

In-service safety for automated vehicles

June 2020

**Decision regulation
impact statement**

Report outline

Title	In-service safety for automated vehicles
Type of report	Decision regulation impact statement
Purpose	For the Transport and Infrastructure Council's approval in June 2020
Abstract	<p>This decision RIS and associated PwC cost-benefit analysis assess four options to manage the in-service safety of automated vehicles in Australia. We recommend an approach that includes a general safety duty on automated driving system entities and a single national regulator. Either option 3 (a single national regulator enforces a general safety duty through Commonwealth law) or option 4 (a single national regulator enforces a general safety duty through state or territory applied law) could form the basis of the end-state regulatory framework.</p> <p>We conclude that option 3 is preferable because it:</p> <ul style="list-style-type: none">▪ achieves a single market through federal jurisdiction and allows for nationally consistent enforcement through the Federal Court, meaning it would provide better national consistency than option 4▪ allows for more efficient implementation and maintenance of law through one parliament. <p>PwC's cost-benefit analysis found option 3 to have the highest net benefit, primarily because it was assessed as the option least likely to delay the uptake of automated vehicles in Australia.</p>
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Key words	automated driving systems, automated driving system entities, cost-benefit analysis, general safety duty, regulation impact statement, safety assurance system
Contact	<p>National Transport Commission Level 3/600 Bourke Street Melbourne VIC 3000 Ph: (03) 9236 5000 Email: enquiries@ntc.gov.au www.ntc.gov.au</p>

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Glossary

Term	Definition
Australian Design Rules (ADRs)	National standards for safety, anti-theft and emissions in vehicle design.
Australian Road Rules	National model law intended to provide the basis for nationally consistent road rules in each jurisdiction. These rules do not, by themselves, have any legal effect.
Austroads	The peak organisation of Australasian road transport and traffic agencies.
Automated driving system (ADS)	The 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 SAE levels 3, 4 or 5 of automation as established in standard SAE J3016 by the Society of Automotive Engineers International (SAE).
Automated driving system entity (ADSE)	The legal entity that certifies that the automated driving system (ADS) can safely perform the driving task in place of a human driver. The ADSE will self-nominate by seeking type approval for the ADS under the <i>Road Vehicle Standards Act 2018</i> (Cth).
Automated vehicles	A vehicle with SAE levels 3–5 automation. It is a vehicle that has an automated driving system, which means that it is capable of performing the entire dynamic driving task on a sustained basis without human input. It is distinct from vehicles with automated features to assist a driver (SAE levels 1–2), which still require a human driver to perform part of the dynamic driving task.
Council of Australian Governments (COAG)	The peak Australian intergovernmental forum comprising the heads of Commonwealth, state and territory governments and the Australian Local Government Association.
Department of Infrastructure, Transport, Regional Development and Cities (DITRDC)	Department of the Commonwealth government responsible for administering the <i>Road Vehicle Standards Act 2018</i> and housing the Office of Future Transport Technology.

Dynamic driving task	All the operational and tactical functions required to operate a vehicle in on-road traffic. This includes steering, acceleration and deceleration, object and event detection and response, manoeuvre planning and enhancing conspicuity through lighting signalling, etc. The dynamic driving task excludes strategic functions like trip planning, such as where and when to travel and route selections.
Driving automation features	Automation features that assist the driver, such as lane-changing features. A vehicle with driver assistance features is not capable of performing the entire dynamic driving task and requires a human driver. It can cover SAE level 1 (either longitudinal or lateral vehicle control) and SAE level 2 (longitudinal and lateral control).
Fallback-ready user	A human in a vehicle with SAE level 3 automation who can operate the vehicle, 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.
First supply	The market entry of motor vehicles to Australia.
<i>Geneva Convention on Road Traffic 1949</i>	A convention on road traffic created before the Vienna Convention. Australia is a contracting party to this convention.
Global Forum on Road Traffic Safety (WP.1)	A permanent working party of the UNECE (see below) that administers the Geneva and Vienna Conventions.
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.
Human-machine interface	Interface between a human operator and a machine. Includes functional and ergonomic design of the interface (human factors).
In service	Vehicles supplied to the Australian market and are now in use.
In-service safety	The safety of automated vehicles once the vehicles are on the roads or 'in service'.
<i>Motor Vehicle Standards Act 1989 (Cth)</i>	Commonwealth legislation to control the safety, environmental and antitheft performance of all new and used vehicles entering the

	Australian market for the first time. The Road Vehicle Standards Act 2018 (Cth) will replace this Act.
National Heavy Vehicle Regulator	Australia's independent regulator for all vehicles over 4.5 tonnes gross vehicle mass (heavy vehicles). It administers one set of laws for heavy vehicles under the Heavy Vehicle National Law, delivering a comprehensive range of services under a consistent regulatory framework.
National Highway Traffic Safety Administration	An agency of the Executive Branch of the United States Government and part of the Department of Transportation. Its functions include writing and enforcing Federal Motor Vehicle Safety Standards and licensing vehicle manufacturers and importers.
Operational design domain (ODD)	The specific conditions under which a driving automation system or feature is designed to function (for example, locations, weather conditions, driving modes).
Parliamentary Counsel's Committee	A committee representing the legislative drafting offices in Australia and New Zealand.
<i>Road Vehicle Standards Act 2018 (Cth)</i>	Commonwealth legislation to control the safety, environmental and anti-theft performance of all new and used vehicles entering the Australian market for the first time, and to set national road vehicle standards. It will replace the <i>Motor Vehicle Standards Act 1989 (Cth)</i> from 2019. The main provisions of the Act will come into effect on 10 December 2019. There will be a 12-month transitional period allowing some type approval holders to continue operating under existing approvals until 10 December 2020.
Remote driver	The remote driver (sometimes described as a 'remote operator' or 'teleoperator') is a human who can operate an automated vehicle but who is not seated in a position to manually operate vehicle controls such as brakes and steering (SAE International, 2018, p. 16). A remote driver may operate the vehicle from outside it or inside it.
Society of Automotive Engineers (SAE)	A global professional association and standards-developing organisation for engineering professionals. It established the levels of vehicle automation in its technical document J3016.
SAE level 3	Where the ADS undertakes the entire dynamic driving task in situations within its 'operational design domain'. 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. SAE level 3 is also referred to as 'conditional automation'.

SAE level 4	Where the ADS undertakes the entire dynamic driving task for sustained periods in situations within its 'operational design domain'. When the system is driving the vehicle, a human driver is not required to monitor the driving environment or the driving task. Nor are they required to intervene because the ADS can bring the vehicle to a safe stop unassisted. SAE level 4 is also referred to as 'high automation'.
SAE level 5	Where 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. SAE level 5 is also referred to as 'full automation'.
System failure	A malfunction in a driving automation system and/or other vehicle system that prevents the driving automation system from reliably sustaining dynamic driving task performance (partial or complete).
Transport and Infrastructure Council	Group comprising Commonwealth, state, territory and New Zealand ministers with responsibility for transport and infrastructure issues, as well as the Australian Local Government Association.
United Nations Economic Commission for Europe Working Party 1 (WP.1)	United Nations permanent body that focuses on improving road safety. Its primary function is to serve as guardian of the United Nations legal instruments aimed at harmonising traffic rules.
United Nations Economic Commission for Europe Working Party 29 (WP.29)	United Nations forum within the institutional framework of the UNECE Inland Transport Committee. It works as a global forum allowing open discussion on motor vehicle regulations.
<i>Vienna Convention on Road Traffic 1968</i>	A convention that covers road traffic safety entered into at Vienna in 1968. Australia is not a contracting party.

Introduction

Automated vehicles (AVs) have the potential to fundamentally change transport and deliver safety, productivity, environmental and mobility benefits to Australians.

The National Transport Commission (NTC) is working with states, territories and the Commonwealth government on a program of reform to ensure Australians can gain these benefits. The NTC's aim is to develop a flexible and responsive regulatory environment for the commercial deployment of AVs that supports safety and innovation.

In November 2018, transport ministers agreed that Australia will adopt a national approach to the safety assurance of AVs when they first enter the market. This will be based on mandatory self-certification by companies introducing AV technology into Australia. This decision Regulation Impact Statement (RIS) delivers another key reform, building on ministers' earlier decision to address the safety of AVs throughout their life on the road.

Australian transport ministers have agreed to work towards establishing a single, national approach to regulating AVs when they are commercially deployed on our roads. This approach will include a general safety duty for companies introducing AV technology into Australia with the expectation that they are able to validate its safety. This general safety duty will be introduced under a national law and overseen by a national regulator.

The approach provides assurance to the community on safety and provides certainty for industry.

The NTC will carry out further work over the next 12 months in partnership with Australian governments to develop the detail of the national approach, including:

- the implementation of the approach in legislation
- the form and powers of a national AV regulator
- how a national AV regulator would interact with other agencies
- how to deal with vehicle modifications.

The recommended approach set out in this decision RIS is based on consultation with a wide range of government and industry stakeholders. We would like to thank each organisation and individual for their contribution to this process and encourage you to continue to work with us on this important national reform.



Gillian Miles
Chief Executive Officer and Commissioner



Marcus Burke
Executive Leader, Future Technologies

Executive summary

Context

Ministers' decisions to date

This decision regulation impact statement (RIS) forms part of the National Transport Commission's (NTC) roadmap of reform to develop a nationally consistent regulatory framework to support the safe commercial deployment of automated vehicles in Australia.

The Transport and Infrastructure Council has made several key decisions concerning the regulation of automated vehicles that inform this decision RIS. In May 2018 the council agreed for a uniform approach to driving laws for automated vehicles to be taken through developing purpose-built law. It also agreed that when the automated driving system (ADS) is engaged, it is the automated driving system entity (ADSE) that is responsible for complying with dynamic driving task obligations, rather than the human user.

In November 2018 transport ministers agreed to mandatory self-certification for ADSs at their first supply to the Australian market. An ADSE must self-certify against safety criteria, demonstrating how it will manage safety risks. The safety criteria will be incorporated into existing regulatory frameworks for the first supply of vehicles to the Australian market through the *Road Vehicle Standards Act 2018* (Cth).

Transport ministers asked the National Transport Commission to do further work on how automated vehicles should be regulated once they are in use on Australian roads ('in service'). We developed a consultation RIS in July 2019 to engage with the community on the available options, and PwC completed an independent cost-benefit analysis (CBA).

Problem statement

Automated vehicles are expected to improve road safety by reducing the number of crashes arising from human error. However, there are risks associated with introducing automated vehicles. In our current regulatory environment, when automated vehicles become ready for deployment:

- they may introduce new in-service safety risks that the market will not eliminate or mitigate
- nationally inconsistent approaches to in-service safety and multiple regulators without clearly defined roles could be a regulatory barrier to market entry.

The objective of government action is to create an environment for automated vehicles that:

- eliminates or mitigates in-service safety risks
- minimises regulatory costs, barriers and burdens
- opens the Australian market to automated vehicle technology.

Consultation

This decision RIS seeks agreement to a national regulatory approach that ensures automated vehicles will be able to operate legally in Australia and supports their safe operation once they are in service.

The NTC engaged extensively with industry, governments and other stakeholders around the country to discuss the reform options. We sought both written and verbal comments on our consultation RIS. We also engaged with international government and industry stakeholders.

We have considered the views gathered from submissions and consultation on our July 2019 consultation RIS and incorporated these into our analysis to develop this decision RIS. The evidence contained in the decision RIS and CBA will assist the Transport and Infrastructure Council to decide the best approach to in-service safety for automated vehicles.

Options to address the problem

The decision RIS and PwC CBA assess four options for regulating in-service safety of automated vehicles. The four options assessed are:

Option 1 (baseline): Current approach: This option does not introduce any new safety duties or obligations for the in-service safety of automated vehicles at the national level. Instead, in-service safety is managed separately by each state and territory through existing regulatory frameworks.

Option 2: State and territory-based regulators enforce prescriptive safety duties (option 2a) or general safety duties (option 2b) under state and territory laws based on a national model law.

Option 3: A single national regulator enforces a general safety duty through Commonwealth law.

Option 4: A single national regulator enforces a general safety duty through state or territory applied law.

Conclusions and recommendations

Need for regulation

Existing regulation and legal frameworks developed for regulating conventional vehicles and drivers do not adequately cover new risks that are unique to automated vehicles. We consider that automated vehicle in-service safety risks could be adequately addressed through a mix of regulatory approaches. The regulatory framework should include a general safety duty supported by some prescriptive rules or performance-based regulation. This RIS identifies parties to which these duties and regulations should apply.

