recall provisions.
• a suite of appropriately targeted sanctions and penalties would be a sufficient additional factor to change the behaviour of ADSEs to achieve acceptable safety outcomes	?	The new Road Vehicle Standards Act has been designed to provide greater flexibility for the government's compliance and enforcement regime and has included recall provisions.
• the additional cost, both in terms of government administration and compliance costs imposed on ADSEs are outweighed by the additional safety benefits achieved	?	The costs have yet to be quantified.
• it is possible to formulate requirements, offences and penalties so they do not require ongoing revision and updating as ADS technology and the market for it evolve	✓	
• implementing penalties to supplement the self-certification system if the need arises would be too slow and unduly risk safety either because technology may evolve very rapidly or because it would take a long time for governments to implement penalties as an incremental regulatory step above option 2	?	As part of ADR 90/01 the certification of an ADS will be included in the vehicle type approval.
• additional costs of implementing this regime are likely to be low because it will only need positive action by governments if ADSEs	?	The costs have yet to be quantified.

breach legal requirements		
• it is broadly in line with regulatory regimes in key international markets and would not discourage potential suppliers from entering the Australian market	?	
• it is likely to lead to greater uptake of automated vehicles than option 2 because the public view it as providing better assurance about the safety of automated vehicles.	?	

Option 4

would be preferable if governments consider that:	FCAI View	Comment
• the potential and unknown safety risks associated with ADSs are so significant that a primary safety duty is required to provide ADSEs with an additional incentive (over and above options 2 and 3) to manage the safety of the products and services they provide	✕	Any potential and unknown safety risks with commercial deployment of vehicles fitted with ADS will be best managed via the existing vehicle regulatory system.
• a proactive regulator is required to deal with potential issues as they arise	?	The new Road Vehicle Standards Act has been designed to provide greater flexibility for the government's compliance and enforcement regime and has included recall provisions.
• options 2 and 3 cannot cover all foreseeable future safety risks, and the broad nature and flexibility of a primary safety duty is needed to manage these	?	Any potential safety risks with commercial deployment of vehicles fitted with ADS will be best managed via the existing vehicle regulatory system.
• they only have one chance at implementing a complete regulatory regime, and an incremental approach is not a feasible option	✕	The existing vehicle regulatory regime caters for introduction of new technology by an incremental introduction of new vehicle regulatory standards as a need is identified and the standard is developed.
• additional costs associated with this option are likely to be relatively low due to the primary safety duty applying to ADSEs only	✕	Additional costs are likely to be high due to legal interpretations of a non-prescriptive primary safety duty.
• this option would not be significantly more onerous than regulatory approaches in key international markets and would not discourage potential suppliers from entering the Australian market	?	Mainstream vehicle OEMs will be unlikely to introduce new technology into Australia on a widespread commercial basis without clearly defined standards.
• this option would significantly enhance the public's confidence in automated vehicles (over and above 0ptions 2 and 3), and this	?	Mainstream vehicle OEMs will be unlikely to introduce new technology into Australia on a widespread

enhanced confidence would potentially translate into higher uptake rates		commercial basis without clearly defined standards. Therefore, this option is likely to result in the lowest uptake.

Question 18. Do you agree with our view on the relevant factors and conditions for government in choosing an option?

The FCAI does not agree with the NTC's view on the relevant factors and conditions for choosing an option. In particular, the FCAI does not agree with the NTC's analysis and views that (p. 65):

- option 2 may not provide adequate means of ensuring that ADSEs ensure safety, and
- the use of targeted sanctions and penalties alone in option 3 is also unlikely to result in sufficient safety outcomes because they do not provide sufficient incentive to ADSEs to address emerging safety risks.

As outlined elsewhere in this submission the FCAI considers that the existing regulatory regime provides an adequate means of ensuring that ADSEs (e.g. vehicle OEMs) ensure safety and there are already sufficient sanctions and penalties to provide an incentive to ADSEs to address emerging safety risks.

The new Road Vehicle Standards Act has been designed to provide greater flexibility for government's compliance and enforcement regime. By including the proposed safety assurance system within the vehicle type approval system (e.g. as per FCAI's proposed revised option 2) the new RVSA will go some way to addressing the current perceived shortcomings in the governments (at both national and state/territory level) compliance and enforcement activities in relation to vehicle safety.

