



Changing driving laws to support automated vehicles

Discussion Paper
October 2017



National Transport Commission

Report outline

Title	Changing driving laws to support automated vehicles
Type of report	Discussion paper
Purpose	For public consultation on options for legislative reform to ensure driving laws provide for automated vehicles to operate on Australian roads.
Abstract	This discussion paper seeks feedback on how driving laws should provide for the public deployment of automated vehicles, new legal obligations that may be required, and the establishment of legal obligations for automated driving system entities.
Submission details	Submissions will be accepted until 24 November 2017 online at www.ntc.gov.au or by mail to: Att: Changing driving laws to support automated vehicles National Transport Commission Level 3/600 Bourke Street Melbourne VIC 3000
Key words	driver laws, Australian Road Rules, automated vehicles, driver duties
Contact	National Transport Commission Level 3/600 Bourke Street Melbourne VIC 3000 Ph: (03) 9236 5000 Email: enquiries@ntc.gov.au www.ntc.gov.au

Contents

Report outline	ii
Contents	iii
Executive summary	1
Context	1
What are the problems?	1
Potential reforms to support automated vehicles	2
Next steps	3
1 Context	5
1.1 About the NTC	5
1.2 Objectives	6
1.3 Benefits of automated vehicles	7
1.4 Key terms	7
1.5 Background	11
1.5.1 Broader national reform program for automated vehicles	11
1.5.2 Project interdependencies	13
1.6 What are the problems?	15
1.6.1 Current driving laws and offences assume a human driver	15
1.6.2 An ADS is not a person and cannot be legally responsible for its actions	16
1.6.3 Current law does not provide for a legal entity (the ADSE) to be held responsible for the actions of the ADS	16
1.6.4 Some legislative duties and obligations given to drivers could not be controlled by the ADSE if an ADS is the driver	16
1.6.5 Safety duties may need to be carried out by someone else if the driver is an ADS and legislation would need to clarify who has the safety duty	17
1.6.6 Control and proper control of a vehicle if an ADS is driving are not defined	17
1.6.7 Legal obligations to ensure readiness to drive	17
1.6.8 Compliance and enforcement	18
1.7 Scope	18
2 Consultation	20
2.1 Consultation	20
2.1.1 Questions to consider	20
2.2 How to submit	21
3 Current driving law and its application to automated vehicles	22
3.1 Purpose	22
3.2 What laws are we talking about?	22
	iii

3.2.1	International conventions	23
3.2.2	State and territory driving legislation	23
3.2.3	State and territory road rules based on model Australian Road Rules	23
3.2.4	Other legislation	24
3.3	Responsible parties under driving law and their obligations	24
3.3.1	What is a driver?	25
3.3.2	What does 'drive' mean?	26
3.3.3	Do current definitions of a driver cover an ADS driver?	27
3.3.4	What are the obligations of a driver?	27
3.3.5	What is a registered owner, registered operator or licence holder?	29
3.3.6	What are the obligations of a registered operator?	30
3.3.7	What is a manufacturer?	31
3.3.8	What are the obligations of a manufacturer?	31
3.3.9	Overlapping duties and responsible parties under chain of responsibility	32
3.3.10	Future responsibility for driver obligations in automated vehicles	32
4	International approaches to automated driving systems	34
4.1	Purpose	34
4.2	Summary of international review	34
4.3	International approaches to ADS and driving laws	35
4.3.1	Amendments to the Vienna Convention to recognise an ADS	35
4.3.2	Germany	36
4.3.3	United States	37
5	Legal recognition of an ADS and responsibility of an ADSE	42
5.1	Purpose	42
5.2	Is reform to existing driving laws required?	43
5.2.1	Conclusion	43
5.3	Should the ADS be considered in control of a vehicle when it is engaged?	44
5.3.1	At what levels of automation should the ADS be considered to be in control of the vehicle?	44
5.3.2	Legislative options for whether the ADS or the human driver is in control of an automated vehicle	46
5.3.3	Conclusion	47
5.3.4	Safety assurance system and legal recognition of the ADS as being in control of a vehicle	48
5.3.5	How would 'proper control' apply if an ADS is in control of the vehicle?	48

5.3.6 Conclusion	49
5.4 Which entity should be responsible for the ADS	49
5.4.1 Conclusion	52
5.5 What obligations should apply to the ADSE?	53
5.5.1 Responsibility for the dynamic driving task	53
5.5.2 Duties relating to the dynamic driving task that an ADS cannot perform	53
5.5.3 Driver duties and obligations that do not relate to the dynamic driving task	54
5.5.4 Conclusion	55
5.6 Legislative approaches to recognise an ADS and an ADSE	56
5.6.1 Approach 1: Expand the definition of driver in Acts that deal with the dynamic driving task to include the ADS when it is engaged and make the ADSE responsible for the actions of the ADS	56
5.6.2 Approach 2: Exclude the ADS from the definition of driver. Make the ADSE responsible for the safe operation of the vehicle, including compliance with dynamic driving task obligations when the ADS is engaged.	58
5.6.3 Approach 3: Create a new Act for automated vehicles that establishes the dynamic driving task obligations. Make the ADSE responsible for non-compliance with those obligations by the ADS when it is engaged	59
5.6.4 Conclusion	59
5.7 Approach to analysis of legislation referring to driving	60
6 New obligations and duties for people and entities other than the ADSE	61
6.1 Purpose	61
6.2 Responsibility for non-dynamic driving tasks that cannot be performed by an ADS	61
6.2.1 Conclusion	64
6.3 New duties for maintenance and software updates	64
6.4 New duties to ensure readiness to drive and take back control	65
6.4.1 Readiness to drive in a vehicle with conditional automation	65
6.4.2 Conclusion	67
6.4.3 Readiness to drive in vehicles with high automation that allow manual driving	68
6.4.4 Conclusion	69
6.5 Duties of a driver—fatigue	69
6.6 Duties of a driver—alcohol and drugs	69
6.6.1 Conclusion	70
7 ADSE sanctions and penalties	72
7.1 Purpose	72

7.2 Linkages with the NTC reform to develop a safety assurance system	72
7.3 Many existing road traffic offences could apply to the ADSE	73
7.4 Appropriate and effective ADSE penalties for road traffic breaches	73
7.5 How ADSE penalties for road traffic breaches could be implemented	74
7.6 Apply corporate multipliers to existing offences	74
7.7 Regulate the ADSE as part of the safety assurance system	75
7.8 Conclusion	77
Glossary	78
References	80

List of tables

Table 1.	Non-dynamic driving tasks an ADS may not be able to perform	62
-----------------	--	-----------

List of figures

Figure 1.	Driving at different levels of automation over the course of a journey	10
Figure 2.	Creating an end-to-end post-trial regulatory system	12
Figure 3.	Interdependencies between safety assurance system and driving laws	14
Figure 4.	Giving a hand signal when stopping	26

Executive summary

The purpose of this paper is to outline legislative reform options to clarify how current driver and driving laws apply to automated vehicles, and to establish legal obligations for automated driving system entities (ADSEs). We are seeking feedback on whether current laws should be amended in order to develop recommendations for transport ministers to consider at their May 2018 Transport and Infrastructure Council meeting.

Context

In November 2016 the Transport and Infrastructure Council directed the National Transport Commission (NTC) to develop legislative reform options to clarify the application of current driver and driving laws to automated vehicles, and to establish legal obligations for ADSEs.

The Australian community cannot gain the benefits of automated vehicles, including safety, productivity, environmental, and mobility benefits, unless legislative barriers in transport legislation to the operation of automated vehicles are removed. But these legislative barriers should not be removed without ensuring that the intent of the laws—to ensure the safe operation of vehicles on Australian roads—is maintained.

Vehicles that do not require human input for part or all of a trip are already being trialled on Australian roads and are likely to become commercially available from around 2020. Our aim is to ensure relevant driver laws apply to automated vehicles when the automated driving system (ADS), rather than a human driver, is operating the vehicle and that there is a legal entity that can be held responsible for the operation of the ADS.

Any amendments to legislation required to achieve this will need to be in place in time for the commercial deployment of vehicles with high or full automation functions. These amendments should also be implemented in parallel with the reforms to establish a safety assurance system, the purpose of which is to ensure automated vehicles are safe to use on our roads.

We are seeking submissions on this paper by **Friday 24 November 2017**.

What are the problems?

Chapter 1 sets out the following problems that the ‘changing driving laws to support automated vehicles’ reform needs to address:

1. Current driving laws and offences assume a human driver
2. An ADS is not a person and cannot be legally responsible for its actions
3. Current law does not provide for a legal entity, which we describe as an automated driving system entity (ADSE), to be held responsible for the actions of the ADS
4. Some legislative duties and obligations given to drivers could not be controlled by the ADSE if an ADS is the driver
5. Safety duties may need to be carried out by someone else if the driver is an ADS
6. ‘Control’ and ‘proper control’ of a vehicle are not defined if an ADS is driving
7. There are no legal obligations on a human who may be required to take over the driving task (fallback-ready user) to ensure he or she is alert and ready to do so.
8. Current compliance and enforcement measures may not be suitable to ensure the safe operation of an ADS.

Chapter 2 presents some questions to guide submissions.

Chapter 3 provides an overview of current driving law and how it may apply to automated vehicles. It acknowledges that current legislative definitions of ‘a driver’ do not cover an ADS ‘driver’. There is an underlying assumption that a driver is human.

Chapter 3 also identifies some of the parties who have existing duties under driving laws and explains their obligations.

Chapter 4 looks at how automated vehicles are legally recognised internationally. The Vienna Convention on Road Traffic has been amended to provide increased recognition of a vehicle that has an ADS. International jurisdictions have not adopted a uniform approach to how an ADS is recognised in domestic law.

Potential reforms to support automated vehicles

Chapter 5 provides in depth analysis of the need to legally recognise an ADS in Australia. It explains that an ADS is a system—not a person—so it cannot be held responsible for its actions. An entity needs to be responsible for the actions of an ADS to ensure they can operate safely.

The NTC proposes that an ADSE should be identified through the NTC’s safety assurance system for automated vehicles reform. The ADSE should be responsible for the actions of an ADS when it, rather than a human, is driving a vehicle. Legislative amendments will be required to allow an ADS to legally drive vehicles with conditional, high and full automation on Australian roads.

Chapter 5 also considers the distinction between the dynamic driving task and other obligations assigned to drivers. It proposes that an ADSE should only be responsible for actions of the ADS relating to the dynamic driving task.

The chapter proposes three possible approaches for legislative changes to recognise an engaged ADS as controlling or driving the vehicle and the ADSE as the legal entity responsible for its actions.

Chapter 6 discusses obligations on drivers that are not directly related to the dynamic driving task and can only be performed by humans. An ADS cannot perform these tasks, but someone must be responsible for them. Based on this analysis, the chapter considers new obligations and duties for people and entities other than the ADSE.

The NTC proposes that legislation be reviewed to assess if other driver obligations, unrelated to the dynamic driving task, especially those relating to road safety, would be covered if there is an ADS driver. If gaps are identified, these obligations should be reassigned to an entity that is connected with the task or vehicle and capable of carrying it out.

Chapter 6 also discusses the creation of new duties to ensure readiness-to-drive for a fallback-ready user.

It also considers whether drug and alcohol offences relating to starting a vehicle should apply to someone starting an automated vehicle.

Chapter 7 considers how responsibilities can be enforced. It concludes that breaches of road traffic laws by an automated vehicle should be taken as evidence of a broader failure to provide safe automated vehicles. It recommends that breaches of road traffic laws should be considered a potential breach of the primary safety duty or other specific offences included in the safety assurance system, which the NTC is developing.

Next steps

The NTC is inviting submissions on this paper by **24 November 2017**. We are seeking responses to the following questions:

1. Do you agree that reform to existing driving laws is required to:
 - (i) allow an ADS to perform the dynamic driving task when it is engaged?
 - (ii) ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged?
2. Do you agree that if the ADS is engaged, legislation should provide that the ADS is in control of the vehicle at conditional, high and full levels of automation? If not, do you think a human in the vehicle should be considered in control of the vehicle, and at what levels?
3. Do you agree that the proper control offence should not apply to the ADS, provided there are appropriate ways to hold the ADSE to account for the proper operation of its ADS?
4. Do you agree that if a safety assurance system is approved that requires an ADSE to identify itself, the identified ADSE should be responsible for the actions of the vehicle while the ADS is engaged? If the ADSE is not identified through the safety assurance system, how should the responsible entity be identified in legislation?
5. Do you agree that when the ADS is engaged:
 - (i) an ADSE should be responsible for compliance with dynamic driving task obligations?
 - (ii) obligations that are part of the dynamic driving task that the ADS cannot perform should be modified where appropriate, or the ADS exempted from the obligation?
 - (iii) an ADSE should not be responsible for existing driver duties and obligations that are not part of the dynamic driving task?
6. How should legislation recognise an ADS and an ADSE? In assessing the options in section 5.6, please consider the following factors:
 - (i) legislative efficiency
 - (ii) timeliness
 - (iii) impact on compliance and enforcement
 - (iv) impacts on other schemes such as compulsory third-party insurance

Are there other options that you prefer? Please provide details of how it would work.
7. Do you agree that driver obligations need to be assessed to ensure there are no obligations that cannot be fulfilled if an ADS is in control? If gaps are identified, should other appropriate entities—such as fallback-ready users, other vehicle occupants, registered operators and operators—be made responsible for the obligation?
8. Do you agree that obligations on a fallback-ready user of a vehicle with conditional automation, who will be required to take over driving if requested by the ADS should include:
 - (i) sufficient vigilance to acknowledge warnings and regain control of the vehicle without undue delay, when required?

- (ii) holding the appropriate licence for the vehicle type?
- (iii) complying with drug, alcohol and fatigue driver obligations?

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

9. Do you think it is necessary to impose readiness-to-drive obligations on humans who will take over driving when a vehicle with high automation that includes manual controls reaches the limit of its operational design domain?
10. Do you agree that no readiness-to-drive obligations should be placed on passengers in dedicated automated vehicles (designed to be 'driverless')?
11. Should exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting, or who is a passenger in, a dedicated automated vehicle?
12. Should exemptions from the drink- and drug- driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting a vehicle with high or full automation that includes manual controls?
13. How do you think road traffic penalties should apply to ADSEs?
14. Do you think obligations and penalties on ADSEs in the safety assurance system should complement, or be an alternative to, road traffic offences?

Written submissions and feedback from this consultation will be used to develop reform options for the Transport and Infrastructure Council meeting in May 2018.

1 Context

Key points

- The Transport and Infrastructure Council directed the National Transport Commission to develop legislative reform options to clarify the application of current driver and driving laws to automated vehicles, and to establish legal obligations for automated driving system entities.
- Our aim is to ensure relevant driving laws apply to automated vehicles when the automated driving system, rather than a human driver, is operating the vehicle and that there is a legal entity that can be held responsible for the operation of the automated driving system.
- Any amendments to legislation required to achieve this will need to be in place in time for the commercial deployment of vehicles with high or full automated functions. These amendments should also be implemented in parallel with the reforms to establish a safety assurance system, the purpose of which is to ensure automated vehicles are safe to use on our roads.

The National Transport Commission (NTC) is seeking your feedback on options for legislative amendments to ensure relevant driving laws apply to an automated driving system (ADS), and to establish legal obligations for the automated driving system entity (ADSE). These terms are explained below.

Current driving laws are based on vehicles having a human driver. This includes the model Australian Road Rules, road traffic and safety laws, passenger transport laws, the Heavy Vehicle National Law, compulsory third-party insurance schemes, tolling legislation and some criminal offences.

1.1 About the NTC

The NTC is an independent advisory body. We submit national land transport reform proposals to the Transport and Infrastructure Council. The council comprises Commonwealth, state and territory ministers who are responsible for transport and infrastructure.

The NTC contributes to achieving national reform priorities that are agreed by the council. Our reforms are objectively assessed against the following policy objectives:

- improve transport productivity
- improve environmental outcomes
- support a safe transport system
- improve regulatory efficiency.

One of our key focus areas is removing regulatory barriers to innovative transport technologies that have significant safety, productivity and environmental benefits.

1.2 Objectives

The objective of the ‘changing driving laws to support automated vehicles’ reform is to develop options for legislative reform to ensure driving laws provide for automated vehicles to operate both legally and safely on Australian roads.

Current Australian transport legislation assumes there is a human driver. It does not provide for a situation in which an ADS, rather than a human driver, is in control of the vehicle.

The Australian community cannot gain the benefits of automated vehicles, including safety, productivity, environmental, and mobility benefits, unless barriers in transport legislation to the operation of automated vehicles are removed. But these legislative barriers should not be removed without ensuring the intent of the laws—to ensure the safe operation of vehicles on Australian roads—is maintained.

In November 2016, the Transport and Infrastructure Council approved the below NTC recommendation:

Recommendation 6: *That the NTC develops legislative reform options to clarify the application of current driver and driving laws to automated vehicles, and to establish legal obligations for automated driving system entities.*

Timeframe: Early 2017 to May 2018.

We have developed this discussion paper to assist readers to understand the issues. Its aim is to help reach an agreed position about how to ensure relevant driving laws apply when an ADS is operating a vehicle and what the legal obligations for ADSEs should be. It is the first step in completing recommendation 6 and establishing legal obligations for ADSEs.

This paper:

- explains the application of current driver and driving laws to automated vehicles—**chapter 3**
- outlines international approaches to ADSs and driving laws—**chapter 4**
- outlines options for legislative reform to allow an ADS to perform the driving task when it is engaged and ensure a legal entity (ADSE) is responsible for the actions of the vehicle—**chapter 5**
- outlines duties placed on drivers that are not part of the driving task and for which an ADSE should not be responsible. It draws a distinction between things that are within the control of the ADSE (the dynamic driving task) and other duties—**chapter 5**
- analyses whether the safe operation of automated vehicles on the road requires new obligations and duties to be placed on various parties under driving laws. This includes consideration of duties to ensure a human who may be required to take over the driving task is ready for that task—**chapter 6**
- analyses the sanctions and penalties that may be suitable to ensure an ADSE provides for the safe operation of automated vehicles on Australian roads—**chapter 7**

1.3 Benefits of automated vehicles

The impetus to ensure automated vehicles can operate legally on roads is based on the recognition that they could fundamentally change transport and society by improving road safety, mobility and freight productivity and by reducing road congestion.

Automated vehicles have the potential to save lives by removing, or at least reducing, the risk of human error. Up to 90 per cent of crashes in Australia are the result of human error, such as distraction or fatigue (QBE, 2017). Likewise, the United States (US) Department of Transportation attributes the cause of 94 per cent of all crashes to 'human choice' (United States Department of Transportation, 2017). In addition to the projected safety benefits, automated vehicles also have the potential to provide personal mobility options to communities that currently do not have these options.

On 11 September 2017, the House of Representatives Standing Committee on Industry, Innovation, Science and Resources Committee released the inquiry report *Social issues relating to land-based automated vehicles in Australia*. The report notes 'the range of benefits automated vehicles are likely to bring'. Evidence given to the Committee focused on the benefits of improved safety, increased access and mobility, passengers' ability to use their time in a more productive way, reduction of congestion and improved urban planning and use of space (Parliament of the Commonwealth of Australia: House of Representatives Standing Committee on Industry, Innovation, Science and Resources, 2017, pp. 11–14, 23–27, 56.).

1.4 Key terms

What do we mean by automated vehicle?

The term 'automated vehicle' covers a variety of levels of automation. The table below describes levels of driving automation. These definitions are based on Society of Automotive Engineers (SAE) International Standard J3016, *Taxonomy and definitions for terms related to driving automation systems for on-road vehicles*. These SAE levels are currently being used to develop legislative and regulatory responses to automated vehicles in the US and the European Union. Throughout this paper, unless otherwise specified, when we use the terms 'partial', 'conditional', 'high' or 'full automation' we are using these terms in the same way they are used in the SAE International Standard J3016.

Partial automation means a driving automation system may take control of steering, acceleration and braking in defined circumstances. It cannot undertake the entire dynamic driving task. The human driver must perform the remainder of the dynamic driving task, supervise the automated system and intervene if necessary to maintain the safe operation of the vehicle.

Conditional automation means the ADS undertakes the entire dynamic driving task for sustained periods in defined circumstances. The human driver does not have to monitor the driving environment or the ADS but must be receptive to ADS requests to intervene and any system failures.

High automation means that the ADS undertakes the entire dynamic driving task for sustained periods in some situations, or all of the time in defined places. When the system is driving the vehicle a human driver is not required to monitor the driving environment and the driving task or to intervene and the ADS can bring the vehicle to a safe stop unassisted.

Dedicated automated vehicle means a vehicle that has no manual controls enabling it to be driven by a human driver. In this type of vehicle, the dynamic driving task is always performed by the ADS. An example is low speed driverless passenger shuttles such as EasyMile, being trialled in Darwin (this term is not derived from the SAE International Standard J3016).

Full automation means all aspects of the dynamic driving task and monitoring of the driving environment are undertaken by the ADS. The ADS can operate on all roads at all times. No human driver is required.

Automated driving technology has created many new terms that are not always used consistently. The box below provides an explanation of key terms and the way the NTC uses these terms in this paper. These are derived from the SAE International Standard J3016.

Automated driving system (ADS) means the hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis. It is a type of driving automation system used in vehicles operating with conditional, high and full automation mode.

Automated driving system entity (ADSE) means the legal entity responsible for the ADS. This could be the manufacturer, registered operator of the vehicle or another entity (this term is not derived from the SAE International Standard J3016).

Dynamic driving task means the operational and tactical functions required to operate a vehicle in on-road traffic (a more expansive definition is provided in the glossary).

Dynamic driving task fallback means the response by the fallback-ready user or an ADS to either perform the dynamic driving task or achieve a minimal risk condition after a dynamic driving task performance-relevant system failure or when the vehicle exits the operational design domain. In a vehicle with conditional automation the fallback-ready user performs the dynamic driving task fallback. In vehicles with high or full automation the ADS performs the dynamic driving task fallback.

Fallback-ready user means a human in a vehicle with conditional automation who is able to operate the vehicle and who is receptive to requests from the ADS to intervene and is receptive to evident dynamic driving task performance-relevant system failures. The fallback-ready user is expected to respond by taking control of the vehicle.