National law and national regulator

This RIS recommends a national law and single national regulator to manage in-service safety of automated vehicles. Without such an approach, regulation could create unnecessary costs and burdens for governments and regulated parties, which may be passed on to consumers. A single regulator also avoids the inefficiencies and duplication caused by having eight separate regulators.

General safety duty applying to ADSEs supported by prescriptive rules as required

We identified the relevant parties that will have an influence on the in-service safety of automated vehicles (chapter 3). These parties were categorised for the level of their influence on in-service safety: major, moderate or low. We assessed which of these parties are already adequately regulated (in relation to automated vehicle safety) through existing

regulation. Through this analysis we identified the following parties with a major influence on in-service safety that are not adequately regulated (chapter 4): ADSEs, ADSE executive officers, remote drivers and fallback-ready users.

We considered three regulatory approaches to regulate the identified parties: prescriptive rules, performance-based regulation and general safety duties. We conclude that a principles-based, general safety duty, supplemented by prescriptive rules (where required) is the appropriate regulatory approach for ensuring ADSEs manage safety risks within their control (chapter 5).

The general safety duty should be the central feature of an automated vehicle national law. However, the law should enable prescriptive regulation for the limited circumstances where it is warranted.

We propose that the automated vehicle national law should provide a head of power for subordinate, prescriptive rules to regulate the dynamic driving task when performed by an ADS. Those rules would have national application (chapter 6).

Recommended approach

This decision RIS identifies the best regulatory approach to managing the in-service safety of automated vehicles as including:

- a specialised national regulator for in-service safety supported by necessary functions, powers and duties authorised to regulate the ADSE, ADSE executive officers and remote drivers (teleoperators)
- a general safety duty on the ADSE, supported by certain prescriptive rules where necessary
- due diligence obligations on executive officers of the ADSE to ensure the ADSE complies with the safety duty.

We assess options 3 and 4, which both include a general safety duty and a single national regulator, as best enabling efficient administration of these duties within a single national market (chapter 10). Either option 3 or option 4 could form the basis of the end-state regulatory framework. PwC's CBA supports this proposition, as do the submissions of most stakeholders (notably those of Australian governments).

We conclude that option 3 is preferable because it:

- achieves a single market through federal jurisdiction and allows for nationally consistent enforcement through the Federal Court of Australia, which provides greater national consistency than option 4
- allows for more efficient implementation and maintenance of law through one parliament.

PwC's CBA also assessed option 3 as having the greatest net benefit, primarily because it was assessed as the option least likely to lead to delays in the uptake of automated vehicles in Australia.

Next steps

This decision RIS recommends the key features of a regulatory framework for automated vehicles in Australia. It should assist ministers as they make decisions on regulating automated vehicles throughout 2020.

The next stages of work will include additional detail on the differences between how option 3 and 4 would operate in practice. State, territory and Commonwealth governments have suggested that this work be done before asking ministers to decide between option 3 and 4. Key matters to be assessed in the next phase of work are:

- compliance and enforcement for the in-service national law
- the regulation of aftermarket modifications that enable new automation features, or that potentially diminish the safety of automated vehicles previously approved at first supply
- Austroads' projects on:
 - vehicle registration data necessary to support automated vehicles
 - optimal business and information systems architecture for providing road agency-owned data to manufacturers of automated vehicles, cooperative intelligent transport systems devices and maps
- outcomes of the various automated vehicle trials currently enabled by Australian governments.

The NTC proposes that transport ministers be asked to make a final decision between options 3 and 4 in May 2021. By that time industry will have had a further 12 months to mature and more will be known about the regulatory approaches of other jurisdictions, including what is determined through international forums.

This staggered approach to decision making allows Australia's policy development to continue to advance and therefore provide industry and government certainty, without getting ahead of international developments.

1 Context

Key points

- Automated vehicles have the potential to provide significant benefits to Australian society. Initial models are expected to be commercially deployed between 2020 and 2022.
- In November 2018 transport ministers agreed that the National Transport Commission should propose an appropriate regulatory framework for the in-service safety of automated vehicles.
- In July 2019 our consultation regulation impact statement sought feedback on:
 - the role of different parties in the in-service safety of automated vehicles
 - any additional safety duties that should apply to these parties
 - the institutional and regulatory arrangements to support these duties.
- This paper considers the feedback received from stakeholders to provide recommendations to transport ministers.

1.1 Purpose of this chapter

The purpose of this chapter is to:

- outline the objectives of the in-service safety for automated vehicles reform
- outline some key terms and concepts that will feature in the document
- introduce policy work and key ministerial decisions to date
- explain the scope of the reform.

1.2 Objectives of this work

The objective of the reform is to develop a regulatory approach that ensures automated vehicles can operate legally on Australian roads and support their safe operation once they are on roads ('in service').

1.3 About the National Transport Commission

The National Transport Commission (NTC) is a statutory agency that proposes nationally consistent land transport reforms to the Transport and Infrastructure Council. The council comprises Commonwealth, state and territory ministers who are responsible for transport and infrastructure. Our reforms are objectively assessed against the following policy objectives:

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

1.4 About this decision regulation impact statement

In November 2018 transport ministers agreed to mandatory self-certification for automated driving systems (ADS) at their first supply to the Australian market. The entity seeking to bring an ADS to market in Australia, which we describe as the automated driving system entity (ADSE), must self-certify against safety criteria demonstrating how it will manage safety risks. The safety criteria will be incorporated into existing regulatory frameworks for first supply of vehicles to the Australian market through the *Road Vehicle Standards Act 2018* (Cth).¹ This is described in more detail at 1.7.3.

At that time, transport ministers asked us to do further work on in-service safety for automated vehicles. To appropriately respond to the feedback on previous consultations, including the 2018 consultation, our consultation regulation impact statement (RIS)² explored:

- the role of different parties in the in-service safety of automated vehicles
- any additional safety duties that should apply to these parties
- the institutional and regulatory arrangements to support these duties.

The consultation RIS engaged with the community on the available options. A RIS is required for all government decisions that are likely to have a measurable impact on businesses, community organisations or individuals. They analyse the potential impacts of new policy proposals and regulatory options and present an evidence base for decision making on regulatory options.

PwC undertook an independent cost-benefit analysis (CBA) to assess the proposed options in the consultation RIS.

We have considered the views gathered from submissions and consultation, incorporating these into our analysis to develop this decision RIS. The evidence contained in the decision RIS and CBA will assist the Transport and Infrastructure Council to decide the best approach to in-service safety for automated vehicles.

1.5 The opportunity

Automated vehicles have the potential to provide a significant range of benefits to Australian society. Transport ministers asked the NTC to develop regulation for automated vehicles so that Australia can be an early beneficiary of the potential benefits including the following:

- **Improvements in road safety** – vehicles have the potential to reduce road accidents caused by human error by removing or reducing the role of a human driver. The United States (US) Department of Transportation attributes the cause of 94 per cent

¹ Market entry (or first supply) of vehicles in Australia has been regulated under the *Motor Vehicle Standards Act 1989* (Cth); however, the *Road Vehicle Standards Act 2018* (Cth) will replace that Act no later than 1 July 2021. The commencement date will mark a 12-month transitional period allowing some type approval holders to continue operating under existing approvals. The Road Vehicle Standards Act also provides a framework for recalls of vehicles and vehicle components, which had previously been issued under Australian Consumer Law. This paper focuses on the Road Vehicle Standards Act and its subordinate rules, and not the frameworks that the Act is replacing.

² The consultation RIS can be accessed at:

<https://www.ntc.gov.au/sites/default/files/assets/files/NTC%20Consultation%20RIS%20-%20In-service%20safety%20for%20automated%20vehicles.pdf>

of all crashes to human error (Singh, 2018, p. 1). The most common causes of road accidents in Australia are driver fatigue, speed, driver distraction (including mobile phones) and alcohol or drug use (Budget Direct, 2019). In Australia during 2018, there were 1,145 road deaths (Department of Infrastructure, Regional Development and Cities, 2019a, p. 1).

- In addition to the loss of human life or injury, traffic accidents have a range of other costs 'including property damage; lost earnings; lost household production; medical costs; emergency services; vocational rehabilitation; workplace costs; administrative costs; legal costs; and pain, suffering, and lost quality of life' (Anderson, et al., 2016, p. 10). The annual economic cost of road injury and death in Australia is estimated at \$30 billion (Australian Road Research Board, 2019).
- **Improved access and mobility options** – including for young people, elderly people (Reimer, 2014) and people with a disability. Benefits include 'personal independence, reduction in social isolation, and access to essential services' (Anderson, et al., 2016, p. 17). Fleet-operated automated vehicles may offer a fast and convenient transport option for lower income people and households that cannot afford to own a motor vehicle, improving their access to education, jobs, goods and services.
- **More efficient traffic flow and potential reductions in congestion** – automated vehicle fleet services may be critical in avoiding new congestion problems (Fagnant & Kockelmann, 2018). Automated vehicles could increase highway capacity by 100 per cent (Sundquist, 2016). Automated vehicles may encourage an increase in travel due to the lower time cost of driving and lead to more congestion. However, they may result in a more efficient traffic flow because of their ability to constantly monitor surrounding traffic and respond with finely tuned braking and acceleration adjustments. This means they should be able to travel safely at higher speeds, follow other vehicles more closely and respond more quickly to traffic lights (Anderson, et al., 2016). Additionally, they could lead to a reduction in crash-related traffic congestion (Anderson, et al., 2016).
- **Reduction in the costs associated with congestion** – Traffic congestion in Australian cities could cost \$53.3 billion per annum by 2031 (Infrastructure Australia, 2015, p. 9). UBS estimates a net positive impact on congestion because automated vehicles will be used in a smarter way (UBS, 2017). A 2016 RAND report suggests that automated vehicle technology 'appears almost certain to offer major benefits in terms of reducing the costs associated with traffic congestion' (Anderson, et al., 2016, p. 24). This is because even if automated vehicles do not have a major impact in reducing congestion, they could free a driver to undertake activities other than driving. Additional travel time is one of the key costs associated with traffic congestion (Anderson, et al., 2016). As automated vehicles could operate with smaller headways between vehicles, the capacity of the transport network could be increased without the cost of new lanes or motorways (Infrastructure Partnerships Australia, 2017, p. 13). There could also be a reduction in required parking spaces by 15 per cent (Ohio University, 2019).

Evidence provided to a 2017 House of Representatives Standing Committee inquiry recognised that automated vehicles are likely to bring a range of benefits. Evidence presented 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, reduced congestion and improved urban planning and use of space (Parliament of the Commonwealth of Australia, 2017).

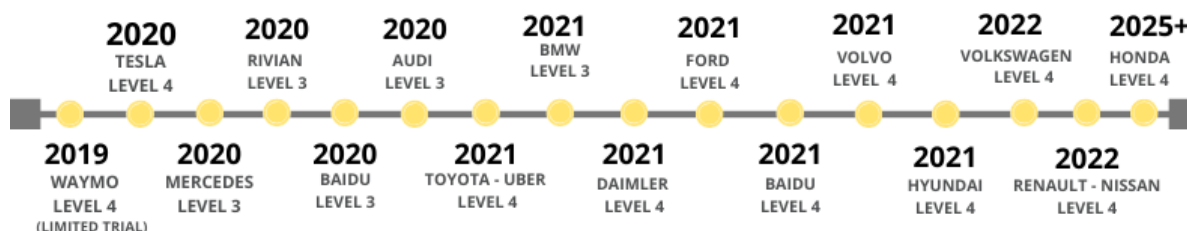
Commentators suggest that regulation is required to ensure the safe introduction and on-road use of automated vehicles (Lohmann & van der Zwaan, 2018, p. 3). In the US commentators note that 'vehicle autonomy offers promise, but only if it is implemented under

a comprehensive and well-thought-out regulatory schema that addresses the complexities of this new technology' (Safety Research & Strategies Inc., 2019, p. 13).

1.5.1 Timelines for deployment

Our understanding is that major vehicle manufacturers and technology companies expect initial ADS models (SAE level 3 or above) to be commercially available to overseas markets between 2020 and 2022. Figure 1 shows a timeline of predicted international release dates of ADS models as announced by the respective manufacturers.

Figure 1. Timeline of manufacturers' predicted release of automated vehicles



We recognise that these timelines could change significantly based on technology developments and outcomes of trials. Some manufacturers may choose to focus their initial product offerings in the larger markets such as the US, Europe and China. This means there may be a delay between commercial deployment to international markets and to the Australian market.