Question 19. Has the consultation RIS used an appropriate analytical method for assessing the benefits and costs of the options? What else should be considered?

The analysis of the costs and benefits of the options has been qualitative and subjection. The FCAI does not consider the costs have been sufficiently quantified to be able to accurately assess the costs of the four options.

Question 20. On balance, do you agree that the preferred option best addresses the identified problem? If not, which option do you support?

The FCAI does not support the NTC's preferred option 4.

The FCAI supports a safety assurance system that is incorporated within the existing vehicle type approval system and as such is targeted to ADS that are not included in any regulatory standard (e.g. UN R79).

The FCAI proposes a revised Option 2:

- Introduce an administrative safety assurance system as part of the current regulatory regime with the introduction of ADR 90/01. As part of the approval to ADR 90/01, a self-certification statement of compliance will need to be submitted for Levels 3, 4 or 5 automated driving systems that are not covered by the '02' series of UN R79, that will be included in ADR 90/01.

- The statement of compliance would be submitted to the Federal Government (DIRDC) as part of the vehicle type approval application and would be included in the vehicle type approval.
- The ADSE will be the type approval holder.
- The existing state transport/traffic legislation (e.g. vehicle standards rules), recall provisions to be introduced with the new Road Vehicle Standards Act and the Australian Consumer Law (ACL) provisions all ensure automated driving systems to be supported in the market and the owner/operator's responsibility to maintain the vehicle.

Question 21. How does your choice of option better address the problem than the preferred option?

The FCAI proposed Option 2, builds on the existing vehicle regulatory framework and therefore provides the necessary community assurances for the safe operation of highly automated vehicles at the lowest cost to both industry and government.

Setting up a new national legislative framework with a national body to administer the legislation creates unnecessary duplication, increases costs to both government and industry, and does not necessarily address the perceived compliance and enforcement shortcomings of the existing national/state vehicle regulatory framework.

Utilising the existing vehicle type approval system and DIRDC's proposed ADR 90/01, also introduces sufficient flexibility to continue to set standards for new ADS technology as it is developed and maintains harmonisation with the international approaches.

4.0 CONCLUSION

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 Consultation Regulation Impact Statement on a Safety Assurance System for Automated Driving Systems.

The NTC consider that Australia's current laws and regulations do not recognise automated vehicles or provide assurances for their safe design or operation. Therefore, the NTC's objective is to have an "end-to-end" regulatory system in place by 2020 to support the safe deployment of automated vehicles. As part of the end to end regulatory system the NTC propose a safety assurance system (SAS) for automated vehicles to support the uptake and safe operation of automated vehicles on Australia's roads.

The FCAI does not support the NTC's recommendation and proposes a revised Option 2:

- Introduce an administrative safety assurance system as part of the current regulatory regime with the introduction of ADR 90/01. As part of the approval to ADR 90/01, a self-certification statement of compliance will need to be submitted for Levels 3, 4 or 5 automated driving systems that are not covered by the '02' series of UN R79, that will be included in ADR 90/01.
- The statement of compliance would be submitted to the Federal Government (DIRDC) as evidence of compliance to ADR 90/01 with the vehicle type approval application and would be included in the vehicle type approval.
- The ADSE will be the type approval holder.
- The existing state transport/traffic legislation (e.g. vehicle standards rules), recall provisions to be introduced with the new Road Vehicle Standards Act and the Australian Consumer Law (ACL) provisions all ensure automated driving systems to be supported in the market and the owner/operator's responsibility to maintain the vehicle.

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.

The FCAI does not support creation of another "national body" to undertake vehicle certification. An additional body This will add complexity and administrative cost to the process and will result in evaluation of vehicle technology by people without any expertise in vehicle technology. In essence, this will be a paperwork exercise and will not add value or otherwise address the road safety aspects of automated driving systems.