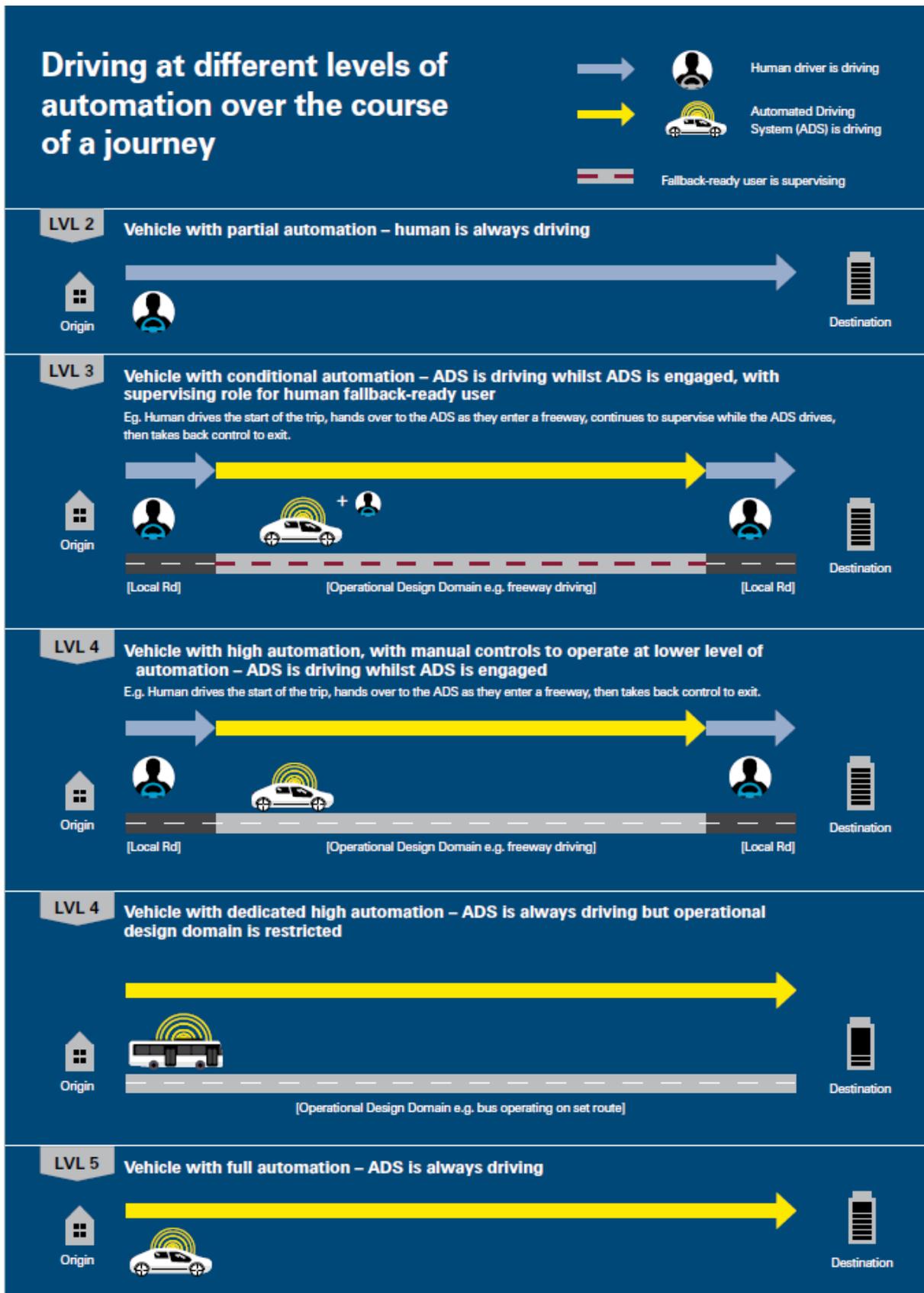
Minimal risk condition means a condition to which a user or an ADS may bring a vehicle to reduce the risk of a crash when the ADS reaches the limit of its operational design domain, or has requested the fallback-ready user to take control or there is a dynamic driving task performance-relevant system failure.

Operational design domain means the specific conditions under which an automated driving system is designed to function (for example, geographic, roadway, environmental, traffic, speed, or temporal limitations), including, but not limited to, driving modes (for example, on fully access-controlled freeways).

Safety assurance system means a regulatory mechanism to provide oversight of the safety performance of an automated vehicle to assure it can operate safely on the network (this term is not derived from the SAE International Standard J3016).

A vehicle may move between levels of automation or be driven by a human driver in some situations. For example, a vehicle with conditional automation is driven by the ADS when it is engaged but may request the fallback-ready user to take over driving. At this point control of the driving task transitions from the ADS to the human. Any changes to driving laws need to ensure they account for the possibility that the vehicle will shift between levels of automation. Figure 1 illustrates the ways in which control of the dynamic driving task may transition between an ADS and a human driver during a journey.

Figure 1. Driving at different levels of automation over the course of a journey



1.5 Background

1.5.1 Broader national reform program for automated vehicles

The ‘changing driving laws to support automated vehicles’ reform will provide legislative reform options to the Transport and Infrastructure Council. It is part of a broader national reform program for the NTC, which aims to put end-to-end regulation in place by 2020 to support the safe, commercial deployment and operation of automated vehicles at all levels of automation. Figure 2 illustrates this.

Since late 2015, the NTC has worked with Commonwealth and state and territory governments, Austroads and industry and consumer groups to identify and address regulatory barriers and policy issues associated with increasingly automated vehicles.

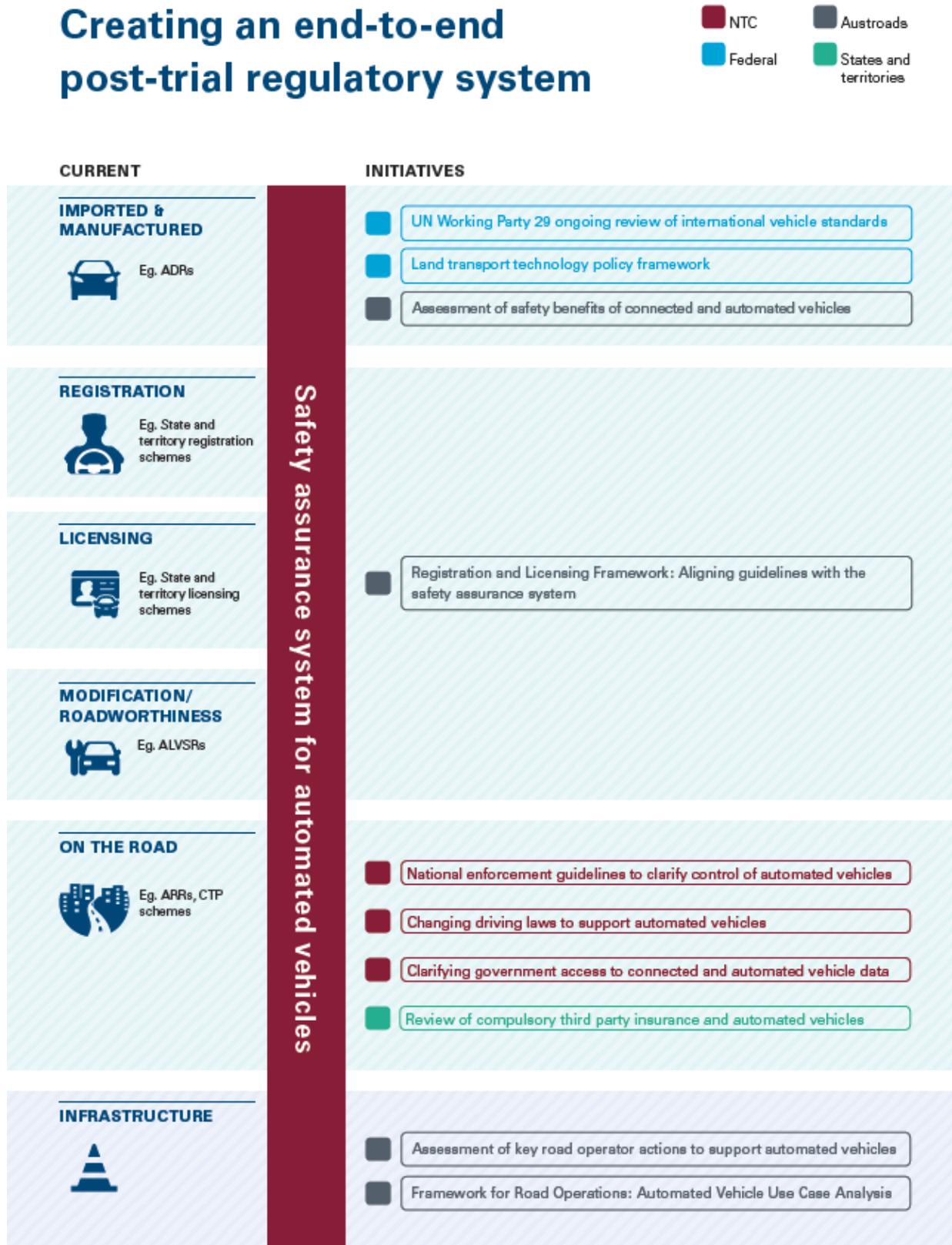
Our initial work identified more than 700 provisions in transport-related Acts and regulations that could be a barrier to road vehicles with high or full automation.

In November 2016, the council approved the NTC policy paper, *Regulatory Reforms for Automated Road Vehicles*. It approved our proposals for the timing and sequence of reform.

Other NTC projects to prepare Australia for the safe and routine commercial use of automated vehicles are:

- **Automated vehicle trials:** a project to develop national guidelines governing conditions for trials of automated vehicles. We delivered this project in May 2017.
- **Clarifying control of automated vehicles:** a project to develop national enforcement guidelines that clarify the application of current law on control and proper control to levels of driving automation available at the current time. We will submit proposed national enforcement guidelines to the council in November 2017.
- **Safety assurance system for automated vehicles:** a project to develop a safety assurance system to ensure the safe operation of automated vehicles. We will submit the proposed high-level design of a safety assurance system to the council in November 2017.
- **Compulsory third-party insurance review:** we are supporting states and territories to review compulsory third-party and national injury insurance schemes to identify any eligibility barriers for occupants of an automated vehicle, or those involved in a crash with an automated vehicle. We will report progress to the council in May 2018.
- **Clarifying regulatory access to data:** a project to scope the circumstances in which government agencies should be able to access and use data generated by automated vehicles. We will submit reform options to the council in November 2018.

Figure 2. Creating an end-to-end post-trial regulatory system



1.5.2 Project interdependencies

Safety assurance system for automated vehicles

The ‘changing driving laws to support automated vehicles’ project is closely linked to the ‘safety assurance system for automated vehicles’ project. Both projects aim to ensure automated vehicles can operate safely on Australian roads and that a legal entity can be held responsible for the safe operation of automated vehicles.

The NTC will provide recommendations to the council in November 2017 on the best regulatory option for the safety assurance of automated vehicle functions. The options identified in the June 2017 NTC discussion paper *Regulatory Options to Assure Automated Vehicle Safety in Australia*, published in June 2017 (SAS Discussion Paper) were:¹

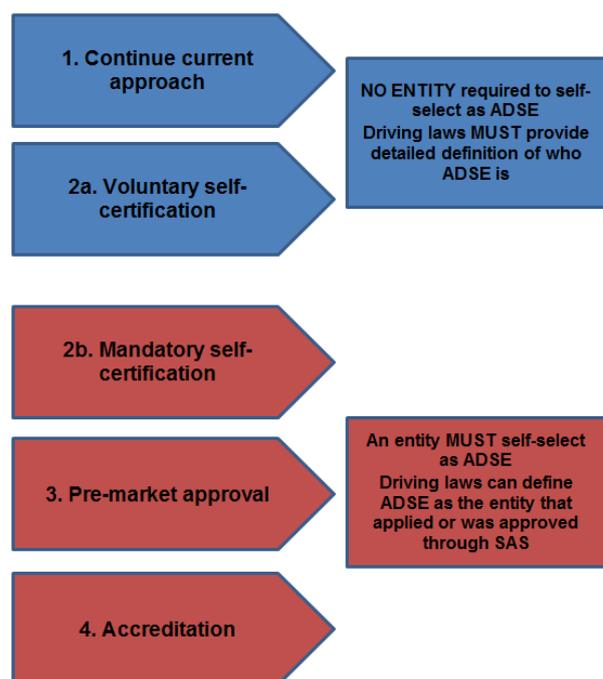
- 1. Continue current approach**—no additional regulatory oversight, with an emphasis on existing safeguards in Australian Consumer Law and road transport laws.
- 2. Self-certification**
 - 2a. Voluntary self-certification**—manufacturers voluntarily make a statement of compliance against high-level safety criteria developed by government. This could be supported by a primary safety duty to provide safe automated vehicles.
 - 2b. Mandatory self-certification**—manufacturers must make a statement of compliance against high-level safety criteria developed by government. A government agency approves the ADS based on assessment of the process the applicant has undertaken to address the safety criteria. This could be supported by a primary safety duty to provide safe automated vehicles.
- 3. Pre-market approval**—ADSs are certified by a government agency as meeting minimum prescribed technical standards prior to market entry.
- 4. Accreditation**—an accreditation agency accredits ADSEs. The accredited party demonstrates it has identified and managed safety risks to a legal standard of care.

Submissions to the SAS Discussion Paper generally supported an approach based on mandatory self-certification (option 2b), transitioning to a more mature regulatory model (such as pre-market approval) as international standards are developed.

The option that is endorsed by council affects who can be identified as an ADSE in driving laws and how much detail is required in the driving laws about who an ADSE is. Figure 3 illustrates this.

¹ To enhance clarity in this discussion paper, a distinction has been made in the self-certification option between voluntary self-certification (option 2a) and mandatory self-certification (option 2b). The June 2017 SAS discussion paper did not include this distinction.

Figure 3. Interdependencies between safety assurance system and driving laws



SAS = safety assurance system

Who is the ADSE?

Options 1 and 2a for the safety assurance system would not require any entity to self-select as the ADSE. This means that driving laws would need to clearly define who the ADSE is. For example, the ADSE might be defined as the manufacturer or supplier of the vehicle. In contrast, options 2b–4 create a regulatory process that requires someone or an organisation to self-select as an ADSE before the vehicle operates on Australian roads. If any of options 2b–4 were selected, the reforms to the driving laws would not need to provide detailed definitions about who the ADSE is. Instead, they could simply define the ADSE as the entity whose ADS was approved or who was accredited through the relevant safety assurance system process.

Feedback loop

Another important link between the safety assurance system and driving laws is that there needs to be a sufficient feedback loop. To ensure the safe operation of automated vehicles on roads, information about breaches of road rules and other traffic laws by an ADS needs to be provided to the national entity that is responsible for the safety assurance system. This might trigger a requirement to reassess the safety of the automated vehicle.

The Transport and Infrastructure Senior Officials' Committee (TISOC) provides the council with advice and assistance. At its 22 September 2017 meeting TISOC endorsed mandatory self-certification as a transitional arrangement until United Nations standards for ADSs are developed and integrated into Australian Design Rules. The NTC will be recommending this option to the council but notes that the council may prefer another option. This paper has been developed on the assumption that an ADSE will be identified through the safety assurance system (options 2b–4).

Compulsory third-party insurance review

The NTC is supporting states and territories to review compulsory third-party and national injury insurance schemes to identify any eligibility barriers for occupants of an automated vehicle, or those involved in a crash with an automated vehicle. The NTC will report progress to the council in May 2018.

Following this review, states and territories will amend their compulsory third party legislation as necessary.

The compulsory third-party insurance legislation refers to driving. Definitions of driver and driving should be consistent across legislation unless there is a clear reason to provide a different definition for a particular purpose. Ideally, any changes to driving laws to expand the definition to include an ADS and recognise an ADSE as legally responsible should also be applicable to the compulsory third-party and national insurance legislation.

Clarifying control of automated vehicles

The NTC is also developing national enforcement guidelines that clarify regulatory concepts of control and proper control for different levels of driving automation.

In April 2017, the NTC published its Discussion Paper, *Clarifying Control of Automated Vehicles* and received 29 submissions. We are seeking approval from transport ministers for the draft guidelines at their November 2017 meeting.

The Guidelines seek to ensure that the existing Australian Road Rules are applied consistently to automated vehicles today. The changing driving laws reform is looking ahead at how laws should change to support automated vehicles, in conjunction with the work on safety assurance for automated vehicles. This means that the changing driving laws reform will examine some of the same issues as the Control Discussion Paper to determine how the Australian Road Rules may need to change in the medium to long term.

1.6 What are the problems?

There are eight problems that have been identified to be addressed by this reform. They are set out below.

1.6.1 Current driving laws and offences assume a human driver

Australian transport law assumes there is a human driver. It does not envisage a situation where an ADS, rather than a human driver, is in control of the dynamic driving task. Obligations relating to driving and road safety through compliance with traffic laws are placed on a human driver.

The introduction of automated vehicles would mean the assumption that there is a human driving the vehicle is no longer valid. An automated vehicle might be entirely driven by an ADS with no input from a human driver for parts or all of the trip.

The underlying assumption that there is a human driver gives rise to a number of related issues that must be considered if legislative change is made to allow an ADS to drive a vehicle. These are summarised below.

Chapter 3 discusses the assumption that a driver is human driver at 3.3.1.

1.6.2 An ADS is not a person and cannot be legally responsible for its actions

To gain the safety, productivity, environmental and mobility benefits of automated vehicles legal reform should ensure it is legal for an ADS to drive a vehicle. However, an ADS is a system—not a person—so it cannot be given legal responsibility for compliance with driving laws.

Chapter 3 discusses the fact that an ADS is not a person and cannot be legally responsible for compliance with driving laws at 3.3.1 and 3.3.3.

1.6.3 Current law does not provide for a legal entity (the ADSE) to be held responsible for the actions of the ADS

To ensure the safety of the Australian public there must be someone legally responsible for vehicles at all times. Without this certainty, the public cannot have faith that they are safe on roads where automated vehicles are operating. Equally, ADSEs need certainty about the situations in which they are legally responsible for the movement and actions of the vehicle. A lack of clarity about legal responsibility would be a disincentive for manufacturers to enter the Australian market.

Clarifying if and when an ADSE has legal responsibility for the actions of an ADS is crucial to providing enforcement officers, industry and consumers with confidence that vehicles with conditional, high or full automation can legally and safely operate in Australia. This requires a clear and nationally consistent approach.

Chapter 5 considers who the legal entity responsible for an ADS should be (ADSE), how to identify the ADSE, and what the ADSE should be responsible for at 5.4 and 5.5.

1.6.4 Some legislative duties and obligations given to drivers could not be controlled by the ADSE if an ADS is the driver

An ADSE should only be responsible for things that it can control, which are those things that can be included in the design and programming of the ADS. The ADSE should not be responsible for duties the ADS is not designed for or capable of carrying out.

An ADS is designed to perform the dynamic driving task within the specific conditions under which it is designed to function (its operational design domain). In principle, an ADSE should only be responsible for the actions of the ADS directly related to the dynamic driving task.

The dynamic driving task involves safely interacting with other vehicles on the road in compliance with road rules, including obeying traffic lights, signs and signals, giving way, turning, speed limits, keeping left and overtaking. The safety assurance system should ensure an ADS can comply with these road rules.

Legislation places duties and obligations on human drivers that do not relate to the dynamic driving task and cannot be included in the design and programming of the ADS. Many of these relate to safety. They assume that the driver is human. Examples include:

- requirements that involve a mental element such as knowledge
- requirements that drivers carry particular documentation
- requirements for a driver to check something (for example, that vehicles transporting dangerous goods are equipped with fire extinguishers that are correctly stowed)

- various duties for drivers of public passenger transport that require the driver to assess a situation or take a particular action (such as intervening if a passenger is engaging in dangerous conduct)
- payment of parking fees and tolls.²

Chapter 5 considers the distinction between the dynamic driving task and other obligations assigned to drivers. It suggests that an ADSE should only be responsible for actions of the ADS relating to the dynamic driving task at 5.5.

1.6.5 Safety duties may need to be carried out by someone else if the driver is an ADS and legislation would need to clarify who has the safety duty

Many of the duties assigned to a driver, that are not related to the dynamic driving task, are crucial to ensuring vehicles operate safely on roads.

There is a need to ensure someone is performing safety tasks assigned to a driver if an ADS cannot perform them. Any legislative change to recognise an ADS will need to make sure there are no safety gaps. In some cases, people other than a driver already have overlapping responsibility for safety tasks so there is no safety gap if an ADS is driving. In other cases there may be a need to assign the driver safety duty to someone else associated with the task or the vehicle.

Chapter 6 considers how to ensure safety gaps are not created because an ADS is driving the car and who may take on these duties at 6.2.

1.6.6 Control and proper control of a vehicle if an ADS is driving are not defined

State and territory traffic laws generally define 'drive' in relation to control of the steering, and movement or propulsion of the vehicle. If the definition of driver is amended to include the ADS of a vehicle with conditional, high or full automation, the ADS would be considered to be in control when it is engaged because it performs the entire dynamic driving task.

The Australian Road Rules require a driver to have proper control of the vehicle he or she is driving. There is no definition of proper control, although it is interpreted for enforcement purposes as being seated in the driver's seat with one hand on the steering wheel. Proper control is designed to deal with human failings such as distraction and inattention and could be considered an irrelevant concept for a machine such as an ADS. An ADS is either operating correctly and in compliance with road traffic laws, or it is not.

Chapter 5 discusses control and possible changes to the proper control rule for an ADS at 5.3.5.

1.6.7 Legal obligations to ensure readiness to drive

Vehicles that operate at conditional levels of automation need a human in the vehicle who can take over the driving task (fallback-ready user). The fallback-ready user must take

² It might be possible for an ADS to be programmed not to go on toll roads. So it is possible that this is within the control of the ADSE. However, generally, if the toll isn't paid, the registered operator gets the penalty. It would seem unfair to allow the registered operator to pass on the responsibility for his/her vehicle to the ADSE.

over driving when the ADS reaches the limit of its operational design domain, if the ADS requests them to, or if there is a dynamic driving task performance relevant system failure.