1.5.2 Two emerging markets

Two major markets are likely to emerge for automated vehicles: a market for vehicles (vehicles privately owned by a household) and a market for rides (taxis, rideshare or public bus services) (Grush & Niles, 2018, p. 73).

It is predicted that original equipment manufacturers will shift into also offering rideshare services. This is because LIDAR sensors are currently too expensive to deploy in cars for consumer sale, automated driving capabilities are too limited geographically and the ridesharing industry is worth five times that of auto manufacturing and sales (The Economist, 2018). Ford, traditionally known for manufacturing and selling vehicles, is now expanding into offering an automated vehicle service that it will trial in three cities in the US in 2021 (Marakby, 2019). Mercedes intends to operate a fleet of automated vehicles controlling its operation and activity from a 'fleet operations center' (Mercedes-Benz and Bosch, 2019). This will allow Mercedes to control where and when such vehicles are deployed, which will minimise risk and allow Mercedes to control the operational design domain (ODD) of its fleet.

It is often predicted that increased automation will lead to a decline in personal ownership of vehicles and a greater proportion of fleet ownership and shared mobility (Deloitte, 2016). It may be many years before automated vehicles are cheap enough for individuals to purchase (The Economist, 2018). Many users could share a fleet of cars. Users could summon an automated vehicle that would pick up and drop the user off before departing to accommodate another user. New models of car ownership could see carmakers own most of the market's automated vehicles that are used through a rideshare service. Regulation will need to accommodate a changing market 'for buying cars and [...] for buying rides. Both will be significant, mutually competitive, and demanding of space, infrastructure, regulation, and investment' (Grush & Niles, 2018, p. 74).

1.6 Key concepts

Automated driving technology has created many new terms and concepts that are not always used consistently. We briefly describe some of the key concepts and how we use them in Table 1. More explanations are available in the glossary.

Table 1. Key terms

Automated driving system (ADS) means the 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 SAE levels 3, 4 or 5 of automation.

Automated driving system entity (ADSE) means the self-nominated party that will certify that the ADS can safely perform the driving task in place of a human driver. The ADSE will self-nominate at first supply when applying to the Commonwealth Government for type approval of the ADS.

Automated vehicle means a vehicle with Society of Automotive Engineers (SAE) levels 3–5. It is a vehicle that has an ADS, which means it can perform the entire dynamic driving task on a sustained basis without human input. It is distinct from vehicles with automated features to assist a driver (SAE levels 1–2), which still require a human driver to perform part of the dynamic driving task.

Dynamic driving task means all the operational and tactical functions required to operate a vehicle in on-road traffic. This includes steering, acceleration and deceleration, object and event detection and response, manoeuvre planning and enhancing conspicuity through lighting signalling and so on. The dynamic driving task excludes strategic functions such as trip planning (where and when to travel and route selections).

Driving automation features means automation features that assist the driver such as lane changing features. A vehicle with driver assistance features is not capable of performing the entire dynamic driving task and requires a human driver. It can cover SAE level 1 (either longitudinal or lateral vehicle control) and SAE level 2 (longitudinal and lateral control).

Fallback-ready user means a human in a vehicle with SAE level 3 automation who can operate the vehicle, and who is receptive to requests from the ADS to intervene and to evident dynamic driving task performance-relevant system failures. The fallback-ready user is expected to respond by taking control of the vehicle.

In-service safety means the safety of automated vehicles once the vehicles are on the roads or ‘in service’.

Operational design domain (ODD) means the specific conditions under which an ADS or feature is designed to function (for example, location, weather conditions, driving modes).

SAE level 3 means the ADS undertakes the entire dynamic driving task in situations within its ‘operational design domain’ (see above). 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. SAE level 3 is also referred to as ‘conditional automation’.

SAE level 4 means the ADS undertakes the entire dynamic driving task in situations within its ‘operational design domain’ (see above). When the system is driving the vehicle, a human driver is not required to monitor the driving environment or the driving task. Nor are they required to intervene, because the ADS can bring the vehicle to a safe stop unassisted. SAE level 4 is also referred to as ‘high automation’.

SAE level 5 means the ADS undertakes all aspects of the dynamic driving task and monitoring of the driving environment. The ADS can operate on all roads at all times. No human driver is required. SAE level 5 is also referred to as ‘full automation’.

Levels of automation

The Society of Automotive Engineers has developed a six-level classification to describe levels of driving automation in SAE J3016, *Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles* (SAE International, 2018). These levels are widely used internationally to provide a common language for developing policy and regulatory responses for automated vehicles. The levels range from ‘no automation’ (level 0), where the human driver carries out all the driving tasks, to ‘full automation’ (level 5), where the ADS carries out all the driving tasks.

A key distinction for the NTC that defines the scope of our work is between vehicles with an ADS and vehicles with ‘driving automation features’ – described in Table 1. Our national reform program focuses on ‘automated vehicles’, which we describe as vehicles that include an ADS (SAE levels 3–5). Only vehicles with an ADS are capable of driving on a sustained basis without human assistance.

Figure 2 provides a simplified explanation of the six levels of vehicle automation, describing the role of the vehicle (ADS or driver assistance features) and the role of a human driver at each level. The levels are derived from the SAE J3016.

Figure 2. Levels of vehicle automation

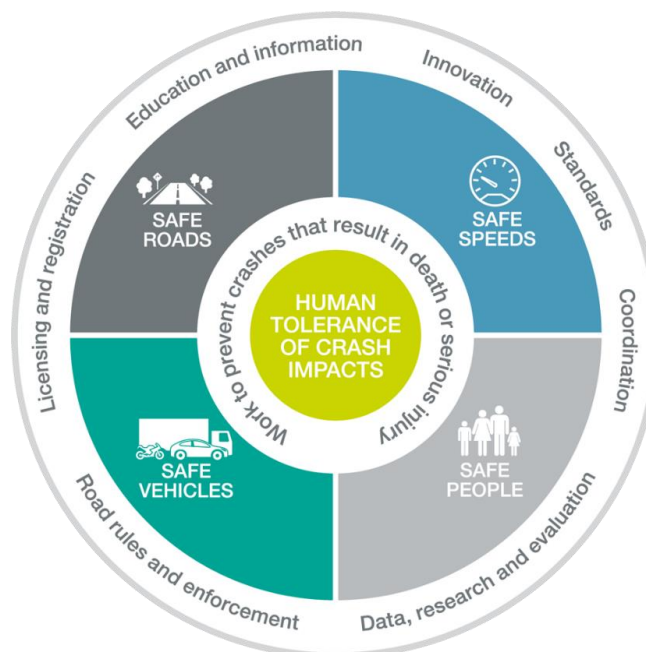
Levels of vehicle automation						
	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Vehicle's role	Nothing	Accelerates and brakes OR steers e.g. cruise control	Accelerates and brakes AND steers e.g. automated reverse parking	Everything, only under certain conditions e.g. specific locations, speed, weather, time of day	Everything, only under certain conditions e.g. specific locations, speed, weather, time of day	Everything
Human driver's role	Everything	Everything but with some assistance	Remains in control, monitors and reacts to the driving environment	Must be capable of regaining control on request when vehicle is driving	Nothing when vehicle is driving, but everything at other times	Nothing

1.7 Background

1.7.1 National road safety strategy

The *National road safety strategy 2011–2020* expresses the strong commitment of all Australian governments to road safety (Australian Transport Council, 2019). It is based on the Safe System approach to improving road safety, outlined in Figure 3.

Figure 3. The Safe System approach



Source: Australian Transport Council, 2019

The Safe System approach includes the principle of shared responsibility, recognising that responsibility for road safety is shared by multiple parties, not just individual road users. The concept of shared responsibility is captured throughout this decision RIS.

1.7.2 NTC's broader automated vehicle national reform program

The in-service safety reform is part of a broader national reform program for the NTC that aims to develop end-to-end regulation to support the safe, commercial deployment and operation of automated vehicles at all levels of automation. The NTC is collaborating closely with the Commonwealth, Austroads and state and territory governments to ensure an integrated regulatory system is designed.

Figure 4 illustrates existing end-to-end regulatory process and initiatives from the NTC, Austroads and the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) to prepare Australia for automated vehicles.

Figure 4. End-to-end regulatory process

Stage	Initiative	Owner	Status
 Import and manufacture	UN harmonization of vehicle standards	Commonwealth	Ongoing
	Safety criteria for first supply of automated vehicles	Commonwealth	Ongoing
 Registration and licensing	Framework for registration and licensing of automated vehicles	Austroads	Ongoing
	Integrating advanced driver assistance systems in driver education	Austroads	Ongoing
 On the road	In-service safety for automated vehicles	NTC	Ongoing
	Operation of automated heavy vehicles in remote and regional areas	Austroads	Complete
	National enforcement guidelines for automated vehicles	NTC	Complete
	Regulating government access to C-ITS and automated vehicle data	NTC	Ongoing
	Review of motor accident injury insurance and automated vehicles	NTC	Ongoing
 Infrastructure	Infrastructure for automated vehicles: freeways and highways, traffic signs, line markings	Austroads	Ongoing
	Road authority data for connected and automated vehicles	Austroads	Ongoing

1.7.3 Key ministerial decisions

Australia's transport ministers have already agreed several key policy elements for regulating automated vehicles. The decisions most relevant to this decision RIS are outlined below.

Purpose-built national law

Transport ministers have agreed that Australia will develop a new purpose-built national law to regulate the on-road operation of automated vehicles (May 2018). Among other matters, ministers agreed that the purpose-built national law should:

- allow an ADS to perform the dynamic driving task when it is engaged and provide the dynamic driving task obligations
- provide that the ADSE is responsible for dynamic driving task obligations when the ADS is engaged

- provide duties on a fallback-ready user.³

We are working through some of the detail of this new national law, such as dynamic driving task obligations, as part of this decision RIS.

Mandatory self-certification against safety criteria at first supply

Transport ministers have agreed that the approach to assuring safety when an ADS is first supplied to the Australian market will be mandatory self-certification (National Transport Commission, 2018c). The entity bringing the ADS to market (the ADSE) needs to provide evidence against a set of safety criteria. The ADSE will apply to the Commonwealth government for type approval⁴ of the ADS as a component under the vehicle certification system at first supply to the Australian market. The approach will be incorporated using existing regulatory frameworks for the first supply of conventional vehicles to the Australian market (Road Vehicle Standards Act).

The applicant must self-certify against the following criteria to demonstrate how it will manage safety risks, before their ADS can be supplied to the Australian market:

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

Ministers also agreed three other obligations on ADSEs to manage liability for events such as road traffic law breaches and crashes:

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

More information about each of the safety criteria and other obligations is in Appendix B. DITRDC has responsibility for the Road Vehicle Standards Act and will implement the safety criteria and other obligations using the ADRs and a range of other instruments.

³ The 'fallback-ready user' is discussed in chapter 4.

⁴ 'Type approval' refers to a pre-market approval process for a road vehicle (or road vehicle component) under the Road Vehicle Standards Act. Once a vehicle receives this certification, it is entered in the Register of Approved Vehicles by DITRDC. The vehicle may be provided for the first time in Australia and registered in a state or territory. When the safety assurance system for automated vehicles at first supply is implemented, ADSEs will be able to receive type approval if their ADS meets a set of safety criteria and obligations as well as any other relevant Australian Design Rules (ADRs). Once international standards develop and are incorporated into ADRs to recognise the approval of ADSs, ADSEs will also be able to get type approval if they meet these standards (potentially combined with some of the safety criteria and obligations).

1.7.4 Links between in-service safety and first supply of automated vehicles

ADSEs will need to self-certify against a set of safety criteria and obligations before they are granted a type approval to supply their ADS into the market. The Commonwealth will only grant a type approval where the ADSE has been able to demonstrate it has appropriate processes for managing the safety risks the safety criteria cover (as well as meeting all other standards relevant to the vehicle).

The ADS must continue to operate in compliance with the ADSE's self-certification while it is in service. The Commonwealth can manage many in-service safety risks by using compliance and enforcement mechanisms under the Road Vehicles Standards Act to address noncompliance with the safety criteria.

However, the first-supply type approval only relates to self-certification statements made at a point in time. This means there are in-service safety risks that will not be fully covered by an approval at first supply. For example, the Commonwealth will not be able to monitor an ADS's actual compliance with road rules, how it interacts with enforcement and emergency services on the road and at the roadside, or whether system upgrades are installed.