GLOSSARY

Abbreviation	Term	Description
1958 Agreement		Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the basis of the United Nations Regulations, Revision 3 which entered into force on 14 September 2017
ACL	Australian Consumer Law	
ADR	Australian Design Rule	
ADS	Automated Driving System	NTC Consultation RIS; The hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis. It is a type of automation system used in vehicles operating in conditional, high and full automation. SAE J3016; The hardware and software that are collectively capable of performing the entire dynamic driving task (DDT) on a sustained basis, regardless of whether it is limited to a specific operational design domain (ODD); this term is used specifically to describe a level 3, 4 or 5 driving automation system.
ADSE	Automated Driving System Entity (NTC Consultation RIS)	The legal entity responsible for the ADS.
DDT	Dynamic driving task (SAE J3016)	All of the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints, and including without limitation: • Lateral vehicle motion control via steering (operational); • Longitudinal vehicle motion control via acceleration and deceleration (operational); • Monitoring the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical); • Object and event response execution (operational and tactical); • Manoeuvre planning (tactical); and • Enhancing conspicuity via lighting, signaling and gesturing, etc. (tactical).

DDT fallback	Dynamic driving task (DDT) fallback (SAE J3016)	The response by the *user* to either perform the *DDT* or achieve a *minimal risk condition* after occurrence of a *DDT performance-relevant system failure(s)* or upon *operational design domain* (*ODD*) exit, or the response by an *ADS* to achieve *minimal risk condition*, given the same circumstances.
DIRDC	Federal Government Department of Infrastructure, Regional Development and Cities	Responsible for administering the vehicle certification type approval system under Motor Vehicle Standards Act (to be replaced by the Road Vehicle Standards Act).
HMI	Human machine interface	
IWVTA	International Whole of Vehicle Type Approval	
ODD	Operational design domain	SAE J3016; Operating conditions under which a given *driving automation system* or *feature* thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics.
OICA	Organisation Internationale des Constructeurs d'Automobiles	International organisation of motor vehicle manufacturers and represents the industry at international forums such as WP. 29.
RVSA	Road Vehicle Standards Act	
SAE	Society of Automotive Engineers	
SAE J3016		SAE Surface Vehicle Recommended Practice, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, J3016, June 2018.
SAS	Safety Assurance System	
UN R	United Nations Regulation	UN Regulations contain provisions (for vehicles, their systems, parts and equipment) related to safety and environmental aspects. They include performance-oriented test requirements, as well as administrative procedures.
WP. 1		The UNECE Global Forum for Road Traffic Safety
WP. 29		The UNECE World Forum for Harmonization of Vehicle Regulations

United Nations ECE/TRANS/WP.29/2018/2

Economic and Social Council

Distr.: General
9 January 2018

Original: English

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 ECE/TRANS/WP.29/2017/145, distributed in English only during the 173th session of WP.29.

* 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.

	Object and Event Detection and Response (OEDR) by the driver *The driver may not perform secondary activities*			*Object and Event Detection and Response (OEDR) by the system* *The driver may perform secondary activities*		
	Monitor by Driver	*Monitor by Driver (a)*	*Monitor by Driver (b)*	*Monitor by System (Return to Driver Control on System Request)*	*Monitor by System Full Time under defined use case*	*Monitor by System only*
Ref. SAE Level (J3016)	*1*	*2*		*3*	*4*	*5*
Outline of Classification	System takes care of longitudinal or lateral control. Monitoring by the driver.	The system takes care of both longitudinal and lateral control. Monitoring by driver necessary because the system is not able to detect all the situations in the ODD. The driver shall be able to intervene at any time.		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). The system drives and monitors (specific to the ODD) the environment. The system detects system limits and issues a transition demand if these are reached. *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	The system is able to cope with any situations in the ODD (fallback included). The driver is not necessarily needed during the specific use-case, e. g. Valet Parking/ Campus Shuttle. The system may however request a takeover if the ODD boundaries are reached (e.g. motorway exit).	The system is able to cope with any situations on all road types, speed ranges and environmental conditions. No driver necessary.

			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 transition demand before	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.	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.

	3. Supervise the dynamic driving task executed by driver assistance system and intervening immediately when required by the environment and the system (warnings).	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).	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).	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.	3. Determine waypoints and destinations .
	4. The driver shall not perform secondary activities which will hamper him in intervening immediately when required.	4. The driver shall not perform secondary activities which will hamper him in intervening immediately when required.	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.	4. May perform a wide variety of secondary activities in the ODD.	4. May perform a wide variety of secondary activities during the whole trip.
	Consideration points on development of vehicle regulation	1. Consider whether regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary.	1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary including the monitoring of the driving environment.	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	Note: Preliminary analysis only- subject further review. 1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are

				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 intervention by the driver is	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

		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.