There are currently no legal obligations on a fallback-ready user because the concept of a fallback-ready user does not exist in legislation. There may be a need to recognise a fallback-ready user in legislation and introduce new duties to ensure they are alert and ready to take over driving if required.

Vehicles with high automation do not require a fallback-ready user. In a vehicle with high automation the ADS performs the dynamic driving task fallback. If it is going outside its operational design domain and the human does not respond to a request to take over, the ADS would bring the vehicle to a safe stop. If the human chooses to take over the driving task in a vehicle with high automation, the driver obligations will apply and he or she will need to be fit and licensed to drive. However, there may be road safety risks such as congestion if a vehicle with high automation stops and a human driver does not take over the driving task because they are asleep or intoxicated.

Chapter 6 discusses the creation of new duties to ensure readiness to drive for a fallback-ready user and whether there should be duties on someone who may take over the driving task at 6.4.

1.6.8 Compliance and enforcement

Current compliance and enforcement measures may not be suitable to ensure the safe operation of an ADS.

Any changes to recognise an ADSE as legally responsible for an ADS need to include appropriate penalties and compliance measures if obligations are breached. There may be a need to introduce new types of offences and penalties to achieve this.

Chapter 7 discusses compliance and enforcement measures for an ADSE.

1.7 Scope

The scope for this project is to identify high level approaches and options for legislative reform to:

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

It is likely that further work will be required by the NTC to make legislative amendments to the model Australian Road Rules, Heavy Vehicle National Law and dangerous goods legislation. It is also likely that states, territories and the Commonwealth will need to amend their road and traffic law and potentially a range of other legislation, including compulsory third-party insurance and criminal legislation.

The following areas are **outside of scope**:

1. **Further detailed analysis of state and territory legislation that may be impacted by changes to the definition of drive and driver and recognition of ADSEs.** With input from states, territories and the commonwealth, the NTC

conducted a preliminary audit in 2016 to identify provisions that may create barriers for vehicles with high or full automation. This was included as an annex to the NTC discussion paper *Regulatory Options for Automated Vehicles*.³

2. **Detailed analysis of how changes to the definition of drive and driver and recognition of ADSEs would affect existing state and territory compulsory third-party and national injury insurance schemes.** As outlined above, in 'project interdependencies' at section 1.5.2 the NTC is supporting the states and territories to review compulsory third-party and national injury insurance schemes. We recognise the need to work closely with states and territories to aim for a consistent approach to the definition of 'driving' in driving legislation and compulsory third-party insurance legislation.
3. **Detailed consideration of changes to the definition of drive and driver and recognition of ADSEs in non-transport law, such as criminal law.** Amendments may be required to a range of laws that refer to 'driver' and 'driving', including laws outside transport portfolios. To effectively address legislative barriers, changes will need to be made simultaneously. This will include any changes to legislation outside the transport portfolio such as criminal law and compulsory third-party insurance.

The NTC recognises the desirability of a consistent approach in transport legislation as well as legislation outside the transport portfolio such as criminal law and compulsory third-party insurance. For this reason, the NTC is seeking whole-of-government responses to the discussion paper from each Commonwealth, state and territory government, rather than agency-based responses.

³ Available at <[http://www.ntc.gov.au/Media/Reports/\(264DF9EA-6247-42C9-8D07-F39E76E95258\).pdf](http://www.ntc.gov.au/Media/Reports/(264DF9EA-6247-42C9-8D07-F39E76E95258).pdf)>.

2 Consultation

Key points

- Any individual or organisation can make a submission to the NTC.
- We are seeking submissions on the paper by Friday 24 November 2017.

2.1 Consultation

2.1.1 Questions to consider

1. Do you agree that reform to existing driving laws is required to:
 - (i) allow an ADS to perform the dynamic driving task when it is engaged?
 - (ii) ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged?
2. Do you agree that if the ADS is engaged, legislation should provide that the ADS is in control of the vehicle at conditional, high and full levels of automation? If not, do you think a human in the vehicle should be considered in control of the vehicle, and at what levels?
3. Do you agree that the proper control offence should not apply to the ADS, provided there are appropriate ways to hold the ADSE to account for the proper operation of its ADS?
4. Do you agree that if a safety assurance system is approved that requires an ADSE to identify itself, the identified ADSE should be responsible for the actions of the vehicle while the ADS is engaged? If the ADSE is not identified through the safety assurance system, how should the responsible entity be identified in legislation?
5. Do you agree that when the ADS is engaged:
 - (i) an ADSE should be responsible for compliance with dynamic driving task obligations?
 - (ii) obligations that are part of the dynamic driving task that the ADS cannot perform should be modified where appropriate, or the ADS exempted from the obligation?
 - (iii) an ADSE should not be responsible for existing driver duties and obligations that are not part of the dynamic driving task?
6. How should legislation recognise an ADS and an ADSE? In assessing the options at section 5.6, please consider the following factors:
 - (i) legislative efficiency
 - (ii) timeliness
 - (iii) impact on compliance and enforcement
 - (iv) impacts on other schemes such as compulsory third-party insuranceAre there other options that you prefer? Please provide details of how it would work.

7. Do you agree that driver obligations need to be assessed to ensure there are no obligations that cannot be fulfilled if an ADS is in control? If gaps are identified, should other appropriate entities—such as fallback-ready users, other vehicle occupants, registered operators and operators—be made responsible for the obligation?
8. Do you agree that obligations on a fallback-ready user of a vehicle with conditional automation, who will be required to take over driving if requested by the ADS should include:
 - (i) sufficient vigilance to acknowledge warnings and regain control of the vehicle without undue delay, when required?
 - (ii) holding the appropriate licence for the vehicle type?
 - (iii) complying with drug, alcohol and fatigue driver obligations?

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

9. Do you think it is necessary to impose readiness-to-drive obligations on humans who will take over driving when a vehicle with high automation that includes manual controls reaches the limit of its operational design domain?
10. Do you agree that no readiness-to-drive obligations should be placed on passengers in dedicated automated vehicles (designed to be 'driverless')?
11. Should exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting, or who is a passenger in, a dedicated automated vehicle?
12. Should exemptions from the drink- and drug- driving offences concerning starting a vehicle and being in charge of a vehicle be provided to a person who is starting a vehicle with high or full automation that includes manual controls?
13. How do you think road traffic penalties should apply to ADSEs?
14. Do you think obligations and penalties on ADSEs in the safety assurance system should complement, or be an alternative to, road traffic offences?

2.2 How to submit

Any individual or organisation can make a submission to the NTC.

To make an online submission, please visit www.ntc.gov.au and select 'Submissions' from the top navigation menu.

Or, you can mail your comments to: Att: Changing driving laws to support automated vehicles, National Transport Commission, Level 3/600 Bourke Street, Melbourne VIC 3000.

Where possible, you should provide evidence, such as data and documents, to support your views.

Unless you clearly ask us not to, we will publish all submissions online. However, we will not publish submissions that contain defamatory or offensive content.

The *Freedom of Information Act 1982* (Cth) applies to the NTC.

3 Current driving law and its application to automated vehicles

Key points

- Current legislative definitions of ‘a driver’ do not cover an ADS ‘driver’. There is an underlying assumption that a driver is human.
- Driving laws give drivers a range of obligations, many of which are not directly related to the driving task.
- Driving laws give a range of people responsibilities for ensuring a motor vehicle drives safely on roads. These people include the driver and registered operator and people in the ‘chain of responsibility’ such as consignors, packers, loaders and prime contractors.

3.1 Purpose

The purpose of this chapter is to set out the current legal framework for driving and drivers. It:

- explains the application of current driver and driving laws to automated vehicles
- considers the obligations and duties of parties other than the driver to ensure a vehicle can drive safely on the roads.

The discussion of current driving law in this chapter provides the groundwork for chapter 5, which considers what legislative change may be required to provide for legal recognition of an ADS and an ADSE. The chapter clarifies that:

- the definition of driver or driving in a variety of legislation refers to a ‘person’ (noting that not all legislation provides a definition of ‘driver’)
- an ADS is a system, not a person. It is not covered by extended definitions of ‘person’ which recognise a body corporate. This means that an ADS is not covered by a range of legislation aimed at a ‘driver’.

The discussion in this chapter about obligations and duties of parties other than the driver to ensure a vehicle can drive safely also provides a basis for the discussion in chapter 6. Chapter 6 considers whether legislative change to recognise an ADS as being in control of a vehicle would create gaps because duties assigned to a driver cannot be performed by an ADS. We suggest that this may require existing driver duties to be reassigned to other people and entities. This chapter identifies parties already recognised in driving laws to whom duties could be assigned.

3.2 What laws are we talking about?

The ‘changing driving laws to support automated vehicles’ reform focuses on legislative change that may be required to:

- allow an ADS to perform the driving task when it is engaged

- clarify whether an ADS or human is in control of the vehicle when the ADS is engaged
- ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged.

Legislative change needs to take into consideration both the Australian context and international agreements.

3.2.1 International conventions

1949 Geneva Convention on Road Traffic

Australia is a contracting party to the 1949 Geneva Convention on Road Traffic (Geneva Convention).⁴

1968 Vienna Convention on Road Traffic

The 1968 Vienna Convention on Road Traffic (Vienna Convention) supplements previous road traffic conventions, including the Geneva Convention.⁵ Australia is not a contracting party to the Vienna Convention, but the Australian Road Rules are broadly consistent with it.

3.2.2 State and territory driving legislation

Each state and territory has legislation providing for:

- road rules
- registration of vehicles and licensing of drivers
- intoxication offences.

The road rules in each state and territory are based on the model Australian Road Rules. The purpose of the model Australian Road Rules is explained briefly below.

3.2.3 State and territory road rules based on model Australian Road Rules

Australia aims for a nationally consistent approach to the rules about driving. The model Australian Road Rules provide rules for 'road users' which includes drivers, riders, passengers and pedestrians.⁶

The model Australian Road Rules apply to vehicles and road users on roads and road-related areas.⁷ It is model law, which is maintained by the NTC. It has no legal effect. The object of this model law is to 'provide uniform rules across Australia for all road users and specify behaviour for all road users that supports the safe and efficient use of roads in Australia'.⁸

⁴ *Convention on Road Traffic*, opened for signature 19 September 1949, 125 UTS 3 (entered into force 26 March 1952) art 8.5 ('Geneva Convention').

⁵ *Convention on Road Traffic*, opened for signature 8 November 1968, 1042 UNTS 17 (entered into force 21 May 1977) art 8.5 ('Vienna Convention').

⁶ *Australian Road Rules* rule 14.

⁷ *Australian Road Rules* rule 11(1).

⁸ *Australian Road Rules* rule 3.

For the most part, each state and territory has incorporated the model Australian Road Rules into their own laws.⁹ However, not every provision has been copied exactly in each state and territory. Also, there are a number of provisions in the model Australian Road Rules that specifically leave certain matters to state and territory governments to determine.

The model Australian Road Rules do not provide all the rules that should be followed by road users. Other rules applying to road users and road safety are found in other laws. For example, other laws deal with drink-driving.

The focus of the analysis in this paper is on:

- transport legislation that has the purpose of regulating the dynamic driving task. The key way we consider this is through analysis of the model Australian Road Rules
- model or applied national transport legislation, which places non-dynamic driving duties on drivers that might not be covered if an ADS was ‘the driver’ (in particular safety duties). This includes the Heavy Vehicle National Law and dangerous goods legislation.

3.2.4 Other legislation

There is a wide range of non-transport legislation that refers to drive, driving and driver. Some of it is aimed at regulating driver conduct. For example, criminal legislation creates offences for matters such as culpable driving causing death, dangerous driving causing death or serious injury, or dangerous or negligent driving while pursued by police.¹⁰ Compulsory third party insurance legislation also refers to a ‘driver’ and ‘driving’.

Detailed consideration of changes to the definition of drive and driver and recognition of ADSEs in non-transport law, such as criminal law and compulsory third party insurance is outside of scope. However, the NTC recognises that amendments may be required to a range of laws that refer to driver and driving, including laws outside transport portfolios. We consider that it is desirable that a consistent approach to driver and driving is used unless there is a clear and appropriate reason not to. We aim to ensure the preferred option is broadly applicable to definitions of driver and driving in non-transport legislation.

3.3 Responsible parties under driving law and their obligations

Current driving laws give a range of people responsibilities for ensuring a motor vehicle drives safely on roads. A failure to comply with these responsibilities results in personal liability for these people through fines, demerit points, or in serious cases imprisonment. In some cases, such as under the Heavy Vehicle National Law there is corporate liability.¹¹

The people who may be directly responsible for a vehicle driving safely on the road include:

- the driver

⁹ *Road Transport (Safety and Traffic Management) Regulation 2000* (ACT) reg 6; *Traffic Regulations 1999* (NT) reg 71(1); *Road Rules 2014* (NSW); *Transport Operations (Road Use Management—Road Rules) Regulation 2009* (Qld); *Road Traffic Act 1961* (SA) s 80; *Road Rules 2009* (Tas); *Road Safety Road Rules 2009* (Vic); *Road Traffic Code 2000* (WA).

¹⁰ See, eg, *Crimes Act 1958* (Vic) ss 318–319AA.

¹¹ *Heavy Vehicle National Law Act 2012* (Qld) sch s 596 provides for higher maximum fines for a body corporate equal to five times the maximum fine for an individual.

- a supervising driver (who is supervising a learner driver)
- a registered owner, registered operator, or licence holder for the vehicle
- people in the ‘chain of responsibility’ such as consignors, packers, loaders and prime contractors.

Sometimes there are overlapping or shared duties. For example, the *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail* provides overlapping duties to a range of parties to ensure transport of dangerous goods is safe.¹²

Manufacturers of a motor vehicle also have duties through the Australian Consumer Law and the *Motor Vehicle Standards Act 1989* (Cth). However, they do not have any direct responsibility through driving laws for a vehicle driving safely on the road.

The below sections provide an overview of the range of people who have responsibility for the safe operation of a vehicle on the road and their obligations.

3.3.1 What is a driver?

As indicated above, a wide range of legislation uses the term ‘driver’. Some of it defines driver, some does not.

The model Australian Road Rules provide the following definition of a ‘driver’:

A driver is **the person** who is driving a vehicle (except a motor bike, bicycle, animal or animal-drawn vehicle).¹³

The Heavy Vehicle National Law also defines the driver of a vehicle as a person.¹⁴

As described above, state and territory road rules are based on the model Australian Road Rules. Where defined in road traffic and road safety laws, driver includes reference to ‘person’.¹⁵

The term ‘person’ is not defined in the model Australian Road Rules or the Heavy Vehicle National Law. The common understanding of ‘person’ is that it means a human. Expanded legal definitions of person in state and territory interpretation Acts include a body corporate. For example, the *Interpretation of Legislation Act 1984* (Vic) provides that person ‘includes a body politic or corporate as well as an individual’.¹⁶

Rules in the model Australian Road Rules such as those relating to hand signalling make it clear that there is an underlying assumption that a driver is human. These rules require that if there is a fault in the brake lights or right turning indicator **the driver** must use hand signals (see Figure 4).¹⁷ The presumption that a driver has hands highlights the underlying assumption that a driver is human.

¹² See, eg, *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail*, cl 3.1.1–3.1.6, which places the same duty and offence provisions on prime contractors, consignors, packers, loaders, and drivers.

¹³ *Australian Road Rules* rule 16.

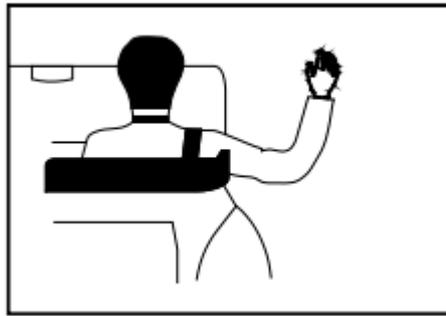
¹⁴ *Heavy Vehicle National Law Act 2012* (Qld) sch s 5.

¹⁵ See, eg, *Road Transport Act 2013* (NSW) s 4(1); *Road Traffic Act 1961* (SA) s5; *Road Traffic Administration Act 2008* (WA) s 4; *Motor Vehicles Act* (NT) s 5(1); *Transport Operations (Road Use Management) Act 1995* (Qld) s 5, sch 4.

¹⁶ *Interpretation of Legislation Act 1984* (Vic) s 38.

¹⁷ *Australian Road Rules* rules 49(2), 50, 54(2), 55.

Figure 4. Giving a hand signal when stopping



An ADS is not captured in the definition of ‘driver’ provided in the model Australian Road Rules because it is not ‘a person’. It is a system and is not covered by either the common understanding of person or the expanded legal definition of person which ‘generally includes a reference to a corporation as well as an individual’.¹⁸ This means that even if an ADS is engaged and performing the dynamic driving task in a dedicated automated vehicle that has no controls for a human, it would not be covered by the current definition of driver.

3.3.2 What does ‘drive’ mean?

The model Australian Road Rules specify that drive ‘includes be in control of’.¹⁹ This is the only guidance provided in the road rules about what ‘drive’ means. It reflects the requirements of Article 8(5) of the Geneva Convention.²⁰

State and territory transport legislation take a mixed approach to defining ‘drive’. None provide exhaustive definitions of ‘drive’. A number have definitions that state that drive includes ‘be in control of the steering, movement or propulsion of the vehicle’.²¹

There is a significant body of case law on what driving means. Cases have considered whether an individual should be considered to be driving a vehicle in a diverse range of situations. Examples include:

- an individual pushing a motor cycle²² (individual was not the driver)
- an individual steering a car being pushed by another person or people²³ (individual was not the driver)
- an individual who was driving but the engine cuts out and the car coasts downhill²⁴ (individual was the driver)

¹⁸ *Acts Interpretation Act 1954* (Qld) s 32D.

¹⁹ *Australian Road Rules* rule 4, dictionary.

²⁰ Geneva Convention on Road Traffic art 8.5 states that: ‘Drivers shall at all times be able to control their vehicles or guide their animals. When approaching other road users, they shall take such precautions as may be required for the safety of the latter’.

²¹ See, eg, *Heavy Vehicle National Law Act 2012* (Qld) sch s 5; *Road Transport Act 2013* (NSW) s 4(1); *Road Traffic Act 1961* (SA) s 5; *Road Transport (Safety and Traffic Management) Act 1999* (ACT) s 4.

²² *Coombe v Currucan* [1981] VicSC 421 (Murphy J).

²³ *McGrath v Cooper* [1976] VR 535 (Gillard J).

- passenger holding steering wheel while vehicle in motion²⁵ (individual was not the driver).

The Victorian Supreme Court decision in *Tinks v Francis* is the leading Australia authority on what will be considered 'driving' of a motor vehicle. Young CJ emphasised that 'the answer to the question in any given case whether the defendant was "driving" a motor vehicle is largely a question of fact'.²⁶ He also considered that 'the question whether a person in given circumstances is driving the car will often turn on the extent and degree to which the person was relying on the use of the driver's controls'.²⁷ Young CJ reviewed the authorities, finding that they suggest 'the view that before a person can be said to be driving a motor vehicle he must have at least some control over the movement and direction of the vehicle and generally that he must have something to do with the propulsion'.²⁸ He suggested that:

*The ordinary meaning to be attached to the word "drives" when applied to a motor car should, I think, embrace the notion of some control of the propulsive force which, if operating, will cause the car to move.*²⁹

If an ADS is engaged in a vehicle with conditional, high or full automation it appears that it would be performing the tasks suggested by Young CJ, as well as those included in legislative definitions, as required to establish driving. The ADS would be in control of the movement and direction of the vehicle and of the propulsive force which causes the vehicle to move. It would have control of steering, acceleration, and braking.

3.3.3 Do current definitions of a driver cover an ADS driver?

Summarising the previous two sections, it is apparent that current definitions of 'driver' found in legislation such as the model Australian Road Rules do not cover an ADS driver.

It seems that when the ADS is engaged it is performing the tasks that courts and legislation have considered relevant to determining who is driving. It is in control of the movement and direction of the vehicle and of the propulsive force which causes the vehicle to move. However, it is not a person, which is a component of the definition of 'driver'. A system such as an ADS is not included in the definition of driver.

3.3.4 What are the obligations of a driver?

Drivers have an extensive range of obligations in addition to controlling the steering, movement and propulsion of the vehicle and compliance with road rules associated with the dynamic driving task.

As well as general road traffic and road safety obligations that apply to all drivers (such as drink- and drug-driving, driver licensing), some legislation places specific obligations on particular classes of drivers (such as drivers transporting dangerous goods, drivers of heavy vehicles and drivers of passenger transport). An overview of key duties that are placed on drivers is set out below. These include:

²⁴ *Tink v Francis; Hughes v McFarlane; Harris v Broadbent* [1983] 2 VR 17, 20–21 (Young CJ).

²⁵ *R v Murray* (1986) 4 MVR 331 (Kelly SPJ).

²⁶ *Tink v Francis; Hughes v McFarlane; Harris v Broadbent* [1983] 2 VR 17, 19.

²⁷ *Ibid.*

²⁸ *Ibid.*

²⁹ *Ibid.*

- licences, permits and exemptions
- compliance with road rules and traffic laws
- compliance with directions of authorised persons
- duties to other road users
- public transport obligations
- payment of tolls and fees.

Licences, permits and exemptions

Drivers are required to hold and carry an appropriate licence for the vehicle they are driving. The particular licence required varies between vehicles. For example, heavy vehicle drivers require different licences to drivers of light vehicles. They must also produce their licence for inspection by a police officer or authorised officer if requested.

Drivers are also required to carry documentation such as permits and exemptions for particular activities and produce it if requested by a police officer or other authorised person. For example, the Heavy Vehicle National Law requires certain drivers to carry a range of documentation such as mass and dimension exemption permits,³⁰ and vehicle standards exemptions permits.³¹ Drivers of dangerous goods are also required to carry transport documentation.³²

Drivers of public transport may be required to display driver identification to demonstrate they are an authorised or accredited driver.³³

Compliance with road rules and traffic laws

Drivers are required to comply with road rules and traffic laws which aim to ensure safe driving and safe roads. Examples include:

- speed limits³⁴
- giving way to police and emergency vehicles³⁵
- stopping at the scene of a crash³⁶
- providing particulars to others involved in the crash, the owner of property damaged in the crash and police in some circumstances,³⁷ and assisting people injured in a crash.³⁸

Obey directions of police officer or authorised person

Drivers have duties to comply with the instructions of police officers or other authorised persons.³⁹

³⁰ *Heavy Vehicle National Law Act 2012* (Qld) sch s133(1).