The first-supply approval will also record other relevant matters for in-service safety. It will:

- identify who the ADSE for an ADS is (the ADSE will be legally responsible for the safety of the ADS over its life)
- identify the ODD of an ADS (the ODD defines the limits of the ADSs on-road capabilities)
- verify that an ADS can comply with the relevant road rules.

1.8 Scope of the reform

1.8.1 Matters in scope

This decision RIS assesses regulatory reform options for the in-service safety of automated vehicles including:

- the role of different parties in the in-service safety of automated vehicles
- existing regulation of these parties and whether any additional safety duties should apply to these parties
- institutional and regulatory arrangements to support these safety duties.

1.8.2 Matters out of scope

The following areas are out of scope for this decision RIS:

- Detailed compliance and enforcement options, including specific powers of the in-service safety regulator to support any new obligations, and sanctions and penalties, are out of scope. The NTC will consider this in a subsequent phase of work that will be informed by the outcomes of this work and our work on government access to vehicle generated data.
- Amendments to the Heavy Vehicle National Law are also out of scope. This RIS considers in-service safety duties for both light and heavy vehicles to ensure consistency. There may be a need to amend the Heavy Vehicle National Law, but we are not considering specific changes to that law in this RIS.

- Amendments to state and territory legislation, including passenger transport legislation, criminal law and road management legislation, are not considered.

Issues that do not relate to developing regulation, such as urban planning and infrastructure requirements, are outside our mandate. We work closely with other agencies that are considering these issues. Figure 4 (see section 1.7.2) outlines the range of work being undertaken to prepare for national commercial deployment of automated vehicles and identifies the responsible agency.

1.8.3 Links to other NTC reforms

The following NTC reforms are not part of the automated vehicle reform program; however, there are links between these reform programs and regulating for automated vehicles.

Driver distraction

The NTC is assessing technology-neutral regulatory options for addressing driver distraction. Any changes to legislation resulting from this project would only apply to drivers of vehicles operating at SAE levels 0–2. Distraction is also a factor in automated vehicles for someone who is required to, or permitted to, take over driving from an ADS. We sought stakeholder feedback on key issues between late 2018 and early 2019, releasing a consultation RIS in June 2019 with options for reform. The Transport and Infrastructure Council is expected to consider a decision RIS recommending a preferred regulatory approach in May 2020. The NTC will ensure any new rules developed for driver distraction are technology-neutral and compatible with increased levels of automation.

Heavy Vehicle National Law review

The NTC is reviewing the Heavy Vehicle National Law and will be consulting on reforms until mid-2020. The review is considering the entirety of the law and its regulations, except the functions of the National Heavy Vehicle Regulator (NHVR).

The Heavy Vehicle National Law review aims to develop performance and outcome-focused regulation. This will support the use of new technology in heavy vehicles, including increased levels of automation.

1.9 Deciding on the most effective option

In developing the decision RIS we have been guided by Council of Australian Governments' (COAG) advice contained in the *Best practice regulation a guide for ministerial councils and national standard setting bodies* (Council of Australian Governments, 2007).

1.9.1 Principles for best practice regulation

COAG has agreed on eight principles for best practice regulation making, and that all governments will ensure that regulatory processes in their jurisdiction are consistent with these principles (Council of Australian Governments, 2007, pp. 4-6).

Transport ministers will assess the decision RIS recommendations for in-service safety of automated vehicles against these principles, which are set out below. The RIS process is designed to help ministers ensure the principles are implemented in a way that:

- establishes a case for action before addressing a problem

- considers a range of feasible policy options, including self-regulatory, co-regulatory and non-regulatory approaches, and their benefits and costs
- adopts the option that generates the greatest net benefit for the community
- accords with the Competition Principles Agreement, meaning that legislation should not restrict competition unless it can be demonstrated that:
 - the benefits of the restrictions to the community as a whole outweigh the costs
 - the objectives of the regulation can only be achieved by restricting competition
- provides effective guidance to relevant regulators and regulated parties to ensure the policy intent and expected compliance requirements of the regulation are clear
- ensures regulation remains relevant and effective over time
- consults effectively with affected key stakeholders at all stages of the regulatory cycle
- is effective and proportional to the issue being addressed.

1.9.2 Practical features of good regulation

COAG has also identified practical features for regulation that the Transport and Infrastructure Council will consider in identifying the best option (Council of Australian Governments, 2007, pp. 16-17):

1. **Accountability** – Ministers should obtain full government agreement on matters that may involve regulatory action before they are considered at Ministerial Council level.
2. **Compliance strategies and enforcement** – Regulatory measures should contain compliance strategies that ensure the greatest degree of compliance at the lowest cost to all parties.
3. **Inclusion of standards in appendices**
4. **Performance-based regulations** – Regulatory instruments should be performance-based; that is, they should focus on outcomes rather than inputs.
5. **Plain language drafting** – Where possible, regulatory instruments should be drafted in 'plain language' to improve clarity and simplicity, reduce uncertainty and enable the public to understand better the implications of regulatory measures.
6. **Date of effect** – The dates of commencement of proposed standards and regulatory measures should be carefully planned to avoid or mitigate unintended or unnecessary market consequences, such as the necessity to discard noncomplying stock and to allow transition to compliance with new regulatory requirements.
7. **Advertising the introduction of standards and regulations**
8. **International standards and practices** – Wherever possible, regulatory measures or standards should be compatible with relevant international or internationally accepted standards or practices to minimise impediments to trade. Compatibility in this context does not necessarily imply uniformity, however. National regulations or mandatory standards should be consistent with Australia's international obligations.

Practical feature '4' is particularly relevant to this RIS. The general safety duty discussed in chapter 5 and analysed in the PwC CBA aligns with this guidance. In contrast, a purely prescriptive approach to regulation would not align well with COAG's practical features of good regulation. There would need to be sound evidence to support departure from the starting point agreed by Australian governments that good regulation is performance-based.

1.9.3 PwC cost-benefit analysis

To help transport ministers to assess the options in this decision RIS, we engaged PwC to prepare an independent CBA of the options outlined in chapter 9. A CBA ‘involves a systematic evaluation of the impacts of a regulatory proposal, accounting for all effects on the community and economy’ (Office of Best Practice Regulation, 2016, p. 1). Like this decision RIS, PwC’s CBA has been prepared consistent with COAG’s principles for best practice regulation.

Consistent with the principles for best practice regulation, part of our assessment in this decision RIS of the most effective option for the in-service safety of automated vehicles refers to and relies on PwC’s CBA. We provide a summary of the outcomes of PwC’s CBA in chapter 10. PwC’s final CBA is available on our website.⁵

⁵ PwC’s final CBA can be accessed at: <https://www.ntc.gov.au/sites/default/files/assets/files/PwC-CBA-In-service-safety-for-automated-vehicles.pdf>

2 Problem statement and need for government intervention

Key points

- Automated vehicles may introduce new in-service safety risks that the market will not eliminate or mitigate.
- Nationally inconsistent approaches to in-service safety of automated vehicles and multiple regulators without clearly defined roles may be a regulatory barrier to market entry.
- Existing mechanisms to manage in-service safety of conventional vehicles are not fit for purpose for automated vehicles.

2.1 Purpose of this chapter

The purpose of this chapter is to outline:

- the problem this decision RIS seeks to address
- the need for government intervention to address it.

2.2 The problem

In our current regulatory environment, when automated vehicles become ready for deployment:

- they may introduce new in-service safety risks that the market will not eliminate or mitigate
- nationally inconsistent approaches to in-service safety and multiple regulators without clearly defined roles could be a regulatory barrier to market entry.

These risks need to be addressed to support the uptake and safe operation of automated vehicles on Australian roads and unlock their broader benefits.

2.3 Automated vehicles may introduce new in-service safety risks that the market will not eliminate or mitigate

2.3.1 Automated vehicles may introduce new in-service safety risks

Automated vehicles are widely expected to improve road safety in the future by reducing human error. However, there are also new risks associated with introducing automated vehicles.

Some of the risks can be mitigated by requiring the entity bringing the ADS to the Australian market (the ADSE) to demonstrate how it will ensure the safety of the ADS at first supply to the market. In November 2018 transport ministers agreed that the ADSE will need to provide evidence against a set of safety criteria to obtain type approval for the ADS under the Road Vehicle Standards Act. DITRDC oversees the Road Vehicle Standards Act and will implement the safety criteria. It is likely that the safety criteria will be implemented using a

mix of requirements under the ADRs, conditions of type approval and rules. Amendments to the Road Vehicle Standards Act may be needed to allow all the safety criteria to be implemented. The choice of implementation approach may affect the extent to which the first-supply requirements can be enforced while the automated vehicle is in service.

The agreed first-supply approach does not extend to safety risks arising over the lifetime of the vehicle when it is in service, nor does it consider the role of parties beyond the ADSE in ensuring that an ADS is safe. Some of these in-service safety risks are set out in Table 2.

Table 2. Examples of in-service safety risks

Safety risks may arise when the vehicle is in service because the ADSE, or another party, does or fails to do something. Risks include:

- technological failure (for example, a hardware fault that was not known at first supply)
- cybersecurity failure (for example, a hack or attack due to poor security maintenance)⁶
- software updates introducing new safety issues (poor quality control or the update is not supported by the vehicle's operating system)
- failure to monitor and issue security updates as required
- failure to issue software updates as required (or failure to install)
- aftermarket fitment and vehicle modifications adversely affecting the performance of the ADS
- vehicle repairs adversely affecting the performance of the ADS
- use of third-party components that do not meet safety requirements
- failure by the ADSE to address safety issues that emerge over time (software or hardware) – for example, through lack of appropriate support
- failure to monitor the performance of the system
- failure to adapt the system to changes in regulation over time
- failure to adapt the system to changes in the road environment over time.

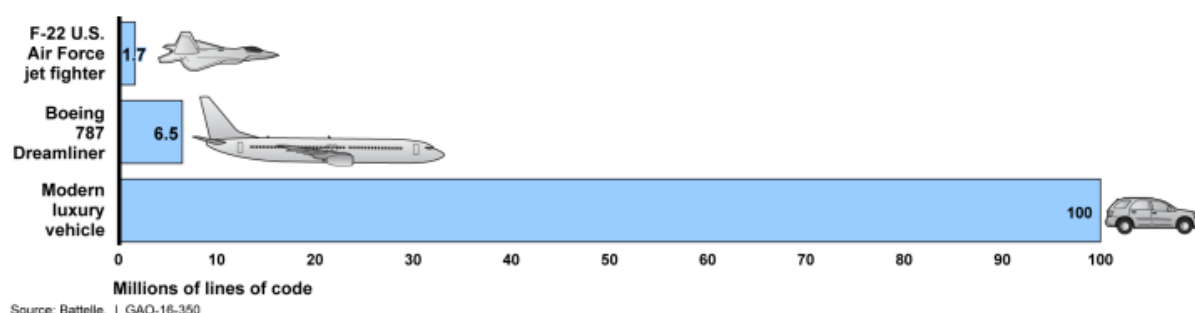
The effectiveness of an ADS on Australian roads over the life cycle of the vehicle is unknown and untested. The software and technology required for automated vehicles will be incredibly complex. The goal of automated vehicle driving is to substitute the human brain with artificial intelligence (Ebert, 2016). Automated vehicles (those with an ADS) will require significantly more lines of code than vehicles currently on the market. In discussing automated vehicles, people often compare them to planes or trains, both of which may have high levels of automation. However, automated vehicles will require significantly more lines of code because of the frequency of their interactions with other objects.

⁶ The risk of a hacker taking control of a vehicle already exists in vehicles that have digital systems without an ADS. For example, in 2015 hackers demonstrated their ability to control a Jeep Cherokee remotely via a weakness in the internet-enabled features of the car. This demonstration resulted in the recall of 1.4 million vehicles (Brewster, 2015).

Figure 5 compares the lines of software code required by a Boeing 787 Dreamliner (about 6.5 million lines) as compared with a modern luxury (non-automated) vehicle (as much as 100 million lines) (United States Government Accountability Office, 2016). The inherent complexity of this technology could result in unforeseen in-service risks once automated vehicles are commercially deployed. Operating a vehicle on public roads is highly complex due to the frequency of interactions with other unpredictable objects including other vehicles and road users (Litman, 2019). There may be ‘edge cases’ where risks and issues that were not foreseen may only become apparent after millions of kilometres of testing (Koopman, 2019). For example, the recent pedestrian fatality in Arizona by an automated vehicle was partly caused because the system design did not include a consideration for jaywalking pedestrians (National Transportation Safety Board, 2019b).