Examples of the necessary system performance requirements						
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

the driver's resumption of dynamic driving tasks (transition periods to the driver, etc.) **Aspect of transition demand procedure.**				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).	requirement when the end of the ODD is reached.	
System reliability	Consideration shall be given to evaluation of the system reliability and redundancy as necessary.					
Comprehensive recognition of surrounding environment **(sensing, etc.)**	The area to be monitored (depends on the system function).	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).	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.	The area to be monitored depends on the system function (Lateral and longitudinal directions). It is the task of the system to perform OEDR.		
Recording of system status	Unnecessary	Unnecessary	The driver's operations and	The driver's operations and the system status (incl. system	The system status (incl. system behavior)).	

(inc. system behavior) **(DSSA-Data Storage System for ACSF, EDR, etc.)**			the system status (incl. system behavior).	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: ・Parking Assist	・ 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	・LKA (draft	Under discussion:		Under discussion :	Requirements need to be developed	

<table>
<tr><td rowspan="2">exclusively for motor vehicles with physical separation from oncoming traffic (e.g. motorway)</td><td rowspan="3">standards)
· ACC (no specific performance requirements)
· ACSF Cat.B1 (Steering Function hands-on)</td><td colspan="2">· Categories [B2], C, D and [E] under ACSF (amendment of R79)
· Category B1 in combination with longitudinal control</td><td>· Categories B2, B2+E under ACSF (amendment of R79)</td><td></td></tr>
<tr><td>· ACC+ACSF (Cat.B1, Cat.C [Basic Lane Change Assist], Cat.D [Smart LCA])</td><td>· [ACSF Cat. B2]
· [ACSF Cat.E] (Continuous Lane Guidance hands-off)</td><td></td><td></td></tr>
<tr><td>Urban and interurban roads</td><td colspan="2">· Category B1 in combination with longitudinal Control
· To be discussed by R79 IWG ACSF:
Cat. B1 in combination with C, D</td><td colspan="2">Requirements need to be developed</td></tr>
</table>

ANNEX B: EXTRACTS FROM UN R79

Following are extracts from UN R79 relevant to approval of ADAS and automated steering systems;

UN Regulation No. 79
Uniform provisions concerning the approval of vehicles with regard to steering equipment

Introduction

The intention of the Regulation is to establish uniform provisions for the layout and performance of steering systems fitted to vehicles used on the road. Traditionally the major requirement has been that the main steering system contains a positive mechanical link between the steering control, normally the steering wheel, and the road wheels in order to determine the path of the vehicle. The mechanical link, if amply dimensioned, has been regarded as not being liable to failure.

Advancing technology, coupled with the wish to improve occupant safety by elimination of the mechanical steering column, and the production advantages associated with easier transfer of the steering control between left and right hand drive vehicles, has led to a review of the traditional approach and the Regulation is now amended to take account of the new technologies. Accordingly it will now be possible to have steering systems in which there is not any positive mechanical connection between the steering control and the road wheels.

Systems whereby the driver remains in primary control of the vehicle but may be helped by the steering system being influenced by signals initiated on-board the vehicle are defined as "Advanced Driver Assistance Steering Systems". Such systems can incorporate an "Automatically Commanded Steering Function", for example, using passive infrastructure features to assist the driver in keeping the vehicle on an ideal path (Lane Guidance, Lane Keeping or Heading Control), to assist the driver in manoeuvring the vehicle at low speed in confined spaces or to assist the driver in coming to rest at a pre-defined point (Bus Stop Guidance). Advanced Driver Assistance Steering Systems can also incorporate a "Corrective Steering Function" that, for example, warns the driver of any deviation from the chosen lane (Lane Departure Warning), corrects the steering angle to prevent departure from the chosen lane (Lane Departure Avoidance) or corrects the steering angle of one or more wheels to improve the vehicle's dynamic behaviour or stability.