³¹ *Heavy Vehicle National Law Act 2012* (Qld) sch s 153(1).

³² See, eg, *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail* cl 11.1.6.

³³ See, eg, *Passenger Transport (General) Regulations 2017* (NSW) regs 92,132.

³⁴ See, eg., *Australian Road Rules* rule 20.

³⁵ *Ibid* rule 79.

³⁶ *Ibid* rule 287(1).

³⁷ *Ibid* rule 287.

³⁸ See, eg, *Road Transport (Safety and Traffic Management) Act 1999* (ACT) s 16.

Duties to other road users

Drivers have duties to other road users. In addition to duties relating to accidents, other duties include removing fallen things from the road⁴⁰ and not driving a vehicle if the load is not properly secured or causes the vehicle to be unstable.⁴¹ For heavy vehicles there are specific duties including the requirement to carry portable warning triangles which must be used in specified circumstances if the driver stops on a road or if some of the load falls on the road.⁴²

Passenger compliance on public transport and cleanliness of vehicle

Drivers of public transport are given various duties such as ensuring the vehicle is clean, taking action about dangerous passenger conduct, and accepting hiring for taxis.⁴³ Drivers of public transport also have duties such as ensuring public transport vehicles are not overloaded.⁴⁴

Payment of tolls and fees

A driver is liable to pay tolls and parking fees.⁴⁵

3.3.5 What is a registered owner, registered operator or licence holder?

Vehicles in Australia must be registered. Each state and territory has its own legislation governing registration of vehicles.

The terminology used to describe the person in whose name the vehicle is registered varies between states and territories. The key terms used are 'registered owner',⁴⁶ 'registered operator'⁴⁷ and 'licence holder'.⁴⁸ The registered owner, registered operator, or license holder is not necessarily the owner of the vehicle.

Whichever term is used, one of the aims of vehicle registration is to ensure that vehicles are identifiable and that someone is responsible for each registered vehicle.⁴⁹ This helps ensure a vehicle will operate safely on the roads.

The aim of ensuring someone is responsible for each registered vehicle is explicit in the relevant legislation of the Australian Capital Territory, Tasmania, Victoria and New South Wales, which describe the 'registered operator' as the person recorded on the register

³⁹ See, eg, *Australian Road Rules* rule 304; *Model Act on the Transport of Dangerous Goods by Road or Rail 2007* ss 21-24.

⁴⁰ See, eg, *Australian Road Rules* rule 293.

⁴¹ *Ibid* rule 292.

⁴² *Ibid* rules 226–227.

⁴³ See, eg, *Passenger Transport (General) Regulation 2017* (NSW) regs 35, 37, 42, 63, 146.

⁴⁴ See, eg, *Passenger Transport Regulations 2009* (SA) reg 86. Although, it is possible that mass, dimension and loading requirements could be programmed into an ADS this seems likely to unduly restrict the uses of a particular vehicle.

⁴⁵ See, eg, *Roads Regulation 2008* (NSW) reg 23.

⁴⁶ See, eg, *Motor Vehicles Act 1959* (SA) s 5(1); *Motor Vehicles Act* (NT) s 5(1); 102(2A)(b) the term used in s 5(1) is 'owner' but s 102(2A)(b) refers to a 'registered owner' suggesting the terms are used interchangeably.

⁴⁷ See, eg, *Vehicle and Traffic Act 1999* (Tas) s 3(1); *Road Transport Act 2013* (NSW) s 8; *Road Safety Act 1986* (Vic) s 3(1); *Road Transport (Vehicle Registration) Act 1999* (ACT) s 3; *Transport Operations (Road Use Management) Act 1995* (Qld) s 5, sch 4; *Motor Vehicles Act 1959* (SA) s 5(1).

⁴⁸ *Road Traffic (Administration) Act 2008* (WA) s 6.

⁴⁹ See, eg, *Road Safety Act 1986* (Vic) s 5(c).

and specify that this person is responsible for the vehicle.⁵⁰ Western Australia uses the term 'licence holder' to describe the person in whose name the vehicle is licensed and specifies that for the purposes of road law a licence holder is responsible for the vehicle.⁵¹

For simplicity, the discussion paper uses the term 'registered operator' to refer to the person who has primary responsibility for the vehicle.

3.3.6 What are the obligations of a registered operator?

The obligations of the registered operator are set out in the relevant laws of each state and territory. The obligations vary somewhat but essentially fall into two main categories of obligations.

The first category of obligations are direct obligations, to do certain things, either as a matter of course or if requested by an authorised authority. These may include:⁵²

- registration requirements, including payment of registration and keeping records about the registration of the vehicle
- installation and display of number plates and registration labels
- carriage of document requirements (for example, exemptions and permits)
- production of documents required by the regulations
- ensuring the vehicle complies with vehicle standards and is roadworthy.

The second category of registered operator responsibilities are things that occur during driving that a registered operator is deemed to be responsible for. This includes parking fees, tolls and camera detected traffic offences, such as speeding and running red lights. These are operator onus or deemed liability offences. They occur when an offence is detected when the driver is not present or is detected via camera, and the only way to identify the driver responsible is through the registered operator.⁵³

This approach is based on the principle that the registered operator should be held responsible for the vehicle. Therefore, they are also liable for the offence unless they can establish that they were not responsible at the time and provide the name of the person who was driving.

The registered operator for a vehicle may also have obligations to:

- present the vehicle for inspection when requested in specified circumstances, for example, if an authorised officer reasonably suspects the vehicle has been used on a road in contravention of a requirement of the law
- pay costs associated with removal and storage of the vehicle if it is moved because it is causing an obstruction

⁵⁰ *Vehicle and Traffic Act 1999 (Tas)* s 3(1); *Road Transport Act 2013 (NSW)* s 8; *Road Safety Act 1986 (Vic)* s 3(1); *Road Transport (Vehicle Registration) Act 1999 (ACT)* s3, dictionary; *Road Transport (General) Act 1999 (ACT)* s 10.

⁵¹ *Road Traffic (Administration) Act 2008 (WA)* s 6(2).

⁵² See, eg, *Road Transport Act 2013 (NSW)* s 70; *Vehicle and Traffic (Driver Licensing and Vehicle Registration) Regulations 2010 (Tas)* reg 63; *Road Safety Act 1986 (Vic)* s 9A; *Road Transport (Vehicle Registration) Act 1999 (ACT)* s 21.

⁵³ See, eg, *Road Safety Act 1986 (Vic)* ss 84BA-84BC; *Roads Act 1993 (NSW)* s 244; *Transport Operations (Road Use Management) Act 1995 (Qld)* s 114.

- surrender the vehicle under impoundment, immobilisation and forfeiture laws when requested if a police officer believes on reasonable grounds that the motor vehicle has been used in the commission of a relevant offence.⁵⁴

3.3.7 What is a manufacturer?

The common meaning of manufacturer is found in the dictionary—for example, ‘a person or business concern that manufactures goods or owns a factory’ (Collins English Dictionary, 2017).

Different laws may provide more specific definitions. A definition is more likely to be needed if a duty is imposed and penalties apply.

Traffic and motor vehicles laws

The *Motor Vehicle Standards Act 1989* (Cth) does not include a definition of manufacturer but defines that ‘manufacture’ in relation to a road vehicle includes modifying the vehicle and assembling the vehicle.⁵⁵

‘Manufacturer’ is not defined in road traffic and motor vehicles laws. It is used in reference to motor vehicle manufacturers—for example, referring to a vehicle’s gross vehicle mass as specified by the manufacturer.⁵⁶

Consumer protection laws

Under the Australian Consumer Law manufacturer is defined as including:⁵⁷

- a person who produces, processes or assembles goods
- a person who holds himself or herself out to the public as the manufacturer of goods
- a person who causes or permits another person to hold themselves out to the public as the manufacturer of the goods, when that other person is supplying or promoting the goods
- a person who imports goods into Australia if the person is not the manufacturer of the goods and the manufacturer of the goods does not have a place of business in Australia.

A manufacturer of a motor vehicle is captured within this definition and there is nothing to suggest that the manufacturer of a vehicle with an ADS or of an ADS aftermarket device would not be covered. Under the last example above, the importer of an ADS manufactured by a company that did not have a place of business in Australia would be considered the manufacturer.

3.3.8 What are the obligations of a manufacturer?

There are nine consumer guarantees in the Australian Consumer Law that place obligations on suppliers and, in certain circumstances, manufacturers of goods. It includes guarantees aimed at ensuring the goods are fit for purpose, free from defects, safe and match descriptions provided (Commonwealth of Australia, 2016, p. 12).

⁵⁴ See, eg, *Road Safety Act 1986* (Vic) ss 13, 63A(4), 84H.

⁵⁵ *Motor Vehicle Standards Act 1989* (Cth) s 5(1).

⁵⁶ *Road Traffic Act 1961* (SA) s 5(1) definition of ‘GCM of a vehicle’.

⁵⁷ *Competition and Consumer Act 2010* (Cth) sch 2, cl 7.

If a product fails to meet one or more of the consumer guarantees, the consumer is entitled to a remedy. Depending on the circumstances the remedy may be a repair, replacement or refund and compensation for any consequential loss.⁵⁸

Consumers can seek compensation for damages and loss caused by a safety defect in products supplied by a manufacturer.⁵⁹

These guarantees would provide consumer protection and remedies against the manufacturer or supplier of an automated vehicle.

3.3.9 Overlapping duties and responsible parties under chain of responsibility

The Heavy Vehicle National Law places obligations on parties in the ‘chain of responsibility’ for a heavy vehicle.⁶⁰

Under amendments anticipated to come into operation in 2018, a new duty on the parties in the chain of responsibility to ‘ensure, so far as is reasonably practicable, the safety of the party’s transport activities relating to that vehicle’ will replace several prescriptive obligations.⁶¹ Among others, the following parties are included in the chain of responsibility:

- an employer or prime contractor of the driver
- an operator of the vehicle
- a packer of goods in the vehicle
- a loading manager for goods in the vehicle
- a loader of goods in the vehicle
- an unloader of goods in the vehicle.⁶²

The *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail* provides overlapping duties to a range of parties to ensure transport of dangerous goods is safe.⁶³ For example, ‘a driver must not drive a vehicle transporting goods if the person knows, or reasonably ought to know that the goods are too dangerous to be transported’.⁶⁴ A similar duty is placed on loaders and prime contractors.

3.3.10 Future responsibility for driver obligations in automated vehicles

A key question for this reform is if the ADS is legally permitted to perform the dynamic driving task, who should have responsibility for duties legislation currently assigns to a driver? In chapter 5 we propose that:

⁵⁸ *Competition and Consumer Act 2010* (Cth) sch 2, cls 259, 261 (repair, replacement and refund); and cl 271 (compensation).

⁵⁹ *Ibid* sch 2, cls 138–141.

⁶⁰ *Heavy Vehicle National Law Act 2012* (Qld) sch ss 214, 227.

⁶¹ *Heavy Vehicle National Law and Other Legislation Amendment Act 2016* (Qld) s 26C.

⁶² *Ibid* s 7.

⁶³ *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail*, cls 3.1.1–3.1.6. which places the same duty and offence provisions on prime contractors, consignors, packers, loaders, and drivers.

⁶⁴ *Ibid* cl 7.2.4.

- if an ADS is performing the dynamic driving task it should be considered in control of the vehicle
- an ADSE identified through the safety assurance system should be responsible for the actions of the ADS that relate to the dynamic driving task, including compliance with traffic laws
- the ADSE should not be responsible for driver duties that do not relate to the dynamic driving task, such as payment of tolls.

If this approach is accepted there will be a need to ensure no gaps are created. In some cases, duties placed on a driver may need to be reassigned to other parties, including those listed above. This is particularly important for safety duties.

4 International approaches to automated driving systems

Key points

- Work is ongoing to reach international agreement on legal approaches to vehicles with an ADS. The Vienna Convention has been amended to provide increased recognition of a vehicle that has an ADS.
- In the US the Department of Transportation's National Highway Transport Safety Administration proposed in 2016 that states deem an ADS, when engaged, as the 'driver' of the vehicle for the purposes of state traffic law at conditional, high and full levels of automation.
- Some states in the US are amending their legislation to allow an ADS to perform the dynamic driving task and clarify who is responsible for compliance with traffic laws relating to the dynamic driving task if the ADS is engaged.
- Germany has amended its Road Traffic Act to recognise the ADS in vehicles with conditional and high automation. It provides that the human driver remains the driver even if the vehicle is controlled by the ADS.

4.1 Purpose

The purpose of this chapter is to give an overview of international approaches to providing legal recognition of an ADS 'driver'. The NTC has reviewed international developments to identify possible models for legislative reform and to inform the development of an Australian approach.

The focus is on international proposals for legislative amendment to ensure an ADS may legally perform the dynamic driving task and to clarify the entity responsible for compliance with dynamic driving task obligations.

The chapter:

- outlines the extent to which the 1949 Geneva Convention and the 1968 Vienna Convention allow for an ADS to undertake the dynamic driving task, including 2016 amendments to the Vienna Convention
- outlines the approaches taken in the US and Germany to providing legal recognition of an ADS at various levels of automation and clarify the entity that has legal responsibility.

The chapter focuses on the US and Germany because the NTC identified these countries as the most advanced in establishing clear policy positions and making legislative provision for the public deployment of automated vehicles.

4.2 Summary of international review

The NTC's review of international approaches established that:

- There are increasing moves internationally to regulate for automated vehicles.

- Much of the focus to date has been on testing of automated vehicles and there has been only limited provision made for the public deployment of automated vehicles.
- Countries are only starting to provide legal recognition of an ADS and clarify the legal responsibility for its actions at conditional, high and full automation.
- Varying international approaches have been taken to assigning legal responsibility for the ADS when it is performing the dynamic driving task, including for compliance with traffic laws.
- There has been limited consideration of responsibility for driver duties that do not relate to the dynamic driving task.
- There has been limited consideration of compliance and enforcement measures.

The key approaches identified by the NTC are:

1. Allow an ADS to perform the dynamic driving task but provide that there must be a human in the vehicle who remains the driver. This approach does not provide for vehicles with dedicated automation where there is no possibility of a human taking control (German approach).
2. Allow an ADS to perform the dynamic driving task and deem it the driver for the purposes of traffic laws at conditional, high and full automation (approach proposed by US Department of Transportation's National Highway Transport Safety Administration in 2016).
3. Allow an ADS to perform the dynamic driving task and provide that the manufacturer is responsible for the safe operation of the vehicle including compliance with traffic laws relating to the dynamic driving task when it is operating within its operational design domain at conditional, high and full automation (Californian approach).
4. Allow an ADS to perform the dynamic driving task but provide that the human driver remains responsible for traffic laws at conditional levels of automation (Tennessee approach).

4.3 International approaches to ADS and driving laws

4.3.1 Amendments to the Vienna Convention to recognise an ADS

As outlined in chapter 3, Australia is a contracting party to the Geneva Convention. While it is not a contracting party to the Vienna Convention, the model Australian Road Rules are broadly consistent with it.

Amendments to the Vienna Convention to recognise an ADS came into effect on 23 March 2016. Article 8.5 requires that '[e]very driver shall at all times be able to control his vehicle or to guide his animals'. The amendment to Article 8 clarified that a human driver is in control of a vehicle, even if a vehicle system (that conforms to United Nations vehicle regulations or can be overridden or switched off by the driver) influences the way it is driven (Economic Commission for Europe: Global Forum for Road Traffic Safety, 2017, pp. 4–5, para 23).

The amendments do not provide for an ADS 'driver'. Instead, they continue the common understanding that the driver is human. The human driver remains responsible for the control of the vehicle. The amendments do not address dedicated automated vehicles where there is no possibility of a human taking over the driving task.

The Informal Working Group of Experts on Automated Driving (IWG-AD), set up by the United Nations Economic Commission for Europe's Global Forum on Road Traffic Safety (WP.1), recently examined automated driving functions and their relationship with concepts of 'driver' and 'control'.

In March 2017, IWG-AD provided its draft common understanding of the Vienna and Geneva Conventions. IWG-AD considered that the use of functions equivalent to conditional and high automation are 'in line' with the conventions (as both still require a driver). Some IWG-AD members regarded fully automated vehicles as being in line with the Conventions, assuming that the driver had the option to take control of the driving task (Global Forum for Road Traffic Safety, 14 March 2017, pp. 4–5, para 23).

The amendment to Article 8 of the Vienna Convention did not specify the extent to which a human driver may undertake activities other than driving. IWG-AD provided guidance on how a driver should adapt their driving to meet the Vienna Convention Article 8.6 requirement to 'minimise' any activity other than driving. At conditional levels of automation, a driver could perform other activities, so long as the activities:

- do not prevent the driver from responding to takeover demands, and
- are consistent with the intended use of the automated driving function. (Economic Commission for Europe: Global Forum for Road Traffic Safety, 2017, pp. 56, para 26).

At high and full levels of automation, the IWG-AD guidance suggests that the conventions do not prevent the driver from performing other activities, subject to the safety regulations of member states.

IWG-AD noted that due to procedural and administrative complexities, it may not be possible to include full automation vehicles by amending the existing conventions. It noted that an entirely new convention may be required. IWG-AD has not reached consensus on how to proceed at this stage.

4.3.2 Germany

In June 2017 the German Parliament amended the German Road Traffic Act (Straßenverkehrsgesetz) to recognise the ADS in vehicles with conditional and high automation. The law:

- states that the human driver remains the driver of the vehicle even if the vehicle is controlled by the ADS
- provides the legal basis for temporary, full transfer of the driver's control to the ADS. The general liability concept under German law will not change and both the driver and the 'owner' (not the manufacturer) remain liable even if the vehicle is in automated driving mode. However, drivers may avoid liability if they lawfully used the automated driving mode
- defines the requirements for automated vehicles to use public roads 'within the limits of intended use'
- clarifies the rights and duties of the driver when activating the automated driving mode (Federal Council Germany, 2017).

The law does not address culpability for traffic offences when the ADS is engaged.

4.3.3 United States

Federal policy— National Highway Transport Safety Administration

Interpretation of 'driver'

In 2015 Google sought clarification of who, or what, would be considered a 'driver' in their dedicated autonomous vehicles. In response, the US Department of Transportation's National Highway Transport Safety Administration (NHTSA) advised that:

If no human occupant of the vehicle can actually drive the vehicle, it is more reasonable to identify the 'driver' as whatever (as opposed to whoever) is doing the driving. In this instance, an item of motor vehicle equipment, the self-driving system, is actually driving the vehicle (National Highway Traffic Safety Administration, 2016, p. 3).

Federal Automated Vehicles Policy

In 2016 the NHTSA released its *Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety* for vehicles with conditional, high and full automation, which the NHTSA described as 'highly automated vehicles' (HAV). It included a model state policy that suggests for the purposes of state traffic laws the ADS be deemed the 'driver' of a vehicle with conditional, high or full automation. It states:

For purposes of State traffic laws that apply to drivers of vehicles (e.g., speed limits, traffic signs), States may wish to deem a HAV system that conducts the driving task and monitors the driving environment (generally SAE Levels 3–5) to be the 'driver' of the vehicle. For vehicles and circumstances in which a human is primarily responsible for monitoring the driving environment (generally SAE Levels 1–2), NHTSA recommends the State consider that the human be the driver for purposes of traffic laws and enforcement (United States Department of Transportation, 2016, p. 39).

In September 2017, the NHTSA released new federal guidance in a document entitled *Automated Driving Systems (ADS): A Vision for Safety 2.0*. It provides high-level guidance on best practices for legislatures. It suggests that states should 'review traffic laws and regulations that may serve as barriers to operation of ADSs' (National Highway Traffic Safety Administration, 2017, p. 21). It does not provide any suggested approach to how states may wish to treat an ADS for the purposes of traffic laws and enforcements and does not retract the 2016 suggestion that states may wish to deem the ADS as the 'driver'.

State legislation and policy

This section provides a brief overview of the legislative approaches taken in some states of the US to recognise the role an ADS has in performing the dynamic driving task.

A number of states have developed legislation or draft legislation to allow an ADS to perform the dynamic driving task on public roads. (National Conference of State Legislatures, 2017). The sections below focus on states that have provided more detail about the key concerns of this discussion paper. Specifically, states that have considered either:

- responsibility for compliance with dynamic driving task traffic laws at conditional, high and full automation, or

- responsibility for non-dynamic driving tasks that an ADS cannot perform, such as ensuring occupants of the vehicle wear seatbelts.

The states do not use the term ‘ADSE’ but a number have incorporated definitions that have the effect of placing responsibility on the ‘manufacturer’ for compliance with traffic laws in some circumstances when the ADS is engaged and performing the dynamic driving task.

The states use a variety of terminology to describe automated vehicles, levels of automation, and the ADS. To avoid confusion terms used by jurisdictions have been changed, where possible, to convey the equivalent meaning as terms used throughout this paper.

California

Draft 2017 regulations establish requirements to test and publicly deploy vehicles with conditional, high or full automation with or without a driver (Department of Motor Vehicles, 2017).

The regulations propose to define ‘driver’ (within the autonomous vehicles section of the *Vehicle Code*) as the natural person who is operating an autonomous vehicle when it is not operating in the autonomous mode.⁶⁵ The intention is to make clear that references to ‘driver’ are references to a natural person rather than the ADS or manufacturer.⁶⁶

The new definition of driver does not include the ADS, but the proposed regulations specify when the manufacturer is responsible and when the human driver is responsible.