The UK Law Commission has highlighted the potential risk of ‘frozen robot syndrome’ where the vehicle freezes in the presence of a situation it does not know how to handle (Law Commission and Scottish Law Commission, 2019a). The code for automated vehicles will be more complex than vehicles currently on the market so the risks will continue to evolve over time as the technology develops.

Figure 5. Average lines of software code in modern luxury vehicles versus aeroplanes and jets



Source: (United States Government Accountability Office, 2016)

Evidence of in-service safety risks

In automated vehicle trials and in early commercial deployments of vehicles with partial automation, there have been some crashes, including a small number of fatalities.

The case studies below highlight the potential for overreliance on automated vehicle technology and the need for adequate safeguards while an automated vehicle is in service.

First pedestrian fatality involving an automated vehicle

In 2019 the National Transportation Safety Board (NTSB) released its investigation findings into the fatal crash of a pedestrian in Arizona. On 18 March 2018 an automated test vehicle struck and killed a female pedestrian walking across a road in Tempe, Arizona. The vehicle was operated by the Advanced Technologies Group of Uber Technologies, which had modified the vehicle with a proprietary ADS.

NTSB found that the ADS never accurately classified the pedestrian or predicted her path (National Transportation Safety Board, 2019a). The system design precluded activation of emergency braking. Further, the investigation found that Uber Advanced Technologies Group did not adequately manage the anticipated safety risk of its ADS’s functional limitations.

Head-on collision between two cars in the Netherlands

On 30 January 2019 a Tesla Model S collided head on with a Nissan, killing the driver of the Nissan. The Tesla driver believed that Autopilot was engaged; however, only Traffic Awareness Cruise Control (TACC) was switched on. TACC and Autosteer must both be switched on to engage Autopilot.

When the Tesla driver briefly looked at the console, he noticed that the vehicle had veered into the left lane approaching an oncoming vehicle. The system did not provide a warning to the driver because Autosteer was not engaged. Data from the vehicle showed that the driver did not have his hands on the wheel for nine seconds before the collision.

Seeing Machines CANdrive Trial – Driverless response time doubles

Seeing Machines undertook its automated vehicle trial, CANdrive, supported by the ACT Government in Canberra. The trial used automated vehicle technology to research driver behaviour to test how quickly a driver can be ready to resume control of an automated vehicle.

Initial results show reaction times more than double when the automated function is engaged. When drivers had complete control, typical reaction times were 1–1.5 seconds but increased to 3–3.5 seconds with autopilot engaged (The Australian, 2018). Drivers were also likely to glance away from the road for twice as long when the system was running (Car Advice, 2018).

2.3.2 The market may not eliminate or mitigate the new in-service safety risks

There is a risk of market failure to deliver a socially desirable level of safety risk management once automated vehicles are in service. ADSEs have a commercial incentive to maintain a good reputation with their customers by ensuring that ADSs operate safely when in service. However, there is a risk of a gap between what an ADSE believes is necessary to achieve this (in terms of ongoing service and delivery) and what is socially optimal (in terms of reducing crash risk). This could eventuate for the following reasons:

- ADSEs and other parties with a role in the in-service safety of automated vehicles are unlikely to bear the full economic cost of a crash caused by an unsafe automated vehicle. Broader, unaccounted for social costs (or externalities) include the cost of traffic congestion, loss of productivity for those involved in a crash, other road users' pain and suffering, emergency responder and clean-up costs, medical treatment costs, lost workforce participation and road asset damage.
- ADSEs may identify some in-service safety risks that they do not consider significant enough to rectify. For example, an ADSE may be aware of an error that may occur in very limited circumstances and deem that any potential legal liability or risks to reputation are not enough incentive to address the issues.
- ADSEs may identify an in-service safety risk and consider immediate action is not required or economically efficient. The delayed response may result in avoidable crashes or injuries. Such delay may not be easily attributable as a cause of an accident.

2.3.3 Existing mechanisms to manage in-service safety risks are not fit for purpose

In-service safety risks for conventional vehicles are managed through a range of regulatory tools including driver licensing and road rules. The in-service safety of automated vehicles does not fit within the current regulatory framework, which assumes a human driver. For human drivers, driver licensing and the road rules are ways of ensuring that vehicles are driven safely by sufficiently skilled and capable people. There are no existing equivalent regulatory mechanisms to ensure the ongoing safe performance of an ADS.

Existing regulation such as the Australian Consumer Law (ACL) and work health and safety (WHS) laws may cover some elements of in-service safety. However, as described in chapter 4 of this decision RIS, our analysis suggests that relying on existing regulation would leave gaps.

Due to the limitations of the existing regulatory tools, ADSEs and other relevant parties may not internalise all social costs associated with ADS crashes. The 'patchwork' nature of current aftermarket regulations, which may cover some but not all aspects of in-service safety, means that current regulations are unlikely to sufficiently cover remaining social costs. For these reasons, existing mechanisms to manage in-service safety risks are insufficient.

2.3.4 Market expectations

Governments have an existing role in regulating vehicle and road safety. Australian consumers are likely to have high expectations for automated vehicle safety and for governments to take a proactive role in in-service safety assurance. Submissions to our 2017 paper *Regulatory options to assure automated vehicle safety in Australia* clearly confirm that the community expects governments to have a role in ensuring automated vehicles are safe (National Transport Commission, 2017, p. 12).⁷

Public input to consultation processes in other countries also demonstrates an expectation that governments take a proactive role in assuring the in-service safety of automated vehicles. The majority of submissions to the Law Commissions' preliminary consultation paper on automated vehicles agreed that a new safety assurance scheme should be established for ADSs (Law Commission and Scottish Law Commission, 2019b, p. 4). Seventy per cent of respondents in a Pittsburgh study agreed that a regulatory authority should develop regulations regarding how automated vehicles are tested (Penmestea, et al., 2019). The NTSB has recommended that the National Highway Traffic Safety Administration (NHTSA) takes on a more active role in regulating and administering automated vehicle testing to ensure safer outcomes (National Transportation Safety Board, 2019a). Government regulation could help the industry establish credibility and win public trust (Barkenbus, 2018).

Because automated vehicle technology is new, incredibly complex and its safety performance is uncertain, providing a high standard of safety may require government intervention. Consumers will likely have an expectation that automated vehicles are safer than human drivers. A 2018 survey (EastLink, 2018) found that 37 per cent of females and 28 per cent of male respondents expect that automated vehicles are 100 per cent safe and will never be involved in a collision. Three in four Americans remain afraid of automated vehicles (AAA, 2019). Thirty-seven per cent of the public expect that the greatest benefit of self-driving cars will be to eliminate or reduce deaths due to accidents (SAE International,

⁷ Publicly available submissions are available on our website at: <https://www.ntc.gov.au/submission/376>.

2019). A third of respondents to a survey identified safety concerns as the biggest obstacle to the growth of automated vehicles in the next five years (Perkins Coi & AUVSI, 2019).

2.3.5 Nationally inconsistent approaches and multiple regulators could be a regulatory barrier to market entry

ADSEs, governments and other parties with a role in the in-service safety of automated vehicles could face unnecessary costs arising from unclear, nationally inconsistent or fragmented in-service regulation. These parties could also face costs of interacting with, and understanding the roles of, multiple regulators who may not have clearly defined roles.

Specifically, there are risks that:

- regulation to manage in-service safety is nationally inconsistent and not transferable across jurisdictions, leading to additional and unnecessary costs; ADSEs and other parties with a role in the in-service safety of automated vehicles may need to understand up to eight different regulatory schemes
- overlapping, duplicated regulation between states and territories may result in unclear and uncertain in-service safety expectations.

These costs and risks would act as a disincentive for ADSEs to enter the Australian market, creating a regulatory barrier to market entry. If there are regulatory barriers to introducing ADSs, consumers may not be able to realise the full benefits of automated vehicles.

2.3.6 Nationally inconsistent approaches would result in additional and unnecessary costs

Ministers and industry want a single national market for automated vehicles. In the absence of a coordinated national approach, there is a risk that state or territory-based approaches may not be transferable or harmonised across jurisdictions. In-service safety regulation may be nationally inconsistent.

State and territory requirements for automated vehicle trials in Australia highlight this risk. The requirements differ between Australian states and territories, although they generally include the key elements set out in the *Guidelines for trials of automated vehicles in Australia* (National Transport Commission, Austroads, 2017).

In the US, industry has commented on the need and importance of a uniform set of laws and regulations across jurisdictions. Google highlighted this in its testimony to the Senate Committee on Commerce, Science, and Transportation (Urmson, 2016):

If every state is left to go its own way without a unified approach, operating self-driving cars across state boundaries would be an unworkable situation and one that will significantly hinder safety innovation, interstate commerce, national competitiveness, and the eventual deployment of autonomous vehicles.

Lyft shares this sentiment (Okpaku, 2016):

The worst possible scenario for the growth of autonomous vehicles is an inconsistent and conflicting patchwork of local, municipal and county laws that will hamper efforts to bring [automated vehicle] technology to market. Regulations are necessary, but regulatory restraint and consistency is equally as important if we are going to allow this industry to reach its full potential.

Volvo has highlighted the need for a consistent set of uniform laws, stating that '[t]he absence of one set of rules means car makers cannot conduct credible tests to develop cars that meet all the guidelines of all 50 US states' (Volvo, 2015).

Varying state laws may impose burdens on software developers, who would have to tailor the already complex software in automated vehicles to adhere to specific laws and regions (Brodsky, 2016, p. 875). Manufacturers seeking to comply with multiple jurisdictions may

have difficulty complying particularly in the most restrictive jurisdictions (Riehl, 2018, p. 7). The US Department of Transportation (2018) recognises the need for national regulatory consistency and is looking to build regulatory consensus among states.

These views demonstrate that nationally inconsistent regulation could:

- result in additional and unnecessary compliance costs for ADSEs and other parties such as complying with different requirements across eight different jurisdictions
- constrain cross-border activity
- create unnecessary costs to government by duplicating work across jurisdictions.

2.3.7 Multiple regulators without clearly defined roles

Within each jurisdiction multiple regulators may have a role in regulating in-service safety. As noted in section 2.3.3, existing regulation may cover some elements of in-service safety. Existing regulators, such as WHS regulators, road transport regulators and consumer law regulators, may regulate certain aspects of in-service safety. It is not clear what the role and responsibilities of each regulator would be for in-service safety of automated vehicles. This risks the eventuation of overlapping and duplicated regulation and responsibilities, leading to unclear and uncertain in-service safety expectations and increased costs for parties with a role in the in-service safety of automated vehicles.

A lack of clarity about roles and responsibilities may also mean that no regulator takes responsibility for in-service safety of automated vehicles, increasing the safety risks. Regulators may be hesitant to investigate or prosecute if their legal standing to do so is unclear, or if they are not confident that they have appropriate expertise in the area. They will prioritise areas for which they have clear legal responsibility.

There is also the potential for some states and territories, and not others, to introduce a new regulator and regulations for in-service safety of automated vehicles. These new regulators may not have a clearly defined understanding of their interaction with existing regulators within their own or other states and territories. This could lead to unnecessary costs to government such as the need to establish memorandums of understanding between multiple regulators and administrative changes, such as roles and responsibilities moving between regulators.

2.4 Need for government intervention

The problem statement outlines potential market and regulatory failures for in-service safety that are not adequately addressed by Australia's current regulatory framework. This suggests that government intervention is warranted.

As discussed in section 2.3, despite safety being a major benefit promised by automated vehicles, automated vehicles are also likely to introduce new safety risks. While automated vehicle safety will be regulated at first supply under the Road Vehicle Standards Act, there will be a gap in regulating the in-service safety of automated vehicles. Market forces are unlikely to be sufficient to eliminate or adequately mitigate all new in-service safety risks. Existing regulatory mechanisms, including the ACL and WHS laws, are a patchwork of measures that are unlikely to comprehensively or effectively ensure in-service safety. In addition, Australian communities have an expectation that automated vehicles will be safe and that governments have a key role in ensuring automated vehicle safety (both at first supply and in service).

As discussed in section 2.3.5 and 2.3.6, without a nationally coordinated approach, there is a risk that inconsistent regulatory approaches may emerge. This may involve multiple,

overlapping regulators, resulting in unnecessary and avoidable compliance costs to ADSEs and other parties with a role in the in-service safety of automated vehicles. Significant unnecessary and avoidable compliance costs may form a barrier to market entry, meaning that Australian consumers do not receive the benefits of new automated vehicle technology.

Businesses operating in Australia have an expectation that regulations will be both efficient and effective and not introduce unnecessary costs, barriers or burdens. Industry has noted the need for a nationally consistent framework.