In the case of any Advanced Driver Assistance Steering System, the driver can, at all times, choose to override the assistance function by deliberate action, for example, to avoid an unforeseen object in the road.

It is anticipated that future technology will also allow steering to be influenced or controlled by sensors and signals generated either on or offboard the vehicle. This has led to several concerns regarding responsibility for the primary control of the vehicle and the absence of any internationally agreed data transmission protocols with respect to off-board or external control of steering. Therefore, the Regulation does not permit the general approval of systems that incorporate functions by which the steering can be controlled by external signals, for example, transmitted from roadside beacons or active features embedded into the road surface. Such systems, which do not require the presence of a driver, have been defined as "Autonomous Steering Systems".

1. Scope

1.1. This Regulation applies to the steering equipment of vehicles of categories M, N and O.[1]

1.2. This Regulation does not apply to:

1.2.1. Steering equipment with a purely pneumatic transmission;

1.2.2. Autonomous Steering Systems as defined in paragraph 2.3.3.;

1.2.3. Steering systems exhibiting the functionality defined as ACSF of Category B2, C, D or E in paragraphs 2.3.4.1.3., 2.3.4.1.4., 2.3.4.1.5., or 2.3.4.1.6., respectively, until specific provisions would be introduced in this Regulation.

2. Definitions

For the purposes of this Regulation:

2.3.3. "*Autonomous Steering System*" means a system that incorporates a function within a complex electronic control system that causes the vehicle to follow a defined path or to alter its path in response to signals initiated and transmitted from off-board the vehicle. The driver will not necessarily be in primary control of the vehicle.

2.3.4. "*Advanced Driver Assistance Steering System*" means a system, additional to the main steering system, that provides assistance to the driver in steering the vehicle but in which the driver remains at all times in primary control of the vehicle. It comprises one or both of the following functions:

2.3.4.1. "*Automatically commanded steering function (ACSF)*" means a function within an electronic control system where actuation of the steering system can result from automatic evaluation of signals initiated on-board the vehicle, possibly in conjunction with passive infrastructure features, to generate control action in order to assist the driver.

2.3.4.1.1. *"ACSF of Category A"* means a function that operates at a speed no greater than 10 km/h to assist the driver, on demand, in low speed or parking manoeuvring.

2.3.4.1.2. *"ACSF of Category B1"* means a function which assists the driver in keeping the vehicle within the chosen lane, by influencing the lateral movement of the vehicle.

2.3.4.1.3. *"ACSF of Category B2"* means a function which is initiated/activated by the driver and which keeps the vehicle within its lane by influencing the lateral movement of the vehicle for extended periods without further driver command/confirmation

2.3.4.1.4. *"ACSF of Category C"* means, a function which is initiated/activated by the driver and which can perform a single lateral manoeuvre (e.g. lane change) when commanded by the driver.

2.3.4.1.5. *"ACSF of Category D"* means a function which is initiated/activated by the driver and which can indicate the possibility of a single lateral manoeuvre (e.g. lane change) but performs that function only following a confirmation by the driver.

2.3.4.1.6. *"ACSF of Category E"* means a function which is initiated/activated by the driver and which can continuously determine the possibility of a manoeuvre (e.g. lane change) and complete these manoeuvres for extended periods without further driver command/confirmation.

2.3.4.2. *"Corrective Steering Function (CSF)"* means a control function within an electronic control system whereby, for a limited duration, changes to the steering angle of one or more wheels may result from the automatic evaluation of signals initiated on-board the vehicle, in order:
(a) To compensate a sudden, unexpected change in the side force of the vehicle, or;
(b) To improve the vehicle stability (e.g. side wind, differing adhesion road conditions "μ-split"), or;
(c) To correct lane departure. (e.g. to avoid crossing lane markings, leaving the road).

5. Construction provisions

5.1. General provisions

5.1.6. Advanced driver assistance steering systems shall only be approved in accordance with this Regulation where the function does not cause any deterioration in the performance of the basic steering system. In addition they shall be designed such that the driver may, at any time and by deliberate action, override the function.

5.1.6.1. A CSF system shall be subject to the requirements of Annex 6.

5.1.6.1.1. Every CSF intervention shall immediately be indicated to the driver by an optical warning signal which is displayed for at least 1 s or as long as the intervention exists, whichever is longer.