Responsibility for compliance with traffic laws

The proposed regulations define the ‘manufacturer’ as a manufacturer of autonomous technology, including a vehicle manufacturer producing a vehicle from basic components, and a person who modifies any vehicle by installing autonomous technology.⁶⁷

In relation to vehicles equipped with conditional automation:

- the driver is responsible for the safe operation of the vehicle, including compliance with all traffic laws any time the vehicle requires the driver to take control or when the vehicle is operating outside its approved operational design domain
- the manufacturer of the vehicle is responsible for the safe operation of the vehicle, including compliance with all traffic laws applying to the dynamic driving task when the ADS is engaged and the automated vehicle is operating within its approved operational design domain.⁶⁸

For a vehicle with high and full automation, the manufacturer is responsible for the safe operation of the vehicle at all times the ADS is engaged and is operating in its operational design domain, including compliance with all traffic laws.⁶⁹

⁶⁵ Express Terms, Article 3.7—Testing of Autonomous Vehicles, §227.02(f).

⁶⁶ Initial Statement of Reasons, Articles 3.7 and 3.8 – Testing and Deployment of Autonomous Vehicles, p 4.

⁶⁷ Express Terms, Article 3.7 Testing of Autonomous Vehicles, §227.02(h).

⁶⁸ Express Terms, Article 3.8—Deployment of Autonomous Vehicles, §228.28.

⁶⁹ Ibid.

Tennessee

The *Automated Vehicles Act*, which came into effect in Tennessee in June 2017, enables vehicles with high and full automation to operate on public roads, including for commercial use, without a driver. Changes have been made to definitions in the Tennessee *Motor and Other Vehicles* code to recognise an ADS as a driver, operator and person.⁷⁰

- 'Driver' means:
 - a. for the purposes of a conventionally operated vehicle, every person who drives or is in actual physical control of a vehicle; and
 - b. for purposes of an ADS-operated vehicle and when the context requires, the ADS when the ADS is engaged.
- 'Operator' means:
 - a. for the purposes of a conventionally operated vehicle, every person, ...who drives or is in actual physical control of a motor vehicle upon a highway...; and
 - b. for purposes of an ADS-operated vehicle and when the context requires, the ADS when the ADS is engaged.
- 'Person' means a natural person, firm, ... association, corporation, or an engaged ADS.

Responsibility for compliance with traffic laws

When the ADS is engaged the ADS is considered the driver or operator of the motor vehicle for the purposes of determining liability for applicable traffic or motor vehicle laws.⁷¹

For vehicles operated at any level below high or full automation, the driver will continue to be required to comply with the same laws as conventionally operated motor vehicles.⁷² The law clarifies responsibility for various non-dynamic driving obligations that the ADS is unable to perform.⁷³ For example:

- Responsibility for ensuring the use of a child restraint for a child aged under one year in an ADS-equipped vehicle rests with the parent, guardian or other human person accompanying a child, not the ADS or owner of the ADS-operated vehicle.
- Responsibility for ensuring the use of a seat belt by a child aged nine to twelve years in an ADS operated vehicle rests with the human companion or if there is no companion, then the child's parent or legal guardian.
- Neither the operator nor owner of an ADS operated vehicle will be fined for the failure of a passenger to wear a seat belt with the ADS engaged.
- The obligation to ensure a vehicle containing hazardous waste is not left unattended does not apply to an ADS-operated vehicle.

⁷⁰ Tenn. Code Ann. § 55-8-101 (2017).

⁷¹ Tenn. Code Ann. §55-30-106(b) (2017).

⁷² Tenn. Code Ann. §55-30-108 (2017).

⁷³ Tenn. Code Ann. §§ 55-8-162(d), 55-9-602(a)(6), 55-9-602 (g)(5)(B), 55-9-606(2), 55-10-101(e) (2017).

- Various reporting obligations of a driver are satisfied if the ADS operated vehicle remains on the scene of an accident and the vehicle's owner contacts enforcement authorities.

Nevada

Nevada's laws governing automated vehicles were updated in June 2017 to include public deployment of vehicles with high and full automation and commercial automated vehicle transport networks.

Nevada's legislation specifies that no motor vehicle laws or traffic laws of Nevada require a human driver to operate a vehicle with high or full automation that is being operated by an ADS.⁷⁴

The definition of 'driver' has been amended to recognise the role of the ADS:

- 'Driver' means a person who drives or is in actual physical control of a vehicle. In a vehicle with conditional automation with the ADS engaged the driver is the person who engaged the ADS. In a vehicle with high or full automation the driver does not include a natural person who engaged the ADS unless they are the vehicle's owner.⁷⁵
- 'Operator' means a person deemed to be the operator when the person causes the ADS to engage, regardless of whether the person is physically present in the vehicle while it is engaged.⁷⁶

Responsibility for compliance with traffic laws

Correspondence with Nevada's Department of Motor Vehicles suggests that if there is a driver or operator present in the vehicle and the ADS is engaged, then the operator or driver will be responsible for traffic infringements. If it is not a roadside issued infringement, then the infringement would be sent to the owner or operator.

If the vehicle has no driver or operator in it, then the company overseeing the vehicle or ADS would be responsible. There appear to be no multipliers enabling larger fines for corporate entities (Nevada Department of Motor Vehicles, 2017).

Georgia

Laws that came into effect in Georgia in July 2017, allow vehicles with high or full automation on public roads. The definition of driver remains the person who drives or is in actual physical control of a vehicle. The definition of operator has been expanded to recognise the ADS:⁷⁷

- 'Operator' means any person who drives or is in actual physical control of a motor vehicle or who causes a vehicle with high or full automation to move or travel with the automated driving system engaged.

An operator of a vehicle with high or full automation is exempt from having to hold a driver's licence.⁷⁸

⁷⁴ *Assembly Bill 69* (2017) Nev Stat, s 11.

⁷⁵ *Assembly Bill 69* (2017) Nev Stat, s 11.5.

⁷⁶ Nev Admin Code 482A.020.

⁷⁷ Ga Code Ann § 40-1-1(38).

⁷⁸ Ga Code Ann § 40-5-21(13).

Responsibility for compliance with traffic laws

Responsibility for non-dynamic driving obligations that the ADS is unable to perform, such as seatbelt and child restraint use, falls on the vehicle's occupants.⁷⁹ Obligations relating to accidents include: stopping the vehicle, providing personal details, assisting any injured and reporting the accident to police. These obligations will be deemed satisfied if the vehicle remains on the scene of an accident and the vehicle or operator promptly contacts a local law enforcement agency and communicates the information required.⁸⁰

North Carolina

Regulation of high and fully autonomous vehicles operating on public highways commences in North Carolina in December 2017. The laws permit the operation of automated vehicles that do not, at any time require an occupant to perform any part of the dynamic driving task when the ADS is engaged. Any equipment that allows a person to perform the dynamic driving task is to be placed so the occupant cannot assume control of the vehicle when the ADS is engaged.

The terms 'driver' and 'operator' are synonymous, and mean 'a person in actual physical control of a vehicle which is in motion or which has the engine running'.⁸¹ The amendments provide that an operator does not include an occupant within a high or fully autonomous vehicle performing solely strategic driving functions (for example, selecting the journey destination). The operator of an autonomous vehicle is not required to have a driver's licence.⁸²

Responsibility for compliance with traffic laws

The registered owner of a highly or fully autonomous vehicle is responsible for moving violations (those acts involving the vehicle moving, such as speeding or running a red light).⁸³

The legislation specifies that a fully autonomous vehicle with the ADS engaged will not be considered an unattended vehicle for the purposes of an offence.⁸⁴ A parent or legal guardian is responsible for ensuring:

- a child under 12 years old is supervised in a highly or fully autonomous vehicle in motion or which has the engine running⁸⁵
- a child is not transported in an open bed or cargo area, and that a child wears a seat belt or child restraint system in a highly or fully autonomous vehicle. These obligations currently rest with a driver or operator of a conventional vehicle.⁸⁶

If a fully autonomous vehicle is involved in a crash, then existing driver obligations to stop, provide information and assistance and report to law enforcement authorities are satisfied if the vehicle or the operator of the vehicle performs substantially similar actions.⁸⁷

⁷⁹ Ga Code Ann § 40-8-11(b).

⁸⁰ Ga Code Ann § 40-6-279.

⁸¹ NC Gen Stat §20-4.01(7),(25).

⁸² *An Act to Regulate the Operation of Fully Autonomous Motor Vehicles*, NC Sess Laws 2017-166, § 20-401(a).

⁸³ *Ibid* § 20-401(d).

⁸⁴ *Ibid* § 20-401(e).

⁸⁵ *Ibid* § 20-401(c1).

⁸⁶ *Ibid* § 20-401(c).

5 Legal recognition of an ADS and responsibility of an ADSE

Key points

- Legislative change will be required to allow an ADS to legally drive vehicles with conditional, high or full automation.
- An ADSE identified under the safety assurance system should be responsible for the actions of an ADS when it is engaged because the ADSE has the most control over the ADS, can ensure it performs as the manufacturer has claimed, and can provide a remedy if it does not.
- The ADSE should only be made responsible for things within its control, which means it should only be responsible for dynamic driving task obligations.
- The NTC proposes three possible approaches for legislative changes to recognise an engaged ADS as controlling or driving the vehicle and the ADSE as the legal entity responsible for its actions.

5.1 Purpose

The purpose of this chapter is to provide options for legislative reform to:

- allow an ADS to legally perform the driving task when it is engaged
- ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged.

The chapter:

- proposes that an ADS should be considered to be in control of the vehicle when it is engaged at conditional, high or full automation
- proposes that rule 297 of the model Australian Road Rules, which requires that a driver has 'proper control', should either not apply to an ADS or should be amended to be more relevant to an ADS
- outlines features that need to be part of the safety assurance system if an ADS is to be considered in control of the vehicle when it is engaged
- proposes that an ADSE should be legally responsible for the actions of the vehicle relating to the dynamic driving task when the ADS is engaged, including compliance with road rules
- proposes that an ADSE should not be responsible for legal duties given to drivers that do not relate to the dynamic driving task
- proposes that the ADSE that is legally responsible for the actions of the vehicle (the dynamic driving task) while the ADS is engaged should be the entity recognised as the ADSE under the safety assurance system

⁸⁷ Ibid § 20-401(f).

- provides approaches for legislative reform to allow an ADS to perform the driving task when it is engaged and ensure a legal entity (ADSE) is responsible for the actions of the vehicle.

5.2 Is reform to existing driving laws required?

As outlined in chapter 3, current law implicitly requires that a driver is human. This means there is no legal recognition that an ADS can drive a vehicle in place of a human driver. An ADS does not fit within legislative definitions of a 'driver' and there is no alternative legislative provision for an ADS to perform the dynamic driving task in place of a human driver.

The definition of driver or driving in a variety of legislation refers to a 'person' (noting that not all legislation provides a definition of 'driver'). An ADS is not a person. It is a system and is not covered by either the common understanding of person or the expanded legal definition of person found in interpretation Acts, which include reference to a corporation as well as an individual.⁸⁸

The fact that an ADS is not a person means that it is not covered by a range of legislation that uses the terminology 'driver' or refers to a 'person' who drives. However, when an ADS is engaged it is in control of the dynamic driving task. It, rather than a human occupant of the vehicle is 'driving'. The lack of legislative provision for an ADS to perform the dynamic driving task in place of a human driver creates uncertainty about the duties and responsibilities of a human occupant of a vehicle being driven by an ADS.

Because an ADS is not a legal entity, it is also unclear who is responsible for breaches of driver duties by the ADS. If an ADS is legally recognised as being in control when it is engaged, a natural person or corporation must be identified to accept responsibility for the consequences of the ADS should its actions result in a contravention of traffic laws or a crash. We have assumed for the purposes of this paper that the responsible entity (the ADSE) is likely to be identified as an outcome of the NTC's work on developing a safety assurance system for automated vehicles.

5.2.1 Conclusion

To provide certainty for automated vehicle manufacturers and consumers, the NTC considers that it is essential to clarify in legislation that the ADS is legally permitted to perform the dynamic driving task for a vehicle with conditional, high or full automation.

As set out at 5.3.1 the NTC proposes that legislation should provide that if the ADS is engaged it, rather than a human occupant of the vehicle, is in control at conditional, high and full levels of automation.

The NTC considers that legislation needs to ensure a legal entity (the ADSE) is legally responsible for the actions of an ADS when it is engaged, including compliance with road rules.

⁸⁸ See, eg, *Acts Interpretation Act 1954* (Qld) s 32D.

Consultation question

Question 1: Do you agree that reform to existing driving laws is required to:

- (i) allow an ADS to perform the dynamic driving task when it is engaged?**
- (ii) ensure a legal entity (ADSE) is responsible for the actions of the vehicle when the ADS is engaged?**

5.3 Should the ADS be considered in control of a vehicle when it is engaged?

A key barrier to providing legal recognition that an ADS can be in control of a vehicle is that driving laws:

- implicitly require a human driver
- are based on the principle that a driver is in control of the vehicle.

The principle that the driver is in control of the vehicle is derived from international conventions and is reflected in the model Australian Road Rules and state and territory traffic laws.⁸⁹ The road rules and several state or territory road traffic Acts define the term 'drive' to include 'be in control of the vehicle'.⁹⁰ Other states and territories have definitions that refer to 'control of the steering, movement or propulsion of the vehicle'.⁹¹ 'Control' is not defined.

None of these laws contemplate automated vehicles that undertake all of the steering, movement and propulsion. Nor do they address whether a human is still the driver if they are not directly undertaking, or even supervising, the driving task.

Being in control of a vehicle means being responsible for the actions of the vehicle, including for breaches of traffic laws and potentially for damages resulting from crashes. If a human allows an ADS to undertake the driving task that it is designed to perform, including complying with the road traffic rules, they would not expect to be held responsible for contraventions of the laws while the ADS was engaged. To hold the human responsible may restrict the introduction of automated vehicles into Australia and unnecessarily deny or delay the many potential benefits of the technology.

5.3.1 At what levels of automation should the ADS be considered to be in control of the vehicle?

In vehicles with high and full automation, the vehicle's ADS can perform the entire dynamic driving task within the vehicle's operational design domain. It can also bring the vehicle to a safe stop without human intervention in the event of a system failure or if the

⁸⁹ Geneva Convention art 8.5 states that: 'Drivers shall at all times be able to control their vehicles or guide their animals.' The same principle is incorporated into art 8.5 of the Vienna Convention.

⁹⁰ See, eg, *Road Safety Act 1986* (Vic) s 3(1); *Motor Vehicles Act* (NT) s 5(1); *Transport Operations (Road Use Management-Road Rules) Regulation 2009* (Qld) sch 5.

⁹¹ *Road Traffic Act 1961* (SA) s 5(1); *Road Transport Act 2013* (NSW) s 4(1); *Road Transport (Safety and Traffic Management) Act 1999* (ACT) s 4; dictionary.

vehicle is about to leave its operational design domain (SAE International, 2016, p. 17). The ADS is in control of the vehicle while it is engaged.

Conditional automation raises the greatest uncertainty about whether a human is in control of the vehicle when the ADS is engaged. In vehicles with conditional automation, the ADS can perform the entire dynamic driving task within the vehicle's operational design domain. The human, referred to as the 'fallback-ready user', does not have to supervise the ADS, but must remain receptive to requests from the ADS to intervene and to any evident system failures related to the dynamic driving task. The fallback-ready user is expected to take over the driving task in these circumstances because the ADS is not designed to bring the vehicle to a safe stop (SAE International, 2016, p. 17).

The NTC discussed the issue of control of vehicles with conditional automation in our April 2017 discussion paper, *Clarifying Control of Automated Vehicles*. The majority of stakeholders supported the idea that, in the longer term, the ADS should be considered in control of a vehicle operating at conditional, high and full automation when the ADS is engaged. Stakeholders considered that this would require legislative change.

Legislative reform to provide that the ADS is in control of the vehicle when it is engaged, including at conditional automation, is consistent with the approach recommended at the federal level in the US in 2016. The NHTSA suggests that for the purposes of state traffic laws the ADS be deemed the 'driver' of a vehicle with conditional, high or full automation. (United States Department of Transportation, 2016, p. 39). The proposal also recognises that legislative amendments would be required to give effect to this approach. As detailed in chapter 4 the policy document from NHTSA released in September 2017 does not provide any suggested approach to how states may wish to treat an ADS for the purposes of traffic laws and enforcements and does not retract the 2016 suggestion that states may wish to deem the ADS as the 'driver'.

As outlined in chapter 4, some US states have amended their laws or proposed draft regulations. Of those that have made amendments, not all have followed the NHTSA's 2016 proposal.

In California, draft regulations make the manufacturer responsible for compliance with traffic laws relating to the dynamic driving task at conditional automation. This applies if the ADS is engaged and the vehicle is operating within its approved operational design domain. For a vehicle with high or full automation, the manufacturer is responsible for the safe operation of the vehicle at all times the ADS is engaged and the vehicle is operating in its approved operational design domain, including compliance with all traffic laws.

In contrast Tennessee has only partially adopted the approach recommended by the NHTSA in 2016. It recognises the engaged ADS as 'the driver' or operator of vehicles with high or full automation but provides that the human remains 'the driver' at conditional levels of automation. At high and full automation when the ADS is engaged it will be considered the driver for the purpose of determining liability for non-compliance with applicable traffic or motor vehicle laws.

Legislative change to recognise the ADS as being in control of the vehicle when it is engaged may create tensions with the Geneva and Vienna Convention requirements. As outlined in chapter 3, the Vienna Convention was amended in 2016 to provide some recognition of automated vehicles. However, it continues the common understanding that a vehicle requires a driver to control it, and that the driver is human. The amendments do not allow for dedicated automated vehicles although some member parties regard the amendment as allowing for the use of vehicles with full automation provided the driver has

the option to take control of the driving task (Economic Commission for Europe: Global Forum for Road Traffic Safety, 2017, pp. 4–5, para 23).

It may be that temporary inconsistencies with the Geneva Convention on the issue of human driver control are acceptable in light of the acknowledged short-comings of the Convention regarding automated vehicles.

The USA, like Australia, is a party to the Geneva Convention. In spite of this, NHTSA's 2016 proposal was to recognise the ADS as 'the driver' in vehicles with conditional, high or full automation.

5.3.2 Legislative options for whether the ADS or the human driver is in control of an automated vehicle

Option 1: The human driver is always in control of a vehicle with all levels of automation even if the ADS is engaged

Advantages

- It is consistent with the Geneva Convention and with the approach taken in Germany.
- It provides certainty to manufacturers, technology developers, enforcement agencies and consumers about how a human driver's legal obligations and responsibilities when driving in a vehicle at all levels of automation will be enforced.

Disadvantages

- The human driver is legally responsible for the dynamic driving task when the ADS is performing it.
- The automated design features of these vehicles at high and full automation cannot be used as intended by the manufacturer because the human will need to monitor driving.
- It does not provide for dedicated automated vehicles in which there is no possibility of a human driver performing the dynamic driving task.

Option 2: The ADS is in control of a vehicle with high or full automation only; a human driver is in control of a vehicle with conditional automation even if the ADS is engaged

Advantages

- Vehicles with high and full automation can come to a safe stop without the intervention of a fallback-ready user. This reduces the risk of human error and makes the vehicles safer.
- It reduces enforcement and insurance complications arising from changes in control between the fallback-ready user and the ADS.

Disadvantages

- By excluding vehicles with conditional automation, the full benefits of automated vehicles cannot be realised.
- A fallback-ready user would be considered in control of a vehicle with conditional automation and may be held responsible for a traffic offence caused by an ADS,

although they were not required to be supervising or monitoring the vehicle or the external environment.

Option 3: The ADS is in control of a vehicle with conditional, high or full automation when it is engaged

Advantages

- All the automated design features of these vehicles can be used as intended by the manufacturer providing customers with all the advertised benefits.
- It places an appropriate burden of responsibility on the entity actually undertaking the dynamic driving task, rather than the human who is not actively driving the vehicle or monitoring the driving environment.
- It provides additional incentive for automated vehicle manufacturers to develop safe systems for vehicles with conditional automation.
- It provides certainty to manufacturers, technology developers, enforcement agencies and consumers about how a human driver's legal obligations and responsibilities when driving in a vehicle with conditional automation will be enforced.
- It provides for dedicated automated vehicles in which there is no possibility of a human driver performing the dynamic driving task.
- It is consistent with the approach proposed at the federal level by the NHTSA in the US in 2016.

Disadvantages

- If legislative change is made to recognise the ADS as in control at conditional automation there are safety risks if the fallback-ready user is not alert and ready to drive.

5.3.3 Conclusion

The NTC considers that the preferable approach is option 3—to recognise the ADS as being in control of the vehicle at conditional, high and full levels of automation.

We propose that if legislative change is made to recognise the ADS as in control at conditional automation new 'readiness to drive' obligations should be placed on fallback-ready users. We discuss legal obligations to ensure alertness and to reduce the possibility of human error at the transition between ADS and fallback-ready user in chapter 6 at 6.4.1.

Consultation question

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

5.3.4 Safety assurance system and legal recognition of the ADS as being in control of a vehicle

Legal recognition that an ADS is in control of a vehicle when it is engaged should not occur unless there are mechanisms to ensure an ADS can operate safely—in particular, requiring that the ADS can comply with road and traffic rules and that it is possible to identify whether a human or an ADS is in control of a vehicle.

The NTC's safety assurance system reform addresses these matters. The proposed safety assurance system would operate alongside any legislative recognition that an ADS was in control of an automated vehicle.

At its meeting of 22 September 2017, TISOC endorsed mandatory self-certification as the preferred safety assurance system. The NTC will be recommending this option to the council. Under this model, government would set principles-based safety criteria that an automated driving system would need to be certified against before it could be used.

The NTC provided a list of possible criteria in its June 2017 discussion paper *Regulatory Options to Assure Automated Vehicle Safety in Australia*. It included the following which most directly relate to compliance with road and traffic rules (National Transport Commission, 2017, p. 56):

1. The vehicle can operate in compliance with relevant road safety and traffic laws.
2. The vehicle has a defined operational design domain.
3. Wherever the vehicle operates, the vehicle can appropriately respond to:
 - temporary speed zones and traffic controls
 - all likely road and environmental conditions
 - interaction with trains and light rail
 - interaction with vulnerable road users.
4. The vehicle has real-time monitoring of driving performance and incidents, including event data records in the lead up to any crash or near miss that identifies which party was in control of the vehicle at the relevant time.

The final principles-based safety criteria will be developed as part of the process to implement mandatory self-certification if that option is approved by transport ministers.