For these reasons, governments are justified in taking a coordinated and proactive role to provide nationally consistent oversight of automated vehicle in-service safety.

2.5 Objectives of government action

The objective of government action is to create an environment for automated vehicles that:

- eliminates or mitigates in-service safety risks
- minimises regulatory costs, barriers and burdens to ADSEs and other parties with a role in the in-service safety of automated vehicles, such that Australian businesses and consumers can realise the benefits of automated vehicle technologies
- opens the Australian market to automated vehicle technology.

If these goals were achieved this would mean that:

- the Australian community is not exposed to unnecessary in-service safety risks from automated vehicles
- Australian businesses and consumers can fully realise the benefits of automated vehicle technology
- ADSEs and other parties with an influence on ADS in-service safety do not face unnecessary costs, barriers or burdens.

2.6 Stakeholder feedback

We asked stakeholders about the extent to which the consultation RIS fully and accurately described the problem to be addressed. This included whether automated vehicles may introduce new in-service safety risks that the market may not eliminate and whether existing mechanisms are fit for purpose.

Most stakeholders who responded to this question considered that the RIS captures the key problem to be addressed including the in-service safety risks (Australian Competition and Consumer Commission (ACCC), Department of Planning, Transport and Infrastructure SA (DPTI SA), Department of Transport and Main Roads Queensland (TMR QLD), Department of Transport WA (DoT WA), DITCRD), Federal Chamber of Automotive Industries (FCAI), Graeme Pattison, Insurance Council Australia (ICA), Intelligent Transportation Systems Australia (ITS Australia), Kate Hunt, Maurice Blackburn, Royal Automobile Club of Queensland (RACQ), Transurban, Truck Industry Council, Victorian Automobile Chamber of Commerce (VACC), two government agencies).

2.6.1 Automated vehicles may introduce new in-service safety risks that the market will not eliminate or mitigate

Many stakeholders considered that automated vehicles will introduce new in-service safety risks that the market will not eliminate or mitigate (ACCC, DPTI SA, DITCRD, a government agency, ICA, Insurance Australia Group (IAG), Maurice Blackburn, RACQ, TMR QLD,

Transurban, VACC). Transurban submitted that there is no doubt that new risks will emerge once automated vehicles are in service.

Some submissions suggested additional safety risks that may arise once automated vehicles are in service. Some of the suggested risks arise through the actions of ADSEs and some arise because of the actions of other parties. They include:

- risks of physical interference with automated vehicles, such as intentional damage (DoT WA)
- possible actions by users of automated vehicles that interfere with their safety – for example, attempting to defeat safety interlocks (devices that are designed to keep drivers' hands on the wheel) (Australian Motorcycle Council)
- environmental conditions, such as cyclones, hail or fog, that may affect the ability of an ADS to function properly (DoT WA)
- poor infrastructure, algorithmic decision making (where the automated vehicle is presented with two options and is unable to decide, potentially making the automated vehicle inoperable or making an unsafe decision) (Kate Hunt)
- risks associated with automated vehicles operating in mixed fleets (a government agency, Kate Hunt).

Ricketts Point Power Pty Ltd agreed that automated vehicles may introduce new in-service safety risks, suggesting that the specific risks identified in the consultation RIS are probably over-simplified. The submission identified a range of risks associated with the ongoing operation of complex systems, including errors made at the design stage, which will only become apparent once the automated vehicle is in service.

2.6.2 Nationally inconsistent approach to in-service safety and multiple regulators could be a barrier to entry

Many submissions considered that a nationally inconsistent approach to in-service safety and multiple regulators without clearly defined roles could be a regulatory barrier to entry (DoT WA, EasyMile, FCAI, GM Holden, RACQ, a government agency).

Stakeholders strongly supported a nationally consistent approach (ACCC, AICD, ANCAP, DITCRD, EasyMile, FCAI, GM Holden, three government agencies, ICA, ITS Australia, Kate Hunt, LIV, RACQ, TMR QLD, Truck Industry Council, VACC).

VACC considered that a nationally consistent approach would also benefit repairers and licensed motor car traders.

A nationally inconsistent regulatory approach and multiple in-service safety regulators could:

- impose unnecessary costs on ADSEs to comply with varying standards that may act as a disincentive to enter the Australian market (DITCRD, VACC)
- create inefficiencies (ICA, TMR QLD)
- undermine public confidence in the deployment of automated vehicle technology in Australia (ITS Australia)
- constrain national road freight movement in the future (TMR QLD).

2.6.3 Existing regulatory mechanisms are not fit for purpose

Most stakeholders considered that existing regulatory mechanisms are not fit for purpose (ACCC, Australian Institute of Company Directors (AICD) (excluding executive officers),

DITCRD, DoT WA, DPTI SA, EasyMile, two government agencies, Maurice Blackburn, RACQ, TMR QLD, Transurban, VACC).

FCAI, Truck Industry Council and GM Holden considered that existing regulatory mechanisms are sufficient. They submitted that the ACL and new Road Vehicles Standard Act place sufficient safety duties on manufacturers. FCAI submitted that the ADSE will most likely be the manufacturer and will be appropriately regulated through the ACL. This view was not shared by ACCC, who submitted that the ACL is not the appropriate legislative regime to regulate the ongoing or in-service safety of automated vehicles. ACCC further stated that there is a potential for harm in the absence of a specialist regulatory framework for automated vehicle safety.

FCAI submitted that the only existing regulatory gap would be for fallback-ready users and remote drivers. GM Holden submitted that the only changes to existing regulations required is the amendment of the Australian Road Rules. Truck Industry Council submitted that if any new regulation was introduced in Australia before regulations are developed internationally it may result in automated technology for trucks not being introduced in Australia.

2.7 NTC conclusions

2.7.1 Automated vehicles may introduce new in-service safety risks that the market will not eliminate or mitigate

We consider that automated vehicles will introduce new in-service safety risks. Without regulatory intervention there is a risk of market failure to deliver an appropriate level of safety risk management. Submissions provided strong support for this assessment, identifying a range of in-service safety risks not detailed in the consultation RIS.

The additional safety risks identified in submissions illustrate that not all the risks for automated vehicles are known at this time; as the technology develops, more risks will arise. We recognise that in-service safety risks may arise through the actions and inactions of ADSEs, or of other parties; for example, someone, other than the ADSE, may interfere with the safe operation of an automated vehicle. We consider the range of parties that may have a role in the in-service safety of automated vehicles and the adequacy of regulation to cover their role in chapters 3 and 4.

In response to Kate Hunt's submission that automated vehicles may have to rely on poor infrastructure, we recognise the responsibility of road managers for this infrastructure, which we discuss further in chapter 3. We also considered the privacy implications of government access to automated vehicle data and have developed a set of design principles that will guide further work (National Transport Commission, 2019b).

We recognise that ADSs are inherently complex and give rise to a range of in-service safety risks beyond those identified in the consultation RIS. Any regulatory system needs to be sufficiently flexible to ensure that regulated parties deal with risk appropriately, including risks that were not identified when the automated vehicle was first supplied to the market.

2.7.2 Existing mechanisms are not fit for purpose

We consider that existing mechanisms are not fit for purpose to manage the in-service safety risks of automated vehicles, which is consistent with feedback from most stakeholders. With respect to FCAI's view that the ACL would be sufficient, we note ACCC's view that the ACL is not adequate to regulate in-service safety for automated vehicles, even on an interim

basis. The adequacy of existing regulatory mechanisms to regulate parties with a role in the in-service safety of automated vehicles is discussed further in chapter 4.

2.7.3 Nationally inconsistent approach to in-service safety and multiple regulators could be a barrier to entry

We consider that the strong stakeholder support for a nationally consistent approach justifies developing a national regulatory framework. A nationally consistent approach is discussed further throughout this decision RIS, including in the choice of option to manage in-service safety.

3 Parties with an influence on the in-service safety of automated vehicles

Key points

- There are several parties that may have an influence on the in-service safety of automated vehicles.
- Some parties may influence in-service safety in multiple roles.
- Parties will have varying levels of influence on in-service safety.

3.1 Purpose of this chapter

The purpose of this chapter is to:

- identify the various parties that are likely to have an influence on the in-service safety of automated vehicles
- provide an assessment, based on stakeholder feedback, of how significant the influence of various parties is on the in-service safety of automated vehicles.

Stakeholder comments on how we described a party's role are included under the relevant party heading in sections 3.4, 3.5 and 3.6. Stakeholder feedback on the degree of influence a party may have, and any additional parties that should be included in our discussion, is in section 3.7.

This chapter does not discuss existing duties and obligations that apply to the parties described in this chapter. Duties and obligations are discussed in chapter 4. This chapter also does not discuss whether the parties should be subject to new duties or obligations. We consider this in chapter 5.

3.2 Parties may perform multiple roles and multiple parties could manage the same risk

This chapter explains the role of individual parties that influence in-service safety. A single party may perform multiple roles affecting in-service safety and so could be regulated in a variety of capacities. This is linked to the likely emergence of a business model (described in chapter 1) in which the ADSE operates fleets of vehicles such as 'robotaxi' services. For example, one company may be all of the following:

- the 'ADS manufacturer' that designed the ADS
- an 'ADSE' because it has self-identified at first supply as the party responsible for an ADS's safe operation over its life
- the 'registered operator' for a fleet of automated vehicles
- the 'repairer' because it keeps repairs for the fleet of automated vehicles in-house to control the risk.

Parties with multiple roles will have the responsibilities and influence on in-service safety described under each relevant party heading.

We also recognise that multiple parties may have an influence on the same safety risk. For example, ensuring that an ADS only operates with the most recent system upgrade could be managed by:

- the ADSE notifying the registered owner that updates are available to install, and disabling the ADS until the update is installed
- the registered owner promptly accepting system upgrade installations when notified.

Any future regulation will need to be sufficiently flexible to cover safety risks in a range of potential scenarios. It will need to cover scenarios where one party undertakes multiple roles. Table 3 provides some scenarios that regulation will need to address.

Table 3. Examples of how parties can influence in-service safety

Scenario 1: ADSE/commercial passenger operator/registered owner – one party with multiple roles

ABC Pty Ltd is an ADSE and operates a commercial fleet of SAE level 4 (with a driver when the ADS leaves its ODD) and SAE level 5 (no driver) rideshare vehicles. ABC has multiple roles and duties:

- ABC is an ADSE and must:
 - comply with safety criteria for the ADSs at first supply
 - continue to comply with safety criteria for the ADSs while they are in-service
 - accept responsibility for dynamic driving task obligations
 - ensure the health and safety of their employees, including drivers of their level 4 vehicles, passengers and others so far as reasonably practicable (WHS law for person conducting a business or undertaking).
- ABC is also the registered owner and must maintain the roadworthiness of their vehicles and organise repairs when necessary.

Scenario 2: Registered owner/driver/repairer – one party with multiple roles

Ying owns and drives her SAE level 4 automated vehicle. She has also made repairs to it. Ying has multiple roles:

- Ying is the registered owner of her automated vehicle
- Ying has made repairs to her ADS and so she is a repairer
- Ying is a driver because she is responsible for the dynamic driving task when the ADS is operating outside its ODD.

Scenario 3: ADSE and other parties – multiple parties with ability to manage same safety risk

Electra Autos is an ADSE that has manufactured both the vehicle and ADS. The ADS will only operate safely with the installation of a system upgrade. This risk could be managed by the following parties:

- Electra Autos could disable the ADS unless available safety-critical updates are installed

- the automated vehicle's registered owner, fallback-ready user and human driver (and potentially other parties) could be required to install safety-critical updates.

3.3 Parties with an influence on the in-service safety of automated vehicles

In the consultation RIS we identified a range of parties with a role in the in-service safety of automated vehicles. Figure 6 outlines the parties we identified with an influence, or potential to influence, the in-service safety of automated vehicles.

We did not consider parties who may have a role in regulating or administering safety duties, such as an in-service safety regulator, police or road transport agencies.