5.1.6.1.2. In the case of a CSF intervention which is based on the evaluation of the presence and location of lane markings or boundaries of the lane the following shall apply additionally:

5.1.6.1.2.1. In the case of an intervention longer than:
(a) 10 s for vehicles of category M_1 and N_1, or
(b) 30 s for vehicles of category M_2, M_3 and N_2, N_3, an acoustic warning signal shall be provided until the end of the intervention.

5.1.6.1.2.2. In the case of two or more consecutive interventions within a rolling interval of 180 seconds and in the absence of a steering input by the driver during the intervention, an acoustic warning signal shall be provided by the system during the second and any further intervention within a rolling interval of 180 seconds. Starting with the third intervention (and subsequent interventions) the acoustic warning signal shall continue for at least 10 seconds longer than the previous warning signal.

5.1.6.1.3. The steering control effort necessary to override the directional control provided by the system shall not exceed 50 N in the whole range of CSF operations.

5.1.6.1.4. The requirements in paragraphs 5.1.6.1.1., 5.1.6.1.2. and 5.1.6.1.3. for CSF, which are reliant on the evaluation of the presence and location of lane markings or boundaries of the lane, shall be tested in accordance with the relevant vehicle test(s) specified in Annex 8 of this Regulation.

ANNEX C: EXTRACT FROM SAE INTERNATIONAL WEBSITE

Current Revised 2018-06-15

Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016_201806

This SAE Recommended Practice describes motor vehicle driving automation systems that perform part or all of the dynamic driving task (DDT) on a sustained basis. It provides a taxonomy with detailed definitions for six levels of driving automation, ranging from no driving automation (level 0) to full driving automation (level 5), in the context of motor vehicles (hereafter also referred to as "vehicle" or "vehicles") and their operation on roadways. These level definitions, along with additional supporting terms and definitions provided herein, can be used to describe the full range of driving automation features equipped on motor vehicles in a functionally consistent and coherent manner. "On-road" refers to publicly accessible roadways (including parking areas and private campuses that permit public access) that collectively serve users of vehicles of all classes and driving automation levels (including no driving automation), as well as motorcyclists, pedal cyclists, and pedestrians.

The levels apply to the driving automation feature(s) that are engaged in any given instance of on-road operation of an equipped vehicle. As such, although a given vehicle may be equipped with a driving automation system that is capable of delivering multiple driving automation features that perform at different levels, the level of driving automation exhibited in any given instance is determined by the feature(s) that are engaged.
This document also refers to three primary actors in driving: the (human) user, the driving automation system, and other vehicle systems and components. These other vehicle systems and components (or the vehicle in general terms) do not include the driving automation system in this model, even though as a practical matter a driving automation system may actually share hardware and software components with other vehicle systems, such as a processing module(s) or operating code.

The levels of driving automation are defined by reference to the specific role played by each of the three primary actors in performance of the DDT and/or DDT fallback. "Role" in this context refers to the expected role of a given primary actor, based on the design of the driving automation system in question and not necessarily to the actual performance of a given primary actor. For example, a driver who fails to monitor the roadway during engagement of a level 1 adaptive cruise control (ACC) system still has the role of driver, even while s/he is neglecting it.

Active safety systems, such as electronic stability control and automated emergency braking, and certain types of driver assistance systems, such as lane keeping assistance, are excluded from the scope of this driving automation taxonomy because they do not perform part or all of the DDT on a sustained basis and, rather, merely provide momentary intervention during potentially hazardous situations. Due to the momentary nature of the actions of active safety systems, their intervention does not change or eliminate the role of the driver in performing part or all of the DDT, and thus are not considered to be driving automation.
It should, however, be noted that crash avoidance features, including intervention-type active safety systems, may be included in vehicles equipped with driving automation systems at any level. For Automated Driving System (ADS) features (i.e., levels 3-5) that perform the complete DDT, crash avoidance capability is part of ADS functionality.

Revision History

J3016_201806	2018-06-15	Latest	Revised
J3016_201609	2016-09-30	Historical	Revised
J3016_201401	2014-01-16	Historical	Issued