5.3.5 How would 'proper control' apply if an ADS is in control of the vehicle?

Rule 297(1) of the model Australian Road Rules provides that: 'A driver must not drive a vehicle unless the driver has proper control of the vehicle'. Failure to comply with this is an offence. Proper control is not defined in the model Australian Road Rules.

The 'proper control' offence is designed to deal with human failings such as distraction, inattention and failure to handle the steering wheel properly. It could be considered an irrelevant concept for a machine such as an ADS. An ADS is either operating correctly and in compliance with road traffic laws, or it is not.

In addition to the requirement for the driver to have proper control, there are two other offences in rule 297. Neither are relevant to an ADS. An ADS could not contravene rule 297(1A) (not drive with animal in the driver's lap). Rule 297(2) (not drive a motor vehicle unless the driver has a clear view) would also not be relevant to an ADS because an ADS

is not human and will not require 'a clear view' in the same way to operate safely. 'Clear view' implies the ability to see directly with eyes, whereas the ADS will rely on technology, including radar and lidar, rather than sight.

The proper control offence would not add anything to the proposed safety assurance system requirements that the vehicle can operate in compliance with relevant road safety and traffic laws.

5.3.6 Conclusion

The rule 297 proper control offence should either:

- not apply to an ADS (through an exemption for an ADS; or an amendment to make the rule only apply to a human driver), or
- be amended to be made more relevant to automated vehicles by defining *proper control* for an ADS, for example, 'proper control means the vehicle complies with road traffic rules and has properly operating sensors that provide information about the road, road users and traffic ahead, behind and to each side of the vehicle'.

The NTC's preferred approach is that the rule 297 proper control offence should not apply to an ADS because the offence is not relevant to how an ADS operates. If an ADS fails to comply with a road traffic rule or causes a crash, it is likely to be the result of a system error or a technical or mechanical failure, or the vehicle operating outside its intended operational design domain. The error could be confined to one vehicle or affect the entire model. Penalties for systemic and safety-critical events are likely to be better addressed by product liability under the Australian Consumer Law, or a duty to manage safety, which is being considered as part of the safety assurance system reform.

Consultation question

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

5.4 Which entity should be responsible for the ADS

If legislative change is made to recognise the ADS as being in control of a vehicle when it is engaged, it is important that there is a legal entity responsible for its actions. As discussed at 5.2, an ADS cannot have legal responsibility for its actions because it is just a system.

Without a legal entity to be responsible for the actions of the ADS, allowing automated vehicles on roads poses safety risks. Specifically:

- There may be no-one to hold to account for road traffic breaches
- It would be difficult to locate an entity to take action against for damages resulting from a crash.

The possibilities for the legal entity that could be held responsible for the actions of the ADS when it is engaged include:

- the fallback-ready user for a vehicle with conditional automation (the human driver)
- the operator of the automated vehicle (who might be defined as the person who sets the vehicle in motion or operates a fleet of dedicated automated vehicles)

- the registered operator of the vehicle
- the manufacturer of the vehicle
- the ADSE as identified through the safety assurance scheme or defined in legislation.

The ADSE could be the vehicle manufacturer, ADS designer, or other entity. As previously shown at Figure 3 the NTC has identified the following options for a safety assurance system:

- 1. Continue current approach**
- 2. Self-certification**
 - 2a. Voluntary self-certification**
 - 2b. Mandatory self-certification**
- 3. Pre-market approval**
- 4. Accreditation.**

If the Transport and Infrastructure Council chooses mandatory self-certification, pre-market approval or accreditation (options 2b–4) the ADSE can simply be defined as the entity identified as the ADSE under the safety assurance system.

If the options of ‘continue current approach’ or ‘voluntary self-certification’ (options 1–2a) were chosen, legislation would need to clearly define who the ADSE is that is responsible for the actions of the vehicle when the ADS is engaged. For example, the ADSE might be defined as the manufacturer or supplier of the vehicle. These options create a regulatory process that requires someone or an organisation to self-select as an ADSE before the vehicle operates on Australian roads. It is likely that this might be a manufacturer or technology provider because it will need to be a company willing to guarantee that the ADS can provide for the safe operation of the automated vehicle on Australian roads.

In California, draft regulations make the manufacturer responsible for the safe operation of the vehicle when the ADS is engaged at conditional, high and full automation. This includes compliance with traffic laws and applies if the vehicle is operating within its approved design domain.⁹² The regulations define the ‘manufacturer’ as a manufacturer of autonomous technology, including a vehicle manufacturer producing a vehicle from basic components, and a person who modifies any vehicle by installing autonomous technology.⁹³

In the context of vehicles with conditional automation, several stakeholders responding to the April 2017 NTC discussion paper *Clarifying Control of Automated Vehicles* considered that the human occupant or operator of the automated vehicle should be responsible for compliance with the model Australian Road Rules (Owen Hayford, Griffith Law School, RACV).⁹⁴ One considered that the operator would likely have a claim against the manufacturer (Owen Hayford, p. 1) and another considered that it would ensure consumer pressure on manufacturers of automated vehicles to make their products comply with the model Australian Road Rules (Griffith Law School, pp. 4, 7).

⁹² Express Terms, Article 3.8 Deployment of Autonomous Vehicles §228.28.

⁹³ Express Terms, Article 3.7 Testing of Autonomous Vehicles §227.02(h).

⁹⁴ Submissions available at <http://www.ntc.gov.au/submissions/history/?rid=149727&pid=9405>.

Option 1: The entity responsible for the ADS is the fallback-ready user

Advantages

- The fallback-ready user is in the vehicle and is in a position to ensure the ADS is operating correctly.
- This fallback-ready user has a vested interest in the ADS operating correctly, both for personal safety and avoiding responsibility for traffic infringements.

Disadvantages

- It could result in unfairly holding a fallback-ready user responsible for the actions of the ADS when they were not undertaking the dynamic driving task or expected to monitor the external environment. This may reduce consumer appetite for automated vehicles and delay their uptake in Australia.
- This option would not provide an entity for vehicles with high and full automation, as they do not require a fallback-ready user.
- Manufacturers may be less concerned about the capacity of an ADS to comply with the road traffic laws if they do not have direct responsibility.

Option 2: The entity responsible for the ADS is the operator

Advantages

- The operator (the person who sets the vehicle in motion or operates a fleet of dedicated automated vehicles) is in a position to ensure the ADS has the latest software updates, that it and its associated sensors, cameras and lights are operating correctly, and that repairs and maintenance are done by qualified mechanics on a regular basis.

Disadvantages

- This option could be unfair. The operator may not be in the vehicle, or may have been using the vehicle as designed. It is likely to discourage the take-up of these vehicles.
- Manufacturers may be less concerned about the capacity of an ADS to comply with the road traffic laws.

Option 3: The entity responsible for the ADS is the registered operator

Advantages

- The registered operator has a range of existing responsibilities for ensuring their vehicles comply with vehicle standards and are roadworthy.
- The registered operator is in a position to ensure the ADS has the latest software updates, that it and its associated sensors, cameras and lights are operating correctly, and that repairs and maintenance are done by qualified mechanics on a regular basis.

Disadvantages

- This option could be unfair. The registered operator may not be in the vehicle, or may have been using the vehicle as designed. It is likely to discourage the take-up of these vehicles.

- Manufacturers may be less concerned about the capacity of an ADS to comply with the road traffic laws.

Option 4: The entity responsible for the ADS is the manufacturer of the vehicle

Advantages

- If the manufacturer claims the ADS can operate in compliance with the traffic laws, it should be held responsible if it does not.
- A manufacturer will be a corporation and is likely to have the resources to pay any liabilities arising from the ADS's non-compliance.
- Treating the manufacturer as responsible for the actions of the vehicle while the ADS is engaged is consistent with the position being taken by California in its draft regulations.

Disadvantages

- This option may be unfair if an entity other than the manufacturer is the ADSE under the safety assurance scheme because they are certifying that the ADS can operate safely on Australian roads, rather than the manufacturer. The manufacturer should not be responsible if they have not made this assertion.

Option 5: The entity responsible for the ADS is the ADSE identified through the safety assurance system

Advantages

- Under the proposed safety assurance system, the ADSE would already be responsible for ensuring the vehicle was safe to operate on roads. Safe to operate includes complying with relevant road rules.
- The ADSE is likely to be a corporation with resources to pay any liabilities arising from the ADS's non-compliance.

Disadvantages

- Enforcement agencies may not pursue traffic infringements against the ADSE. If the ADSE is a corporation, a relatively minor infringement notice may not be an incentive for an ADSE to change the operation of the ADS, and this may lead enforcement agencies not to pursue these minor matters with an ADSE.

5.4.1 Conclusion

The NTC propose option 5. We consider the ADSE under the safety assurance system has the most control over the ADS. It would be certifying that an ADS can operate safely on Australian roads, including that it can comply with relevant road safety and traffic laws. It is appropriate that it bears responsibility if the ADS does not comply with these laws and that it provides a remedy.

Chapter 6 considers the need for additional responsibilities critical to the safety of an automated vehicle that cannot be controlled by the ADSE to be placed on other entities.

Consultation question

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

5.5 What obligations should apply to the ADSE?

5.5.1 Responsibility for the dynamic driving task

The NTC considers that an ADSE should only be responsible for the things it can control, which are things that can be included in the design and programming of the ADS. An ADS is designed to perform the dynamic driving task within the specific conditions under which it is designed to function (its operational design domain). In principle, an ADSE should only be responsible for the actions of the ADS that are directly related to the dynamic driving task.

A range of duties and obligations are placed on human drivers that do not relate to the dynamic driving task and cannot be included in the design and programming of the ADS.

This approach is consistent with the Californian draft regulations. The responsibilities of the manufacturer are limited to the matters they can control. The draft regulations specify that at conditional automation, the manufacturer is responsible for the safe operation of the vehicle, *including compliance with traffic laws applying to the dynamic driving task*.⁹⁵

5.5.2 Duties relating to the dynamic driving task that an ADS cannot perform

The NTC proposes that an ADSE should not be responsible for some of the dynamic driving task duties that are assigned to (human) drivers. The duties that should be excluded are those that cannot be performed by a system. Duties that cannot be performed by a system are outside the control of the ADSE.

The NTC has only identified limited examples of duties that are part of the dynamic driving task and cannot be performed by an ADS. Some examples from the model Australian Road Rules that assume a human driver or may create difficulty for an ADS include the following:

- Rule 54 How to give a stop signal—where the brake lights are not in working order or not clearly visible the driver must give the stop signal by giving a hand signal or using a mechanical signalling device fitted to the vehicle.
- Rule 219 Lights not to be used to dazzle other road users—a driver must not use, or allow to be used, any light fitted to or in the driver's vehicle to dazzle, or in a way that is likely to dazzle, another road user.
- Rule 103 Load limit signs—a driver must not drive past a bridge load limit (gross mass) sign or gross load limit sign if the total of the gross mass (in tonnes) of the

⁹⁵ Express Terms, Article 3.8 – Deployment of Autonomous Vehicles §228.28.

driver's vehicle, and any vehicle connected to it, is more than the gross mass indicated by the sign.

- Rule 294 Keeping control of a vehicle being towed—the driver of a motor vehicle must not tow a trailer unless the driver can control the movement of the trailer, and it is safe to tow the trailer.

It may be possible to ensure the effect of these rules can be achieved by designing the ADS to achieve the same outcome. The safety assurance system could require that a vehicle includes this design feature. For example, for rule 54 (how to give a stop signal), the ADS could be designed not to operate if all indicators are not functioning at the commencement of the trip or use a mechanical signalling device. For rule 219 (lights not to be used to dazzle other road users), the controls could be designed not to be overridden when the ADS is engaged.

In other cases, the obligation may need to be modified in some way. For example, rule 294 could be amended to prohibit an ADS driver from towing a vehicle except if the manufacturer's instructions specifically allow it.

There are a number of model Australian Road Rules related to the dynamic driving task that at first glance may appear to involve a judgement that an ADS cannot make. These include references to 'as near as practicable to',⁹⁶ 'without unreasonably obstructing',⁹⁷ 'can safely make' a manoeuvre,⁹⁸ and 'for long enough to give sufficient warning'.⁹⁹

These requirements can be translated into objective measurements, such as seconds or metres. This already happens in guidance for learner drivers. One example is the 'three second rule', which is provided to calculate a safe distance for following another vehicle so as to be able to comply with rule 126 (keeping a safe distance behind vehicles).

An ADS can be programmed using such measurements and if the ADS is designed to comply with the requirement, the ADSE should be responsible for the actions of the ADS.

5.5.3 Driver duties and obligations that do not relate to the dynamic driving task

The NTC considers that an ADSE should not be responsible for driver duties that the ADSE cannot or should not control because they are not part of the dynamic driving task.

There is a range of driver obligations that do not relate to the dynamic driving task and cannot be, or may not be able to be, included in the design and programming of the ADS. Many of these relate to safety. They assume that the driver is human. Examples are:

- requirements that involve a mental element such as knowledge—for example, a driver of dangerous goods must not drive if they know, or ought reasonably to know that a situation applies that means transporting the goods is unsafe¹⁰⁰
- requirements that drivers carry documentation—for example, dangerous goods documentation¹⁰¹

⁹⁶ *Australian Road Rules* rule 31.

⁹⁷ *Ibid* rule 37(b).

⁹⁸ *Ibid* rule 37(b).

⁹⁹ *Ibid* rule 46.

¹⁰⁰ See, eg, *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail* cls 3.1.6, 4.4.6, 4.5.8.

¹⁰¹ See, eg, *ibid* cl 11.1.6.

- requirements for a driver to check something—for example, drivers of vehicles transporting a placard load (which are loads carrying over a certain amount of dangerous goods that are required to display placards) may not drive the load if it is not equipped with compliant fire extinguishers and portable warning devices that are correctly stowed¹⁰²
- various duties for drivers of public passenger transport that require the driver to assess a situation or take an action—for example, ensuring the vehicle is clean, treatment of lost property, taking action about dangerous passenger conduct, and accepting hiring for taxis¹⁰³
- requirements that a driver must report in person to a police station if a person is injured and no police attend the crash¹⁰⁴
- requirements to pay parking fees and tolls.¹⁰⁵

The driver duties described above do not relate to the dynamic driving task and in many cases are not possible for an ADS to carry out because the relevant duty cannot be programmed into the ADS.

5.5.4 Conclusion

The NTC's preferred approach is that the ADSE is only made responsible for things within its control. Therefore, it should only be responsible for dynamic driving task obligations. It should not be responsible for duties given to drivers that do not relate to the dynamic driving task.

If the obligations are not appropriate for the ADS to undertake, consideration needs to be given to whether there is a gap. This will require analysis of the legislation to see if other entities currently have the same or a similar obligation or whether the obligation should be placed on another entity. We consider what gaps may arise and how to deal with duties currently assigned to a driver that an ADS cannot perform in chapter 6 at 6.2.

Consultation question

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

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

¹⁰² See, eg, *ibid* cl 12.1.3.

¹⁰³ See, eg, *Passenger Transport (General) Regulation 2017* (NSW) regs 35, 37, 42, 63, 146.

¹⁰⁴ See, eg, *Road Safety Act 1986* (Vic) s 61(1)(e).

¹⁰⁵ See, eg, *Roads Regulation 2008* (NSW) reg 23.

5.6 Legislative approaches to recognise an ADS and an ADSE

If stakeholders agree that an ADSE should be responsible for the dynamic driving task when the ADS is engaged, the question becomes how to implement this in legislation. This section outlines possible approaches for legislative changes to recognise an engaged ADS as controlling or driving the vehicle and the ADSE as the legal entity responsible for the actions of the ADS.

The NTC considers that the ADSE should only be held legally responsible for the activities of the ADS that it can control—that is, the safe operation of the ADS and its performance of the dynamic driving task. It should not be responsible for non-dynamic driving tasks legislation assigned to drivers.

The NTC has identified three approaches to achieve this outcome:

- 1. Expand the definition of driver in Acts that deal with the dynamic driving task to include the ADS when it is engaged and make the ADSE responsible for the actions of the ADS.**
- 2. Exclude the ADS from the definition of driver. Make the ADSE responsible for the safe operation of the vehicle, including compliance with dynamic driving task obligations when the ADS is engaged.**
- 3. Create a new Act for automated vehicles that establishes the dynamic driving task obligations. Make the ADSE responsible for non-compliance with those obligations by the ADS when it is engaged.**

All three approaches have the following benefits:

- It is clear that an ADS is legally permitted to undertake the dynamic driving task.
- They all provide for an ADS to undertake the dynamic driving task in a dedicated automated vehicle, whether or not a human is present.
- The ADSE is only made responsible for offences related to tasks the ADS is designed to undertake.
- The ADSE's responsibilities are clearly defined. This will benefit manufacturers, enforcement officers and automated vehicle users.

All three approaches risk moving in advance of international legal developments.

5.6.1 Approach 1: Expand the definition of driver in Acts that deal with the dynamic driving task to include the ADS when it is engaged and make the ADSE responsible for the actions of the ADS

Under this approach, the definition of driver would be expanded to make the ADS a driver for the dynamic driving task when it is engaged and operating within its operational design domain. The ADSE would be responsible for the actions of the ADS that relate to the dynamic driving task.

It would be necessary to amend the definition of driver in legislation that contains dynamic driving task obligations. This is primarily road traffic and road safety Acts but also includes other legislation that regulates driving and parking in specific places.

Some dynamic driving task obligations that cannot be performed by the ADS may need to be modified or the ADS provided with an exemption. An example is the requirement to use hand signals if the indicator light does not work.

In legislation that contain dynamic driving task obligations, the ADS would need to be exempted from non-dynamic driving task obligations. These responsibilities would need to be assigned to other entities.

The NTC considers that it is not necessary to amend the definition of 'driver' in legislation that does not contain dynamic driving task obligations to include an ADS. If the ADS was included in any definition of 'driver', it would need to be exempted from all obligations because it would not be programmed or be able to perform them. It may be necessary to clarify that an ADS is not a driver for the purposes of these Acts.

Amendments may be required to Acts that contain only non-dynamic driving task driver obligations to ensure, where necessary, driver obligations are assigned to other parties, if they are not already.

This option would require a new definition of 'driver'. It would also require definitions of 'automated driving system', 'dynamic driving task' and 'operational design domain'. An example of how these definitions could work is provided below. The definitions for concepts that currently do not exist in Australian law are based on the concepts in the SAE Standard J3016.

'Driver' means any person who is driving a vehicle (except a motor bike, bicycle, animal or animal-drawn vehicle) or the ADS if the ADS is engaged.

'Automated driving system' means 'the hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis, regardless of whether it is limited to a specific operational design domain'.

'Dynamic driving task' means all 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:

1. lateral vehicle motion control via steering (operational)
2. longitudinal vehicle motion control via acceleration and deceleration (operational)
3. monitoring the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical)
4. object and event response execution (operational and tactical)
5. manoeuvre planning (tactical)
6. enhancing conspicuity via lighting, signalling, gesturing, etc. (tactical).

'Operational design domain' means the specific conditions under which a given driving automation system or feature thereof is designed to function, including, but not limited to, driving modes.

An ADSE will also need to be defined. The definition will depend on the safety assurance system approved by the Transport and Infrastructure Council.

If the Transport and Infrastructure Council chooses a safety assurance system option that requires an ADSE to identify itself, the ADSE could simply be defined as the entity identified under the safety assurance system.

If transport ministers approve a safety assurance system option that does not require an ADSE to identify itself, legislation would need to clearly define who the ADSE is that is responsible for the actions of the vehicle when the ADS is engaged. For example, the ADSE might be defined as the manufacturer, or supplier of the vehicle

5.6.2 Approach 2: Exclude the ADS from the definition of driver. Make the ADSE responsible for the safe operation of the vehicle, including compliance with dynamic driving task obligations when the ADS is engaged.

This approach has been developed based on the approach in the Californian draft regulations which do not include the ADS in the definition of driver, but instead clarify when the manufacturer is responsible for the actions of the automated vehicle.

The proposed Californian regulations amend the definition of driver to ‘the natural person who is operating an autonomous vehicle when it is not operating in the autonomous mode’. The definition of ‘autonomous mode’ provides for the ADS to perform the dynamic driving task, regardless of whether a natural person actively monitors the driving environment.

The proposed regulation specifies that the manufacturer is responsible for the safe operation of the vehicle, including compliance with all traffic laws relating to the dynamic driving task when the ADS is engaged at conditional, high and full levels of automation and operating within its approved operational design domain.

A similar approach could be adopted in Australia by changing the definition of driver to ‘a natural person who is driving the vehicle except when the ADS is engaged’.

When the ADS is not engaged, the human driver would be subject to all driver obligations. They would be responsible for the safe operation of the vehicle, including compliance with all traffic laws applying to the dynamic driving task, any time the vehicle requires the human to take control or is operating outside its approved operational design domain.

Acts with dynamic driving task obligations would be amended to change the definition of driver to exclude when the ADS is engaged. The ADSE would be responsible for the safe operation of the vehicle, including compliance with dynamic driving task obligations when the ADS is engaged. To support this option, various definitions would be required in legislation—in particular, to provide certainty to the ADSE, a definition of what the ‘dynamic driving task’ includes.

All non-dynamic driving task obligations in these Acts would need to be assessed to ensure there were no gaps while the ADS is engaged. This may need to be addressed by assigning obligations to the fallback-ready user or other entities.

Amendments to the dynamic driving task Acts could include clarification that, for the purposes of other Acts, the driver is the driver regardless of whether or not the ADS is engaged (unless specified otherwise in the other law). In the dangerous goods laws, for example, this would mean obligations on drivers to ensure packaging was not damaged would apply even if the ADS was undertaking the dynamic driving task.

For dedicated automated vehicles, no driver obligations would apply because there is no driver. Consideration would need to be given to gaps that could be created and to assigning responsibility to other parties if necessary.

5.6.3 Approach 3: Create a new Act for automated vehicles that establishes the dynamic driving task obligations. Make the ADSE responsible for non-compliance with those obligations by the ADS when it is engaged

Under this option a new automated vehicle Act would be created. Offences involved in the dynamic driving task would be identified, and the ADSE made liable for a contravention of these offences when the ADS was engaged.