We split the parties into three categories reflecting our assessment of their level of influence on the in-service safety of automated vehicles:

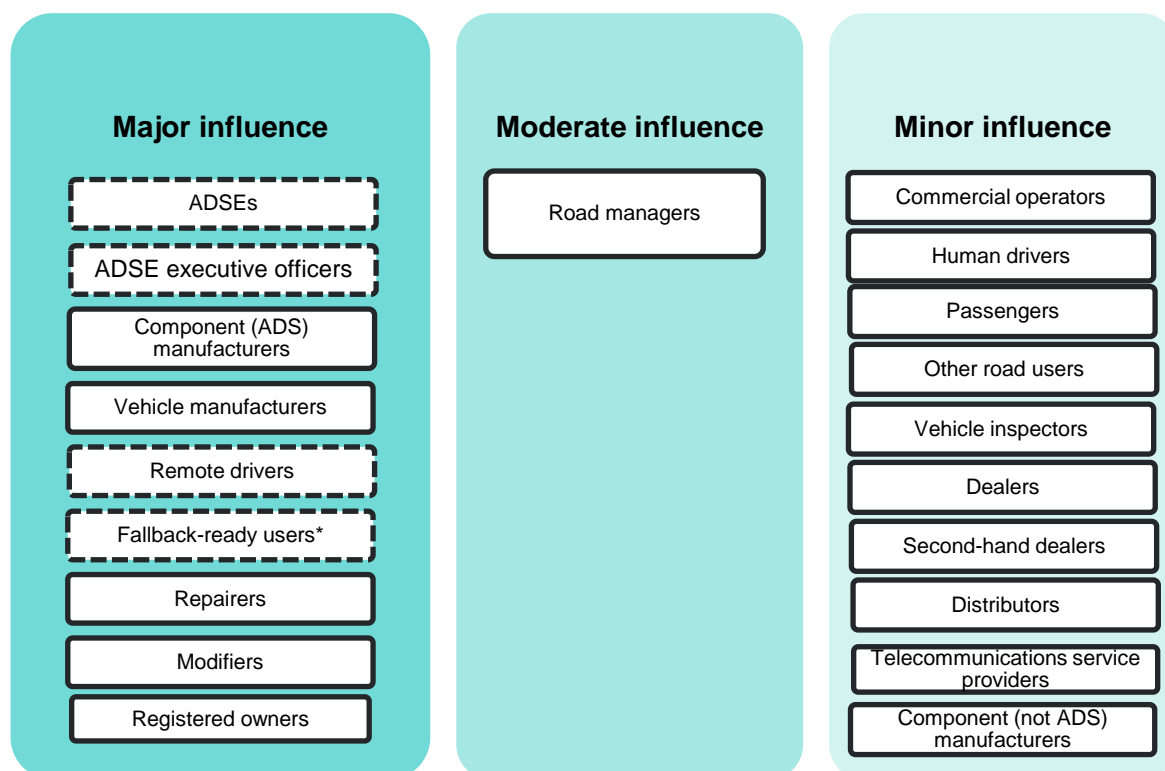
- **Major influence:** Parties whose role directly affects the safe design or safe operation of an automated vehicle.
- **Moderate influence:** Parties whose role indirectly affects the safe design or safe operation of an automated vehicle.
- **Minor influence:** Parties who have the potential to indirectly affect the safe design or safe operation of an automated vehicle.

The dotted line boxes in Figure 6 identify new parties that only exist in relation to automated vehicles. As we describe in chapter 4, this means that there is no existing regulation specifically targeting their role in in-service safety. The parties described in this paper include both parties specified in legislation (for example, registered owner) and more general groupings (for example, commercial operators), as appropriate.

The purpose of identifying the parties with a role in in-service safety is to consider how they are currently regulated and if additional regulation is required. We do this in chapters 4 and 5. If a party is assessed as having a minor influence on in-service safety of automated vehicles it would be less likely that additional regulation would be necessary.

We have adjusted Figure 6 based on stakeholder feedback, described at 3.7.2, to shift our assessment of the level of influence of registered owners from moderate to major.

Figure 6. Parties with an influence on in-service safety of automated vehicles



*The fallback-ready user is a party that only exists in SAE Level 3 vehicles.

The heavy vehicle industry has a range of different parties with an influence on the operation and oversight of heavy vehicles. We have not described relevant parties specified in the Heavy Vehicle National Law as separate parties. These parties will influence the in-service safety of automated heavy vehicles in the same way as other parties described in this chapter, in particular, registered owners, commercial operators, drivers and executive officers.

The following sections describe the role of the parties we identified and the reasons for our assessment of their influence on in-service safety. This level of influence may change as technology evolves and new parties may emerge over time. We have incorporated feedback on whether we have accurately described the parties into the relevant section and, where appropriate, amended the description.

3.4 Parties with a major influence on in-service safety

3.4.1 ADSEs

The ADSE will be a new party involved in in-service safety. It is the party that will be responsible for the safe performance of its ADS. It will certify that its ADS can safely perform the driving task in place of a human driver.

An ADSE may be:

- the manufacturer of the ADS
- the manufacturer of both the ADS and the vehicle that incorporates it
- the manufacturer of the vehicle only and not the ADS

- any other organisation bringing the ADS to market in Australia. For example, Ricketts Point Power Pty Ltd suggested that a third-party safety assurance provider could have a portfolio of ADS products aggregated from a group of small-volume manufacturers.

The ADSE will apply to the Commonwealth Government for type approval of the ADS as a component under the vehicle certification system at first supply to the Australian market. It will need to show how it meets a set of safety criteria (the criteria are at Appendix B). The ADSE will be required to continue to comply with many obligations contained in the safety criteria once the automated vehicle is in service.

There will be one ADSE for each ADS type approval.

The ADSE will have a major influence on in-service safety because it has direct control over the ADS in two main capacities:

- as the party with responsibility for assuring the safety of the ADS over its life, after the ADS is approved at first supply (the ADSE will be largely responsible for managing ADS risks that emerge when the ADS operates on the road)
- as the party with responsibility for the dynamic driving task when the ADS is engaged. In May 2018 transport ministers agreed that the ADSE will be responsible for the dynamic driving task when an ADS is engaged. The dynamic driving task refers to all of the real-time operational and tactical functions required to operate a vehicle in on-road traffic.⁸

3.4.2 ADSE executive officers

ADSE executive officers are a new party involved in in-service safety. ADSE executive officers are the senior decision-makers within an ADSE company, and we have identified them as a separate party from the ADSE.

ADSE executive officers may have a major influence on the in-service safety of automated vehicles because they can independently make decisions that directly affect the design or operation of an ADS.

Some stakeholders noted that ADSE executive officers who are in a position to influence ADS safety are unlikely to be based in Australia (Australian Automotive Dealer Association (AADA), NSW industry stakeholder consultations). Ricketts Point Power Pty Ltd suggested using the term ‘accountable manager’ because it is a concept already used in rail and aerospace to identify an individual rather than a group. We consider the term ‘executive officer’ denotes an individual with decision-making authority. We also note that the COAG principles do not favour a ‘designated officer’ approach to liability for general application.

Kate Hunt sought more detail as to why ADSE executive officers were included as a party. Executive officers were identified separately from the ADSE because we consider that there will be officers making decisions within ADSEs that affect the safe design or operation of the automated vehicles that the ADSE puts into the market. It is important to look at the influence decision-makers will have as distinct from the corporate entity. Kate Hunt stated that mid-level managers also influence safety. We consider that corporate organisation hierarchy generally ensures any level of influence by mid-tier managers would be overseen by executive officers. Chapter 4 discusses ADSE executive officers in more detail.

⁸ A detailed definition of the dynamic driving task is available in the glossary and is discussed further in chapter 6.

The Volkswagen ‘emissions scandal’ is an example of decisions or inaction by executive officers, who were aware of Volkswagen staff misleading regulators about vehicle diesel emissions not meeting regulatory standards. Some executives were convicted of criminal offences such as fraud and conspiracy (Fowler, 2019).

3.4.3 Component (ADS) manufacturers (where they are not the ADSE)

An ADS manufacturer is an existing party involved in in-service safety.⁹ The ADSE can be any party bringing an ADS into Australia (see section 3.4.1) – they do not need to be the manufacturer of the ADS. ADS manufacturers therefore also warrant consideration as a separate party with an influence on in-service safety.

An ADS manufacturer will have a major influence on the in-service safety of automated vehicles because it has direct control over the design and build of the ADS. This means it will have the best understanding of the ADS components and the risks that could emerge. Design risks could emerge while a vehicle is in service and could result in technological failure, cybersecurity failure and other safety issues. The ADS manufacturer is also likely to have an influence in the safe integration of an ADS into a vehicle, either as a component of an automated vehicle supplied to the market, or in aftermarket fitment to a vehicle.

3.4.4 Vehicle manufacturers (where they are not the ADSE)

The vehicle manufacturer is an existing party involved in in-service safety. Vehicle manufacturers could be separate parties to the ADSE. They might manufacture the whole automated vehicle (including the integrated ADS) or only the vehicle into which an ADS manufactured by another party is incorporated.

The vehicle manufacturer will have a major influence on the in-service safety of automated vehicles because it has direct control over the vehicle at the design stage. The vehicle manufacturer will need to ensure the vehicle’s design includes safe integration of the ADS. Inadequate design and ADS integration could lead to automated vehicles failing to operate as designed.

The vehicle manufacturer may also have an influence on in-service safety when repairs to the automated vehicles are required. The vehicle manufacturer could be the repairer or could influence safety by sharing relevant information with third-party repairers to enable them to complete safe repairs.

3.4.5 Fallback-ready user

The fallback-ready user is a new party specific to SAE level 3 vehicles when an ADS is engaged. In SAE level 3 vehicles, the ADS is not designed to bring the vehicle to a safe stop if there is a system failure or it encounters conditions in which it is not designed to function – for example, location or weather conditions. In these circumstances, a human, described as a ‘fallback-ready user’, must take over driving. They must be responsive to requests from the ADS to intervene and be receptive to evident dynamic driving task performance-relevant system failures.

⁹ The ADS manufacturer is an existing party because the ADS will be a ‘road vehicle component’ under s 7 of the Road Vehicle Standards Act.

The fallback-ready user will have a major influence on the in-service safety of an automated vehicle because they must take over the driving task if the ADS cannot perform it. In May 2018 transport ministers decided that fallback-ready users should have legal duties to:

- remain sufficiently vigilant to respond to ADS requests, mechanical failure or emergency vehicles and regain control of the vehicle without undue delay when required
- be appropriately licensed
- comply with drug, alcohol and fatigue driver obligations (National Transport Commission, 2018a, pp. 4, 50–52).

Failure to adhere to these obligations could lead to poor safety outcomes – for example, if the fallback-ready user does not take back control quickly enough and a collision happens.

The safety criteria for ADSs recognises the role of the ADSE in ensuring a safe transition of the driving task between an ADS and a fallback-ready user.¹⁰ The criteria requires the human–machine interface (HMI) between the ADS and relevant parties to occur in a way that allows the vehicle to operate safely (see the HMI criteria in Appendix B).

Example: Fallback-ready user's influence on in-service safety

Darren is in an SAE level 3 automated vehicle that can operate in automated mode on highways. Darren knows that if the ADS makes a request, he must take over driving. The ADS is engaged and has been driving the vehicle down a stretch of highway for some time. Darren is not paying attention when the ADS warns it is nearing the highway exit and requires him to take back control of the vehicle.

3.4.6 Remote drivers

A remote driver is a new party involved in in-service safety. A remote driver (sometimes described as a 'remote operator' or 'teleoperator') is a human who can operate the automated vehicle but who is not seated in a position to manually operate vehicle controls such as brakes and steering (SAE International, 2018, p. 16) (see Figure 7). A remote driver may operate the vehicle from outside it or inside it. A remote driver will have a major influence on the in-service safety of an automated vehicle because it has direct control over an automated vehicle's operation.

¹⁰ The concept of the ADS needing to give a fallback-ready user a 'timely request to intervene' is in SAE International Standard J3016. UNECE Working Party 29 will develop guidance on the transition of control between an ADS and a fallback-ready user.

Figure 7. Example of a remote driver configuration



The remote driver will undertake the driving task when the ADS is not engaged. A remote driver might be used in 'edge cases', where an ADS has been designed to request remote human intervention when it encounters a situation it is not capable of functioning in. A remote driver may perform a range of tasks, like rerouting the vehicle to avoid an obstacle, or simply identifying a path for the vehicle to travel, rather than actively controlling the steering and braking/acceleration.

An example of a company using remote drivers as part of its system design for safety is Nissan's 'Seamless Autonomous Mobility'.

Example: Nissan's Seamless Autonomous Mobility (SAM)

SAM will connect automated vehicles with remote drivers through the wireless network (Nissan Motor Corporation, 2019). When an automated vehicle comes across an unforeseen situation, it will be able to request help from a command centre. A remote driver in the command centre will take corrective action, like plotting a route for the vehicle to go around an obstacle. This data will be shared with other automated vehicles in the fleet so that when other vehicles encounter the obstacle, they will not require remote driver help.