The existing offences could be rewritten to apply to an 'automated vehicle' or an ADS and be included in the Act (or regulations for ease of updating). Alternatively, references to the existing offences could be included in the Act or regulations.

An alternative legislative approach could be to determine offences by whether they fell within the definition of the dynamic driving task, rather than listing specific offences. This is the approach taken in the Californian draft regulations, which refer to 'the safe operation of the vehicle including compliance with all traffic laws applicable to the performance of the dynamic driving task'.¹⁰⁶ A weakness of this approach is that it would lack certainty. This might be ameliorated by providing a definition of what the dynamic driving task involves.

Any obligations to be imposed on fallback-ready users, such as sufficient vigilance to handover requests, could be included in this Act. Obligations on other parties, such as on registered operators to install software updates before using the vehicle, could also be included in this Act.

All existing Acts with driver obligations would continue to apply to human drivers. When the ADS was engaged, the new automated vehicle Act would displace the dynamic driving task obligations on a human driver.

Non-dynamic driving task obligations would continue to apply to human drivers. There may be a need to clarify that non-dynamic driving task obligations should apply even when the ADS is engaged, such as dangerous goods driver obligations. For dedicated automated vehicles, all driver obligations would need to be examined to ensure there are no gaps if there is no driver.

5.6.4 Conclusion

The NTC is seeking feedback on the preferred approach. Our initial assessment is that approach 1 ('Expand the definition of driver in Acts that deal with the dynamic driving task to include the ADS when it is engaged and make the ADSE responsible for the actions of the ADS') may be the most efficient. It has the advantages of using existing concepts and an existing legislative framework. It could be implemented through amendments to the model Australian Road Rules, which would help guide a nationally consistent approach and may lead to a timelier outcome. The expansion of an existing concept of 'driver' also has the advantage of being easily understood by the public, government and enforcement agencies.

¹⁰⁶ Express Terms, Article 3.8 - Deployment of Autonomous Vehicles, §228.28(a)(2).

Consultation question

Question 6: How should legislation recognise an ADS and an ADSE? In assessing the above options, please consider the following factors:

- i. legislative efficiency**
- ii. timeliness**
- iii. impact on compliance and enforcement**
- iv. impacts on other schemes such as compulsory third-party insurance**

Are there other options that you prefer? Please provide details of how it would work.

5.7 Approach to analysis of legislation referring to driving

All laws referring to 'driver' and 'driving' will need to be analysed to see how they are affected by the proposed changes.

The NTC has started an analysis of the model Australian Road Rules, Heavy Vehicle National Law and the model dangerous goods legislation. States, territories and the Commonwealth will need to undertake a similar analysis of their own legislation. It would be beneficial to agree a nationally consistent approach to how these analyses are undertaken.

The NTC suggests that the following will need to be considered by each jurisdiction:

1. Identify all Acts that contain the words 'drive', 'driver' or 'driving'.
2. Identify Acts that contain dynamic driving task obligations.
3. Identify Acts that contain non-dynamic driving task obligations for drivers.
4. Consider if the dynamic driving task obligations can apply to the ADS.
5. Consider if the non-dynamic driving task obligations need to be assigned to another party.

6 New obligations and duties for people and entities other than the ADSE

Key points

- Some driver obligations do not relate to the dynamic driving task and cannot be performed by an ADS.
- Legislation should be reviewed to assess if non-dynamic driving obligations placed on human drivers, especially those relating to road safety, would be covered if there is an ADS driver. If gaps are identified, the non-dynamic driving obligations should be reassigned to an entity that is connected with the task or vehicle, and capable of carrying it out.
- A fallback-ready user of a vehicle with conditional automation should have legal obligations to ensure they are alert and ready to take over the dynamic driving task if required.
- A decision needs to be made about whether drug and alcohol offences relating to starting a vehicle should apply to someone starting an automated vehicle.

6.1 Purpose

The purpose of this chapter is to consider whether legislation should place new obligations and duties on people or entities other than the ADSE. The potential new obligations and duties discussed are based on:

- the principle that the ADSE should not bear responsibility for things it cannot control, such as appropriate vehicle maintenance or accepting software updates, and that other people or entities should have appropriate responsibility
- the proposal raised in chapter 5 that the ADSE should only be responsible for the performance by the ADS of dynamic driving task obligations
- the need to ensure non-dynamic driving obligations that an ADS cannot perform are identified and clearly reassigned to another party if necessary for safety or other reasons
- the need to ensure someone who is required to take over the driving task from the ADS is ready to do so and fit to drive.

6.2 Responsibility for non-dynamic driving tasks that cannot be performed by an ADS

Many Acts place obligations on drivers that are not related to the dynamic driving task. These obligations are based on the assumption that the driver is human and is available to undertake tasks involved with the vehicle, such as managing the vehicle's passengers or load, or responding to emergencies and directions from authorised people.

An ADS will need to be exempted from non-dynamic driving task obligations that it is not designed to perform. In some cases obligations may need to be assigned to other entities.

Most of the obligations in the model Australian Road Rules relate to dynamic driving tasks. However, there are also some obligations not related to the dynamic driving task. Table 1 provides some examples from the model Australian Road Rules of obligations that may not be able to be performed by an ADS. The purpose of this table is to illustrate that, in some cases, non-dynamic driver obligations may need to be assigned to other parties. In other situations, the effect of the obligations may be achieved through the ADS design.

Where legislation needs to assign an obligation to another party, this is part of this ‘changing driving laws to support automated vehicles’ reform.

Where safety design solutions are required, this will be considered through the NTC’s safety assurance system reform. If the Transport and Infrastructure Council endorses mandatory self-certification as the preferred safety assurance system government would set high-level safety criteria that an automated vehicle would need to be certified against before it could be used.

Table 1. Non-dynamic driving tasks an ADS may not be able to perform

Rule	Problem	Possible solution
Rule 207	<p>Parking where fees are payable <i>An ADS cannot put money into a parking meter.</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation could be responsible for this task. If the parking fee is not paid, the registered operator would receive an infringement notice, as currently occurs.</p> <p>In a dedicated automated vehicle with no occupant, there may be no party who can perform this task. If the parking fee is not paid, the registered operator would receive an infringement notice, as currently occurs.</p>
Rule 227	<p>Using portable warning triangles—the driver of a heavy vehicle who stops or whose load falls on the road must, in certain circumstances, place portable warning triangles to warn other road users <i>An ADS may not know when a load has fallen, and cannot place warning triangles</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation that includes manual controls could be responsible for this task if they were able to stop the vehicle.</p> <p>In a dedicated automated vehicle an ADS design solution may be required.</p>
Rule 266	<p>Wearing of seatbelts by passengers under 16 years old—the driver must ensure that passengers under 16 years old wear seatbelts. <i>An ADS does not know the age of a passenger</i></p>	<p>This obligation could be placed on the parent or guardian or any adult passenger in the vehicle.</p> <p>In the US, Tennessee has expressly excluded the ADS and the ADS owner from these responsibilities and assigned them to parents and guardians or the person accompanying the person under 16. Some other US states have provided similarly.</p> <p>An ADS design solution could also require occupants to be suitably restrained.</p>

<p>Rule 287</p>	<p>Duties of a driver involved in a crash—the driver must stop at the scene of a crash and provide details to any other driver involved in the crash and to a police officer in some circumstances</p> <p><i>An ADS may not be able to identify another driver involved in the crash or a police officer</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation that includes manual controls could be responsible for this task if they were able to stop the vehicle.</p> <p>In a dedicated automated vehicle with no occupant, an ADS design solution may be required.</p> <p>In the US, the legislation of some states provides that various reporting obligations of a driver are satisfied if the ADS operated vehicle remains at the scene of an accident and the vehicle or its owner or operator contacts law enforcement authorities.</p>
<p>Rule 292</p>	<p>Insecure or overhanging load—a driver must not drive or tow a vehicle if it is carrying a load that is not properly secured to the vehicle, makes the vehicle unstable or projects dangerously.</p> <p><i>An ADS may not know if a load is properly secured, particularly if it is towing the load. Even if it can recognise the problem, it could not remedy it.</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation that includes manual controls could be responsible for this task if they were able to stop the vehicle.</p> <p>In a dedicated automated vehicle with no occupant, there may be no party who can perform this task.</p>
<p>Rule 293</p>	<p>Removing fallen items from the road—if something falls from the vehicle the driver must remove the thing or take action to have the thing removed.</p> <p><i>An ADS may not know something has fallen on the road, and may not be able to remove it.</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation that includes manual controls could be responsible for this task if they were able to stop the vehicle.</p> <p>In a dedicated automated vehicle with no occupant, there may be no party who can perform this task.</p>
<p>Rule 304</p>	<p>Direction by a police officer or authorised person—a person must obey any reasonable direction for the safe and efficient management of traffic from an authorised person</p> <p><i>An ADS is not a ‘person’, may not be able to identify an authorised person, identify a direction, or decide if a direction is reasonable</i></p>	<p>In vehicles with conditional automation, the fallback-ready user could be assigned this task.</p> <p>An occupant of a vehicle with high or full automation that includes manual controls could be responsible for this task.</p> <p>In a dedicated automated vehicle with no occupant, an ADS design solution may be required.</p>

The requirement (as outlined in rule 304 in Table 1) to obey directions from authorised people is found in many Acts. For example, the Heavy Vehicle National Law has similar powers to direct heavy vehicles, and many state and territory road traffic and road safety Acts have similar powers to direct light vehicles. The considerations in Table 1 will also be applicable to these Acts. Some manufacturers are testing solutions for how an ADS interacts with emergency services and enforcement officers.

Some legislation that contains non-dynamic driver obligations places equivalent duties or obligations on other parties associated with the task. This means that where there are obligations on an ADS driver, there may be other parties who are already required to perform the same or equivalent duty to the driver. In these situations, there is no gap for an ADS driver.

For example, the *Model Subordinate Instrument on the Transport of Dangerous Goods by Road or Rail* places responsibilities for the safe packaging, loading and transport of dangerous goods on the driver, consignor, loader, packer and prime contractor. The NTC's analysis suggests that for dedicated automated vehicles, most dangerous goods driver duties would already be covered by other parties. The following four regulations are exceptions that may need to be amended or reassigned to recognise a dedicated automated vehicle.

- 11.1.6—prime contractor must give transport documentation to the driver
- 12.1.13—driver has to stow fire extinguishers and warning devices
- 13.1.1—driver must alert other road users if vehicle is broken down and a traffic hazard
- 14.1.1—driver must notify police, prime contractor and Competent Authority and render assistance.

Passenger transport legislation place many obligations on the drivers of public and private buses, trams, taxis and other hire vehicles for passenger safety, route setting and fare collection. These Acts may require extensive revisions to adjust to dedicated automated passenger transport vehicles. Operation of these vehicles may require special consideration around agreeing fares and payment in advance, security of passengers and protection of vehicle equipment.

6.2.1 Conclusion

The NTC considers that the intent of existing driver obligations need to be maintained both to ensure safety and to ensure a party who is capable of fulfilling the obligation has responsibility for it. Legislation should be reviewed to assess if driver duties are covered when an ADS is in control of a vehicle. If gaps are identified the obligations should be reassigned to someone capable of carrying it out and connected with the task or vehicle.

Consultation question

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

6.3 New duties for maintenance and software updates

It will be essential to the safe operation of automated vehicles that the software is up to date. Over-the-air upgrades allowing for improvements, correcting programming errors or

weaknesses and recognising changes to the road rules and road infrastructure are likely to be needed regularly. The ADSE may not be able to install these directly and may rely on the registered operator of the vehicle or another party to do so.

ADS associated sensors and equipment also need to be kept in working order and repairs carried out by appropriately qualified repairers to the manufacturer's or ADSE's standards.

There needs to be clear requirements about responsibility for the maintenance and repair of automated vehicles.

States and territories already place obligations on registered operators to ensure their vehicles comply with vehicle standards and are roadworthy. An assessment will be required about whether existing duties in legislation sufficiently cover requirements for the registered operator to ensure appropriate maintenance of the ADS. Existing obligations on registered operators may need to be clarified and extended.

Consideration could also be given to imposing a duty on the registered operator to install updates before the vehicle can be used in automated mode on roads. The proposed Californian regulations include this requirement:

The registered owner of the autonomous vehicle shall be responsible for ensuring the vehicle is operated using the manufacturer's most recent updates as specified in this sub-section.¹⁰⁷

The NTC's safety assurance system reform will consider how to ensure parties maintain the vehicle and system appropriately, including whether legislative changes are required. This could form part of a primary safety duty, which is discussed in chapter 7.

6.4 New duties to ensure readiness to drive and take back control

6.4.1 Readiness to drive in a vehicle with conditional automation

A vehicle with conditional automation has limited types of functionality and requires a fallback-ready user to take over when it reaches these limits (SAE International, 2016, p. 17). The ADS is not designed to bring the vehicle to a safe stop without human intervention. The inability of a vehicle with conditional automation to bring itself to a safe stop when it encounters a system failure or reaches the limits of its operational design domain is what distinguishes vehicles with conditional automation from vehicles with high or full automation.

Internationally, vehicle standards and road safety regulators are concerned about the potential of human distraction and error during the transition of control from an ADS to a fallback-ready user. There are risks that a fallback-ready user could be asleep or unprepared to take over the dynamic driving task. There are two approaches to address this issue. The first focuses on requirements for the system design of the ADS. The second focuses on legal obligations on the fall back ready user to ensure they are alert and ready to take over the driving task.

The NTC considers that at this stage in the development of ADS technology, an either/or approach is not desirable. A combination of system design requirements through the

¹⁰⁷ Express Terms, Article 3.8 - Deployment of Autonomous Vehicles §228.06(8)(C).

safety assurance system and legal obligations on the fallback-ready user provides the best assurance that automated vehicles can operate safely.

ADS design feature to ensure safe transition to fallback-ready user

At the international level there has been consideration of the need for design features in automated vehicles to ensure fallback-ready users are alert enough to take over the dynamic driving task from the ADS driver, and to provide more time for the transition.

The United Nations World Forum for the Harmonization of Vehicle Regulations (WP. 29) has indicated its intention to develop additional safety requirements on vehicles with conditional automation including:

- that the system is automatically deactivated only after requesting the driver takes over with a sufficient lead-time
- driver availability recognition to ensure the driver is in the position to take over when requested by the system (UNECE, World Forum for Harmonization of Vehicle Regulations (WP. 29), 2017).

In the US, the NHTSA's 2016 automated vehicle policy provides guidance to manufacturers. On driver alertness and transitions, it states:

Manufacturers and other entities should have a documented process for transitioning to a minimal risk condition when a problem is encountered ... Fall back actions should be administered in a manner that will facilitate safe operations of the vehicle and minimize erratic driving behavior. Such fall back actions should also minimize the effects of errors in human driver recognition and decision-making during and after transitions to manual control (United States Department of Transportation, 2016, p. 30).

Any system design requirements to ensure a safe transition from ADS driver to a human driver will be considered as part of the NTC's safety assurance system reform.

Legal obligations on the fallback-ready user

In addition to proposed requirements for the system design to ensure a safe transition from the ADS to the fallback-ready user, WP.29 also proposed the following obligations on the fallback-ready user:

- The driver shall remain sufficiently vigilant to acknowledge the transition demand and, acknowledge vehicle warnings, mechanical failure or emergency vehicles.
- The driver may turn his or her attention away from the dynamic driving task but can only perform secondary activities with appropriate reaction times.

Recent amendments to the German Road Traffic Act (June 2017) to allow vehicles with conditional and high automation to operate allow the driver to avert their attention from the traffic. However, the driver must remain aware in order to regain control of the vehicle without undue delay either when prompted by the system or when the driver recognises (or must recognise) that the preconditions for the automated driving mode are no longer fulfilled (Federal Council Germany, 2017).

The proposed Californian regulations include a specific requirement that a fallback-ready user in a vehicle with conditional automation has the correct licence.

The NTC considers that in a vehicle with conditional automation the fallback-ready user should hold an appropriate driver's licence because they are required to take over the

driving task if requested. To make this requirement clear, it may need to be specified in legislation.

The idea of placing obligations on the fallback-ready user to remain alert to system errors or requests to intervene was raised in the April 2017 NTC discussion paper, *Clarifying Control of Automated Vehicles*. It suggested that the system of licensed drivers supervising learner drivers provides a precedent for this approach. The supervisor is not driving, but has responsibilities to oversee the learner driver. This means the supervisor must hold a full licence for the type of vehicle and must not be intoxicated.

The majority of government and industry stakeholder responses agreed that the road traffic laws should introduce obligations on the fallback-ready user if the ADS is driving a vehicle operating with conditional automation.

Obligations suggested by stakeholders were that the fallback-ready user should be required:

- to be sufficiently vigilant to handover requests and mechanical failures and that 'sufficiently vigilant' should be interpreted with reference to the manufacturer's instructions about safe behaviours
- not to engage in certain non-driving activities, such as the use of hand-held mobile phones and visual display units
- to take control when it is apparent that the automation is no longer working in a proper manner.

6.4.2 Conclusion

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

The NTC considers that defining 'sufficiently vigilant' by reference to manufacturer's instructions may be unnecessarily prescriptive. The WP.29 proposal suggests that a fallback-ready user should remain sufficiently vigilant to acknowledge the transition demand and acknowledge vehicle warnings, mechanical failure or emergency vehicles. This less prescriptive approach may still achieve sufficient vigilance from fallback-ready users.

The NTC proposes that a fallback-ready user of a vehicle with conditional automation:

- must remain sufficiently vigilant to acknowledge the transition demand and acknowledge vehicle warnings, mechanical failure or emergency vehicles
- may avert their attention from the dynamic driving task and perform secondary activities, but must remain sufficiently vigilant to regain control of the vehicle without undue delay, when required
- must take control when it is apparent that the automation is no longer working in a proper manner
- must take control when requested by the ADS
- must hold the appropriate licence for the vehicle type
- must comply with drug, alcohol and fatigue driver obligations.

Consultation question

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

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

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

6.4.3 Readiness to drive in vehicles with high automation that allow manual driving

In a vehicle with high automation, the ADS can bring the vehicle to a safe stop without human intervention. This means that a human could travel in a vehicle with high automation without having to be ready or able to drive.

However, a human could choose to take over the driving task of a vehicle with high automation that allows for manual driving. For example, a vehicle that can be driven in high automation mode on a freeway but must be driven by a human driver in other parts of the road network. Key situations include when the ADS is leaving its operational design domain. The human would have a choice of allowing the ADS to bring the vehicle to a safe stop, or taking over the driving task themselves to continue the vehicle's journey. If the human chooses to take over the driving task, the driver obligations will apply. He or she will need to be licensed and fit to drive, including compliance with drug and alcohol obligations.

Because the ADS can bring the vehicle to a safe stop, there may not be the same need to place readiness-to-drive responsibilities on the human occupant as there is for conditional automation. To do so could limit access to some of the consumer benefits of automated vehicles, such as the ability to sleep while travelling. In addition, in vehicles with high automation there may be no need for a person to be seated in the driver's seat. If there were multiple occupants in the vehicle, it would be unclear whether the readiness-to-drive obligations applied to some of them or all of them.

Although a fallback-ready user is not required at high levels of automation, there may be road safety risks in not placing readiness-to-drive obligations on a human who may be required to take over the driving task at a later stage of the trip. One example is the potential for road hazards and congestion if a vehicle with high automation brings itself to a safe stop at the end of its operational design domain. The vehicle could remain there for a significant period—for example, waiting for an occupant of the vehicle to wake up.¹⁰⁸

¹⁰⁸ There are restrictions on stopping in an emergency stopping lane (Australian Road Rule 178) that may prevent stopping in this situation. These rules may need to be amended.

6.4.4 Conclusion

The NTC proposes that no additional obligations are placed on human occupants of vehicles operating in high automation mode. Existing obligations would cover the driver at the point that they take over driving.

These considerations are not relevant for dedicated vehicles with high or full automation designed without human driver controls. The humans in these vehicles should be regarded as passengers. No additional readiness to drive obligations are necessary because the vehicle is not designed for a human to drive.

Consultation questions

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

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

6.5 Duties of a driver—fatigue

The Heavy Vehicle National Law places duties on drivers of fatigue-regulated heavy vehicles as well as others in the chain of responsibility, such as the employer, to ensure a driver does not drive when fatigued.¹⁰⁹ These fatigue obligations are aimed at reducing the human error caused by fatigue that leads to road accidents.

Fatigue is not a relevant concept for an ADS so these provisions would not be relevant to the ADS. However, fatigue provisions should apply to a fallback-ready user for a fatigue-regulated heavy vehicle. There will also be a need to consider how fatigue requirements should apply in situations where a human driver is not the fallback-ready user but will take over driving at some stage in the journey—for example, when the vehicle is leaving its operational design domain.

6.6 Duties of a driver—alcohol and drugs

Alcohol and drug obligations are not relevant to an ADS because it is incapable of driving while under the influence of alcohol or drugs. However, some drug and alcohol offences may still apply to humans before the ADS is engaged. These situations may have an unintended impact on users of vehicles with high and full automation.

Most state and territory road traffic and road safety laws prohibit driving or attempting to put a vehicle in motion while affected by alcohol or drugs.¹¹⁰ These offences may apply to a human starting a vehicle with high or full automation and setting its route and destination

¹⁰⁹ *Heavy Vehicle National Law Act 2012* (Qld) sch pt 6.

¹¹⁰ See, eg, *Road Traffic Act 1974* (WA) s 63; *Road Traffic Act 1961* (SA) s 47; *Road Transport Act 2013* (NSW) s 112; *Traffic Act* (NT) s19(2); *Road Transport (Alcohol and Drugs) Act 1977* (ACT) ss 19A, 24(3).

before the ADS is engaged. In some states and territories—for example, Victoria,¹¹¹ Queensland¹¹² and Tasmania¹¹³—the drink- and drug-driving obligations apply to the person ‘in charge’ of the vehicle. This could include the passengers in a vehicle with high or full automation.

The NTC believes that the introduction of automated vehicles will have overall safety benefits for the road network by reducing the risk of human error. Barriers to use will reduce the uptake of automated vehicles and, therefore, the associated road safety benefits. One potential barrier to receiving the full benefits of automated vehicles would be to require occupants of automated vehicles, who are not driving, to comply with drink-driving laws. This would create a barrier to using a vehicle to safely drive home after drinking. Enabling people to use an automated vehicle to drive them home despite having consumed alcohol has the potential to improve road safety outcomes by reducing the incidence of drink-driving.

Legislative amendments could be made to exempt people who set a vehicle with high or full automation in motion from the drink- and drug-driving provisions.

A risk of providing exemptions is that an occupant may subsequently choose to take over driving the vehicle while under the influence of alcohol or drugs. If this occurred, they would become the driver of the vehicle and drink and drug driving offences would apply. However, the road safety risks of exempting someone who may take over the driving task from the offences that prohibit driving or attempting to put a vehicle in motion while affected by alcohol or drugs, and waiting to see if they do in fact take over the driving task, may be too great. Governments will need to make a policy decision on where the overall safety benefit lies.

The application of an exemption is clear-cut for dedicated automated vehicles, which are not designed for a human driver. The occupants will always be passengers. The situation is analogous to a person instructing a taxi driver where to go.

Any exemptions should not apply to the fallback-ready user of a vehicle with conditional automation. A fallback-ready user is required to be receptive to requests to intervene or system failures and must take over the dynamic driving task if the ADS cannot perform it.

6.6.1 Conclusion

The NTC considers that there should be clear exemptions from the drink- and drug-driving offences concerning starting a vehicle and being in charge of a vehicle for a person who starts, or who is a passenger in, a dedicated automated vehicle. There is no possibility that a human could drive a dedicated automated vehicle so there is no safety risk associated with drink driving.

On balance, the NTC considers that provisions relating to starting and setting in motion should apply to a person who is starting a vehicle with high or full automation that allows manual driving. These offences exist because a person who starts or sets in motion a conventional vehicle while under the influence clearly has an intention to drive. They pose an imminent safety risk to themselves and other road users. In a vehicle with high or full automation, the person’s intention in starting or setting in motion the vehicle would most likely be to have the ADS safely drive them home. However, the NTC is of the view that

¹¹¹ *Road Safety Act 1986* (Vic) s 49.

¹¹² *Transport Operations (Road Use Management) Act 1995* (Qld) s 79.

¹¹³ *Road Safety (Alcohol and Drugs) Act 1970* (Tas) s 2(4).

the safety risk that exists if someone who is drunk decides to take over driving is too high. For this reason, a person who starts an automated vehicle and may take over driving should not be exempted from these offences.

Consultation questions

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

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

7 ADSE sanctions and penalties

Key points

- Existing road traffic penalties are clearly aimed at influencing the behaviour of human drivers—without change, they are unlikely to be appropriate or effective when applied to an ADSE.
- If existing road traffic penalties apply to an ADSE, corporate multipliers are likely to increase the effectiveness of those penalties.
- Breaches of road traffic laws should be taken as evidence of a broader failure to provide safe automated vehicles and as a breach of the primary safety duty or other specific offences included in the safety assurance system.

7.1 Purpose

The purpose of this chapter is to examine what penalties and sanctions are appropriate if legislative changes:

- allow an ADS to perform the driving task when it is engaged
- provide that an ADSE is responsible for the actions of the vehicle when the ADS is performing the dynamic driving task, including compliance with traffic laws.

If an ADSE is responsible for compliance with relevant road traffic laws when the ADS is engaged, two questions relating to penalties and sanctions arise:

1. What are the appropriate penalties for ADSE breaches of road traffic laws?
2. How do any breaches of road traffic laws by an ADSE link to the safety assurance approval process?

In the event of a breach of a road traffic law by an ADSE, it is possible that a prosecutor could have both avenues available and that the appropriate penalty or sanction will depend on the facts of a given case.

The NTC is seeking your feedback on how penalties and sanctions should apply to the ADSE.

7.2 Linkages with the NTC reform to develop a safety assurance system

Further detail about the regulation of the ADSE's responsibility to provide a safe automated vehicle and potential legal obligations and duties are being considered as part of the safety assurance system for automated vehicles. A key issue will be how sanctions and penalties for breaches of the road traffic laws take into consideration any separate safety assurance sanctions and penalties, including a potential primary safety duty to provide and maintain a safe automated vehicle.

Arguably, there will be a reduced emphasis on prescriptive road traffic offences caused by the ADSE if there are stronger sanctions and penalties for a failure to provide a safe automated vehicle, or for failure by the ADSE to comply with the safety assurance system.

7.3 Many existing road traffic offences could apply to the ADSE

Existing state and territory laws have offences for breaches of road traffic laws based on an assumption that there is a human driver. Incentives to comply with the road traffic laws are therefore based on individual penalties given to the human driver.

The Australian Road Rules indicate when a breach of a particular rule is an offence by the use of the words ‘offence provision’.¹¹⁴ Each state and territory decides the penalty for the offence.¹¹⁵ As discussed in chapter 5, some driver offences are unlikely to apply to an ADS because they require a mental element, or are otherwise inapplicable to a non-human driver—for example, offences related to transporting dangerous goods knowing that the goods are not loaded correctly.

However, many other road traffic offences could apply because they relate to the dynamic driving task—that is, offences that seek to ensure safe and standardised behaviours on public roads. Such offences are crucial to road safety and are within the control of the ADSE. The majority of the Australian Road Rules could be categorised in this way—for example, offences of:

- driving over the speed limit
- failure to give way
- failure to abide by other traffic signs and road markings
- failure to obey traffic lights.

These offences could therefore apply to the ADSE. If so, what are the appropriate and effective penalties for ADSE breaches of road traffic laws, given that the ADSE is likely to be a corporation and not necessarily responsive to small, one-off penalties?

7.4 Appropriate and effective ADSE penalties for road traffic breaches

The principle objective of penalties for breaches of road traffic laws is to encourage compliance to provide for safe roads. The current offence and penalty provisions focus on ensuring that each individual human driver has sufficient motivation to drive safely. Current legislation provides penalties for individual offences caused by human drivers, with penalties including fines, demerit points, licence suspension, vehicle impounding and imprisonment. This individual penalty approach for a specific offence—instead of a general unsafe driving offence—has been adopted by states and territories since the inception of road traffic laws.

Without any changes, these penalties are unlikely to adequately incentivise ADS safety and compliance with road safety laws. The current penalty types are also unlikely to have a deterrent effect.¹¹⁶ For example, if a vehicle makes an incorrect turn with the ADS engaged, it is likely to be due to a technical error. That fault may be a systemic issue across that model of vehicle and constitute a significant safety hazard. If that is the case, sanctions such as an enforceable undertaking for the manufacturer to resolve the technical issue (with appropriate corporate penalties if it fails to do so) may provide a

¹¹⁴ *Australian Road Rules* rule 10(1).

¹¹⁵ *Ibid* rule 10(2).

¹¹⁶ The principle that penalties should have a deterrent effect is explicit in the *Crimes Act 1914* (Cth) 16A. The court must consider the deterrent effect that any sentence or order under consideration may have both on the person and on other persons.

better compliance mechanism than a minor financial penalty. In Victoria, for example this offence is penalised by a \$159 infringement notice (the maximum penalty is \$475.71) and three demerit points.¹¹⁷

In some cases, existing penalties will not be relevant to an ADSE. For example, demerit points are applicable to a 'natural person'. Suspension of a driver's licence would not apply to a corporate ADSE because an ADSE will not hold a driver's licence, although an ADS may have to be approved by a safety assurance system as an alternative to driver licensing regimes.

In other cases, existing penalties, such as vehicle impounding, would penalise a registered operator rather than the ADSE. Likewise, unless there were executive officer liability, imprisonment would not be an applicable penalty for a corporate ADSE given a corporation lacks a physical presence and cannot be sentenced to a term of imprisonment (Gibson, 2005, p. 58).

7.5 How ADSE penalties for road traffic breaches could be implemented

Relying on the existing penalty regimes in the road traffic laws could work by issuing infringement notices directly to the ADSE applying the existing monetary penalty. This may require legislative change to recognise an ADSE as an entity that can be issued with an infringement notice.

This would also require the ADSE to ensure, through the safety assurance process, that there is a mechanism in place for enforcement agencies to be able to identify that the ADS is engaged at a particular time (including at the time of detection for on-road enforcement). An alternative would be to issue the infringement notice to the registered operator and require that they nominate the ADSE as responsible for the offence.

7.6 Apply corporate multipliers to existing offences

To achieve effective enforcement, monetary penalties 'must be, and ... *must be seen to be*, serious enough to act as a deterrent and to deliver the appropriate level of moral culpability for the wrong done' (Comino, 2014, p. 196). Corporate multipliers of monetary penalties may therefore be a more effective way to impact and incentivise ADS safety and compliance with road traffic laws.

A corporate multiplier would impose a larger penalty for an offence by the ADSE corporation than by a human driver. The rationale for corporate multipliers is that it 'ensures that corporations can be more effectively punished for serious offences ... and reflects their different resources' (Wells, 2001, p. 34).

The approach of using a corporate multiplier is used across a range of legislation and has been part of Australian transport law for some time. Corporate multipliers are used in relation to camera recorded offences to impose a greater penalty on corporations. For example, in New South Wales the maximum monetary penalty that a court may impose on a corporation is five times that for which a natural person would be liable.¹¹⁸

¹¹⁷ *Road Safety Rules 2017* (Vic) rule 27(1).

¹¹⁸ *Road Transport Act 2013* (NSW) s 184(2).

Amendments to the Heavy Vehicle National Law that are scheduled to take effect in 2018 use a 10-times corporate multiplier if a body corporate breaches the new safety duty.¹¹⁹

However, even with a corporate multiplier, a monetary penalty may not be an effective incentive for an ADSE to comply. There is a risk that a penalty system based on individual offences will fail to address systemic safety risks. There is also a risk that corporations may regard such penalties as a business expense and seek to shift the monetary burden on to consumers through increasing the price of products and services (Gibson, 2005, p. 58).

In summary, the application of existing road traffic penalties to the ADSE, even with a corporate multiplier applied, may not be sufficient to achieve road safety and road traffic compliance objectives.

Advantages of using existing offences and penalties

- The offences exist already, and it is a relatively simple and streamlined approach that reduces the need for extensive legislative change.
- People are familiar with the offences and monetary penalties, so it is easy for both the public and businesses to understand.
- It does not require regulators to engage in comprehensive audits or investigations to undertake a successful prosecution.

Disadvantages of using existing offences and penalties

- Reliance solely on existing monetary penalties, even with a corporate multiplier, appears unlikely to have a deterrent effect on the ADSE or other ADSEs.
- There may be an insufficient focus on safety and a lack of clarity about when a breach of road traffic law needs to be reported to the proposed safety assurance system. It is unlikely to address systemic issues with a series of ADS vehicles because there is no mechanism to ensure this.

7.7 Regulate the ADSE as part of the safety assurance system

Alternatively, or in addition to, penalties for road traffic breaches, sanctions and penalties for the ADSE could be regulated as part of the safety assurance system. Breaches of road traffic laws could be taken as evidence of a broader failure to provide safe vehicles and would result in sanctions and penalties targeting the ADSE for not maintaining safe vehicles rather than focus on offences for specific road traffic breaches. The sanctions and penalties administered through the safety assurance system would be able to take into consideration how the safety risks are being managed by the ADSE and focus on continual safety improvement rather than punitive and potentially ineffective monetary penalties. Ultimately, approval for the ADS could be withdrawn.

The safety assurance system could include a range of duties, powers and specific offences to ensure compliance such as:

- a primary safety duty for parties (including the ADSE) to provide safe automated vehicles with associated penalties

¹¹⁹ *Heavy Vehicle National Law and Other Legislation Amendment Act 2016* (Qld) ss 26F-26G. *Heavy Vehicle National Law Act 2012* (Qld) sch s 596 provides a current multiplier for corporations of five times the maximum fine for an individual.

- specific offences for failure to have an ADS approved (or re-approved) if there are significant modifications
- specific offences for failure to comply with the conditions of approval of the safety assurance system
- a range of powers to assist regulators in securing effective compliance, including auditing powers.

A primary safety duty is a statutory duty of care that imposes a legal obligation on the party or parties it applies to. A primary safety duty to ensure automated vehicle safety could apply at first supply of the vehicle to market, or be an ongoing duty throughout the life cycle of the vehicle. A primary safety duty to ensure automated vehicle safety could be based on existing models such as work health safety, rail safety law, the Heavy Vehicle National Law and civil and criminal negligence.

A primary safety duty could be applied to a range of parties including the ADSE. Other parties could include manufacturers, technology suppliers and service providers. A primary safety duty would operate alongside prescriptive duties and offences integral to the safety assurance system.

Many stakeholders who made submissions to the NTC discussion paper on *Regulatory Options to Assure Automated Vehicle Safety in Australia* published in June 2017 supported the introduction of a primary safety duty.

As noted above, breaches of road traffic laws could be taken as evidence of a broader failure to provide safe automated vehicles and as a breach of the primary safety duty or other specific offences included in the safety assurance system.

Adopting this approach, further work would be required to establish enforcement policies to determine which offence is appropriate, and to establish processes for state and territory agencies to report systemic in-service breaches to the agency responsible for the safety assurance system. This is likely to reinforce the importance for police to be able to identify automated vehicles when undertaking road-based enforcement activities.

Advantages of regulating the ADSE through the safety assurance system rather than exclusively through road traffic offences

- It is a more sophisticated approach to compliance and enforcement that focuses on safety outcomes. It targets unsafe behaviours and incentivises continuing safety improvements.
- Sanctions could include enforceable undertakings and prohibition notices, which could result in greater safety outcomes in relation to ADSEs compared with monetary penalties.
- In comparison with specific road traffic offences, it creates more relevant offences with appropriate penalties.
- It recognises that individual breaches of road traffic laws could be symptomatic of technical failure, rather than human error.
- Individuals and businesses are familiar with risk-based safety legislation such as work health safety.
- It could exist alongside specific offences for road traffic breaches by the ADSE. Offences underpinning the safety assurance system do not have to replace road traffic offences.

Disadvantages of regulating the ADSE through the safety assurance system rather than exclusively through road traffic offences

- This approach is more complicated than using existing offences and penalties. It could require increased capabilities and resources of a regulator to ensure compliance and to undertake audits and investigations.
- New obligations and offences would need to be created, requiring extensive legislative change.
- It may require comprehensive education of manufacturers and service providers about their safety responsibilities, particularly for parties that are not based in Australia.
- It may create perceptions of inequality if individuals are fined for road traffic breaches but ADSEs are not.

7.8 Conclusion

For discussion purposes, the NTC suggests that:

- existing road traffic penalties are clearly aimed at influencing the behaviour of human drivers—without change, they are unlikely to be appropriate or effective when applied to an ADSE
- if existing road traffic penalties apply to an ADSE, corporate multipliers are likely to increase the effectiveness of those penalties
- breaches of road traffic laws should be taken as evidence of a broader failure to provide safe automated vehicles and as a breach of the primary safety duty or other specific offences included in the safety assurance system
- a primary safety duty be examined as part of the safety assurance system reforms.

Consultation questions

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

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

Glossary

Term ¹²⁰	Definition
Australian Road Rules	National model law intended to provide the basis for nationally consistent road rule in each jurisdiction. These rules do not, by themselves, have any legal effect.
automated driving system (ADS)	Hardware and software collectively capable of performing the entire dynamic driving task on a sustained basis. It is a type of driving automation system used in vehicles with conditional, high or full automation..
automated driving system entity (ADSE)	The legal entity responsible for the ADS. This could be the manufacturer, operator, legal owner of the vehicle or another entity.
conditional automation*	When an automated vehicle drives the vehicle for sustained periods of time. The human driver does not have to monitor the driving environment or the ADS but must be receptive to any system failures and intervene if requested and be the fallback for the dynamic driving task.
dynamic driving task*	<p>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:</p> <ul style="list-style-type: none"> • 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) • enhancing conspicuity via lighting, signaling, gesturing, etc. (tactical).
full automation*	When all aspects of the driving task and monitoring of the driving environment and the dynamic driving task are to be undertaken by the vehicle system. The vehicle can operate on all roads at all times.
Heavy Vehicle National Law	National laws related to the regulation of heavy vehicles over 4.5 tonnes. Operational in all Australian states and territories except Western Australia and the Northern Territory.

¹²⁰ Terms marked with an asterisk are quoted or paraphrased from SAE International Standard J3016.

high automation*	When the system drives the vehicle for sustained periods in some situations, or all of the time in defined places, and no human driver is required to monitor the driving environment and the driving task, or to intervene, when the system is driving the vehicle.
operational design domain*	The specific conditions under which a given driving automation system or feature of that system is designed to function, including, but not limited to, driving modes.
partial automation*	When the ADS may take control of steering, acceleration and braking in defined circumstances but that the human driver must continue to monitor the driving environment and the driving task, and intervene if required.
SAE	Society of Automotive Engineers
safety assurance system	A regulatory mechanism for governments to assess the safety performance of an automated vehicle to ensure it can operate safely on the network.
system failure*	A malfunction in a driving automation system or other vehicle system that prevents the driving automation system from reliably sustaining dynamic driving task performance (partial or complete).
United Nations Economic Commission for Europe (UNECE)	Intergovernmental organisation promoting pan-European economic integration. Consists of 56 member states from Europe, Central Asia and North America that work on economic advancement and sustainable development.
WP. 1	Working Group on Road Traffic Safety (WP. 1) established in 1988 as an intergovernmental body with the aim of improving road safety. In 2017 it was renamed the Global Forum for Road Traffic Safety (WP. 1).
WP. 29	World Forum for Harmonization of Vehicle Regulations, which creates regulatory instruments relating to motor vehicles and their equipment. It reports to the UNECE Inland Transport Committee.

References

- Australian Securities & Investment Commission 2015, *Enforceable undertakings: regulatory guide 100*, viewed 12 September 2017, <<http://download.asic.gov.au/media/2976014/rg100-published-19-february-2015.pdf>>.
- Collins English dictionary online 2017, 'Manufacturer', viewed 9 September 2017, <www.collinsdictionary.com/dictionary/english/manufacturer>.
- Comino, V 2014, 'James Hardie and the problems of the Australian civil penalties regime', *University of New South Wales Law Journal*, vol 37, no.1, pp. 195–230.
- Commonwealth of Australia 2007, *Review of Sanctions in Corporate Law*, Commonwealth of Australia, Canberra.
- Commonwealth of Australia 2016, *Australian Consumer Law: Consumer guarantees: a guide for businesses and legal practitioners*, Commonwealth of Australia, Canberra.
- Department of Motor Vehicles (California) 2017, *Deployment of autonomous vehicles for public operation*, viewed 24 August 2017, <<https://www.dmv.ca.gov/portal/dmv/detail/vr/autonomous/auto>>.
- Economic Commission for Europe: Global Forum for Road Traffic Safety 2017, *Automated Driving*, viewed 22 August 2017, <<https://www.unece.org/fileadmin/DAM/trans/doc/2017/wp1/ECE-TRANS-WP1-2017-Informal-2e.pdf>>.
- Federal Council Germany 2017, *Entwurf eines ... Gesetzes zur Änderung des Straßenverkehrsgesetzes*, viewed 11 September 2017, <http://www.bundesrat.de/SharedDocs/drucksachen/2017/0001-0100/69-17.pdf?__blob=publicationFile&v=1>.
- Gibson A 2005, 'The intangible offender: sentencing corporations for federal offences', *Australian Law Reform Commission Reform Journal*, vol. 87, pp. 57-60.
- National Conference of State Legislatures 2017, *Autonomous vehicles | Self-driving vehicles enacted legislation*, viewed 13 September 2017, <<http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>>.
- National Highway Traffic Safety Administration 2016, *Letter to Google Inc 4 February 2016*, viewed 13 September 2017, <<https://isearch.nhtsa.gov/files/Google%20>--

%20compiled%20response%20to%2012%20Nov%20%2015%20interp%20re
quest%20--%204%20Feb%2016%20final.htm>.

National Transport Commission 2017, *Regulatory options to assure automated vehicle safety in Australia*, National Transport Commission, Melbourne.

Nehme M 2010, 'Enforceable Undertaking: A Restorative Sanction?', *Monash University Law Review*, 19, vol. 36 no. 2, p. 108.

Parliament of the Commonwealth of Australia: House of Representatives Standing Committee on Industry, Innovation, Science and Resources 2017, *Social issues relating to land-based automated vehicles in Australia*, Commonwealth of Australia, Canberra.

QBE 2017, *The most common causes of car accidents in Australia*, viewed 11 September 2017, <<https://www.qbe.com.au/news/car/the-most-common-causes-of-car-accidents-in-australia>>.

SAE International 2016, *Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles*, viewed 11 September 2017, <http://standards.sae.org/j3016_201609/>.

Smith B W 2014, 'Automated Vehicles are Probably Legal in the United States', *Texas A & M Law Review*, vol. 1, pp. 411–521.

Texas Parliament 2017, *Bill analysis S.B. 2205*, viewed 25 August 2017, <<http://www.capitol.state.tx.us/tlodocs/85R/analysis/pdf/SB02205F.pdf#navpanes=0>>.

Tranter K 2016, 'The challenges of autonomous motor vehicles for Queensland road and criminal laws', *QUT Law Review*, vol. 16, no. 2, p. 59–81.

UNECE World Forum for Harmonization of Vehicle Regulations (WP 29) 2017, *A proposal for the definitions of automated driving under WP.29 and the general principles for developing a UN Regulation*. Document No. ITS/AD-11-06, UNECE.

United Nations 1968, *Convention on Road Traffic*, United Nations, Vienna.

United States Department of Transportation 2016, *Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety*, viewed 22 August 2017, <<https://icsw.nhtsa.gov/nhtsa/av/>>.

United States Department of Transportation 2017, *Automated Driving Systems 2.0: A Vision for Safety*, viewed 20 September 2017, <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13069a-ads2.0_090617_v9a_tag.pdf>.

United States Department of Transportation 2017, *Automated vehicles*, viewed 10 September 2017, <<https://www.nhtsa.gov/technology-innovation/automated-vehicles>>.

Wells C 2001, *Corporations and Criminal Responsibility*, 2nd ed., Oxford University Press, Oxford.