Nissan intends to use SAM to connect remote drivers with fleets of automated vehicles, either operated by Nissan or commercial passenger operators (Ottley, 2019), rather than individually owned vehicles. The number of automated vehicles one remote driver could manage would be scaled up over time as the automated vehicles' artificial intelligence learns more about navigating obstacles in the real world.

3.4.7 Repairers

Repairers are an existing party involved in in-service safety. They could have a major influence on in-service safety because they will have direct access and control over automated vehicle components (hardware and software) while they are repairing, replacing or recalibrating parts.

If repairs to ADS software or hardware or other components of the vehicle, are inadequate this could adversely impact the operation of the ADS. This could lead to increased crash risk. AADA noted that repairers' actions may be influenced by instructions given by their customers – this could include registered owners and dealers. In the consultation RIS (figure 7, scenario 2) (National Transport Commission, 2019a) we described a scenario where a repairer causes damage to a vehicle's sensors that the ADS doesn't detect, resulting in a crash. The Australian Automotive Aftermarket Association (AAAA) considered that the scenario was 'never likely to occur'.

Repairers are likely to be vehicle manufacturers, dealers (see section 3.6.6) and independent repairers. An independent repairer is a business that repairs and services vehicles but is not officially endorsed by or affiliated with the manufacturer or dealer (Commonwealth of Australia, 2018, p. 5). In response to stakeholder feedback we consider

specialist services such as windscreen replacement, tyre repair and roadside assistance within the definition of repairer (AAAA, RACQ). Information sharing between the ADSE and vehicle manufacturers and repairers will be necessary if independent repairers are to remain a viable industry participant.¹¹

3.4.8 Modifiers

Modifiers are an existing party involved in in-service safety. Modifiers could have a major influence on in-service safety because they will have direct access and control over the components of an automated vehicle while they are modifying it.

Modifiers alter a vehicle from the condition it was in when it was registered. Modifications can be common, simple changes that are unlikely to affect a vehicle's compliance with relevant standards (for example, roof racks, alarm systems), or more complicated changes that may require certification (for example, installing an engine with significantly more power than the original).

Hardware or software modifications to the ADS itself or other parts of the automated vehicle might interfere with the operation of the ADS, and aftermarket installation of an ADS to a conventional vehicle could result in an unsafe vehicle. Modifications of an ADS by someone not involved in designing the system, or with insufficient understanding of it, could cause it to operate unsafely.

Various parties can modify an automated vehicle, for example:

- a repairer, custom modifier or the ADSE could undertake commercial modifications
- a registered vehicle owner (or another party at the owner's request) could undertake non-commercial modifications.

Modifications through aftermarket installation of an ADS could change a conventional vehicle (SAE levels 0–2) to an automated vehicle. Modifications could also increase the level of automation of an already-approved automated vehicle (for example, making an SAE level 4 vehicle into a SAE level 5 vehicle). Modification could also add or change new automated or non-automated features to an already-approved automated vehicle. ConnectEast and Ricketts Point Power Pty Ltd considered that if an automated vehicle was modified then assessment and approval by the ADSE should be required. A government stakeholder suggested that modifications should only be performed by the ADSE.

AAAA noted that third-party software developers have a role in facilitating potentially dangerous modifications of an ADS – there are already devices available that can be used to reset measured values in a vehicle. Participants in the Victorian industry stakeholder session noted that most jurisdictions do not have a certification process for modifications.

We consider that modifiers will most likely be a repairer, a registered owner or the ADSE. The roles and influence of each of these parties is set out in this chapter. For this reason, we do not refer to modifiers as a separate party in the remaining chapters of this report.

¹¹ In 2018 the ACCC recommended mandatory sharing of environmental, safety and security-related technical information with independent repairers on commercially fair and reasonable terms, subject to appropriate safeguards. In early 2019 the Commonwealth Treasury consulted on establishing a mandatory code of conduct to specify minimum standards of conduct for parties sharing and accessing vehicle service and repair information. More information can be found in the consultation RIS, Appendix E, which can be accessed at <https://www.ntc.gov.au/transport-reform/ntc-projects/in-service-safety-AVs>.

3.4.9 Registered owners (if different from the ADSE)¹²

The registered owner is an existing party involved in in-service safety. Vehicles in Australia must be registered to be legally driven on public roads. Registration aims to ensure vehicles are identifiable and that a person or company is responsible for each registered vehicle. This helps ensure a vehicle will operate safely on the roads.

In the consultation RIS, the NTC suggested registered owners will have a moderate influence on in-service safety because they have oversight of the safe operation of the automated vehicle while it is in service. We have revised their influence to 'major' based on additional analysis and stakeholder feedback, described in section 3.7.2. Their role includes:

- overseeing ADS system upgrades
- making decisions about regular servicing, maintenance, repairs and modifications to the ADS or other parts of the vehicle, which could affect the safe operation of the vehicle.

The registered owner may have a role in installing software upgrades. As part of the mandatory self-certification system described in section 3.4.1, the ADSE will need to notify registered owners that a safety-critical software upgrade has been installed or is available and needs to be installed. The safety criterion also requires an ADSE to ensure the ADS is safely disengaged if the registered owner fails to install the update.

The registered owner may also be able to observe safety risks such as software failure, cyber-intrusion or degradation of hardware. This means they will have a role in recognising when an ADS needs maintenance or repair and choosing an appropriate repairer, or in notifying relevant parties about faults.

Similarly, the registered owner could decide to modify their automated vehicle so would have a role in choosing an appropriately qualified modifier.

If a second-hand market for automated vehicles emerges, an automated vehicle might have multiple registered owners over its lifetime. A registered owner may potentially have an influence on the safety of an automated vehicle at the point of sale – for example, in providing accurate information and documentation about the vehicle to the new owner.

Example: Registered owner's influence on in-service safety

Aroha is the registered owner of a SAE level 4 automated vehicle. She receives a notification that a safety-critical software update to the ADS is available and must be activated manually in the vehicle. Aroha decides not to accept the update.

Aroha drives her vehicle to work. She hands control of the vehicle to the ADS on the highway. The ADS fails to detect road works blocking the lane ahead because its software has not been updated. The vehicle crashes into parked machinery, injuring Aroha and the machinery operator.

¹² The terms used to describe the person in whose name the vehicle is registered varies between states and territories. The key terms used are 'registered owner', 'registered operator' and 'licence holder'. For simplicity, this paper uses the term 'registered owner' to refer to the person who has primary responsibility for the vehicle.

3.5 Parties with a moderate influence on in-service safety

3.5.1 Road managers (public and private)

Road managers are an existing party involved in in-service safety. They are responsible for the road network. Public road managers are state and territory governments and local governments. Private road managers are companies that are responsible for maintaining particular roads such as tollways.

Road managers will not have direct access to or control of automated vehicles. However, road managers will have a moderate influence on in-service safety because they are responsible for the infrastructure and networks that the vehicles rely on to operate safely.

Road managers have various functions that could influence the in-service safety of automated vehicles including:

- providing and maintaining the infrastructure that ADSs will interact with – for example, road signs and line markings
- managing access to the road network – for example, limiting the access of an automated vehicle to a narrower part of the road network than it was approved for at first supply¹³
- traffic management, including opening or closing parts of the road network – for example, a temporary closure for works that an ADSE is not aware of could cause a safety hazard. Road managers may authorise traffic managers to control traffic in these circumstances.

Transurban suggested that road managers will have a role to communicate changes to the road environment to ADSEs and other parties such as digital map providers.

3.6 Parties with a minor influence on in-service safety

3.6.1 Commercial operators (not ADSEs or registered owners)

Commercial operators are an existing party involved in in-service safety. Commercial operators control vehicle fleets and provide mobility services or hire vehicles to the public. For example, a commercial operator might own a rideshare platform that links automated vehicles with passengers.

Where a commercial operator owns their fleet of vehicles, they will also be a registered owner and have an influence on in-service safety as described in section 3.4.9. For the purposes of this section, we are describing the influence of a commercial operator on in-service safety that is in addition to, or in place of, a registered owner's influence.

¹³ Some stakeholders have suggested this as a role for road managers, but we note that the safety assurance system is intended to override the need for secondary access decisions. The design principles for the safety assurance system, agreed in November 2017, provide that 'approval of a road manager should not be required for the automated driving system to operate unless the automated driving system forms part of a vehicle that would otherwise require an exemption or permit to access the road network' (National Transport Commission, 2017, p. 3)

Commercial operators will have a minor influence on in-service safety because they oversee the business that allows passengers to ride in automated vehicles provided by their platform.

Commercial operators will have some responsibility for the safety of the people using their automated vehicles. They will have to ensure the health and safety of their workers is not put at risk from work done as part of their business. Their influence lies in the elimination or mitigation of risks they could reasonably foresee.

Commercial operators that are registered owners and provide their vehicles directly to customers, such as hire car companies, may have a role in educating consumers about safely operating the vehicle.

3.6.2 Human drivers

The human driver is an existing party involved in in-service safety. They will have a minor influence on the in-service safety of automated vehicles because they only have direct control over the operation of an automated vehicle when the ADS is not engaged.

When the ADS is not engaged, a human driver will be responsible for the driving task. They will be in a position to manually operate controls such as the brakes. In an SAE level 3 vehicle, the human driver is a differently regulated party to the fallback-ready user, described in section 3.4.5, though it could be the same person.

3.6.3 Passengers

Passengers in an automated vehicle are an existing party involved in in-service safety. They may have a minor influence on in-service safety because they travel inside an automated vehicle while it is operating but do not have direct control over its operation.

In SAE level 3 automated vehicles, passengers may influence safety if their behaviour is a distraction to fallback-ready users. In SAE level 4 or 5 automated vehicles, passengers could potentially play a role in ensuring appropriate behaviour – for example, that minors wear seatbelts. Passengers might have a role in case of an emergency, if their actions to intervene could help to avoid a safety incident. We do not consider this necessary because current regulation does not place legal obligations on passengers to intervene to avoid safety incidents.

3.6.4 Other road users

Other road users such as motorcyclists, mobility scooters, cyclists, pedestrians and drivers of other vehicles are existing parties involved in in-service safety. They could have a minor influence on the in-service safety of automated vehicles because their behaviour could affect an automated vehicle while it is operating.

Road users have behaved in an unsafe manner in some automated vehicle trials – for example, pedestrians deliberately stepping into the path of an automated vehicle to test the vehicle's ability to detect them and stop (Currano, et al., 2018, p. 216).

3.6.5 Vehicle inspectors

Vehicle inspectors are an existing party involved in in-service safety. Vehicle inspectors carry out vehicle roadworthiness inspections so vehicles can be registered, have registration renewed, or have ownership transferred. Vehicle inspectors' influence on in-service safety is minor because they are only responsible for testing for faults and certifying repairs rather than fixing faults directly. Vehicle inspectors also only have access to the vehicle at set times

in a vehicle's life – for example, at the point a vehicle is sold. The points in time a vehicle inspector has access to a vehicle differs depending on state or territory legislation.

A range of different bodies can be vehicle inspectors if approved by state and territory road transport regulators or the NHVR. In response to feedback we have also included inspectors that check and certify repairs made to damaged vehicles (RACQ, VACC). Vehicle inspectors could have a minor influence on the in-service safety of automated vehicles if their role extends to certifying the safe operation of the ADS or vehicle because they have direct access to the vehicle's components while they are testing them. Inappropriately certifying vehicles as roadworthy could result in faulty automated vehicles being driven on the roads.

3.6.6 Dealers

A dealer is any business that supplies vehicles to consumers including physical marketplaces and online auctions (VACC). Dealers are an existing party involved in in-service safety. They could have a minor influence on in-service safety because they interact with individuals or companies before they first use automated vehicles. The Motor Trades Association of Queensland (MTA Queensland) advised that dealers may also influence safety if they provide pre-delivery servicing and scheduled servicing.

Dealers could have an influence on in-service safety through the information they provide to customers purchasing or leasing automated vehicles. If dealers share appropriate advice on the operation of an ADS, such as use limitations, this could minimise the safety risks of operating the ADS. A dealer's role in providing sufficient information to customers may be more important if dealing in second-hand automated vehicles, as there may be fewer sources of information available to the consumer.

3.6.7 Second-hand dealers

Second-hand dealers buy and sell vehicles or vehicle components. They may sell ADSs and assembled automated vehicles. Second-hand dealers are an existing party involved in in-service safety. They will have a minor influence on the in-service safety of automated vehicles. They have a role in providing safe ADSs, but it is not their responsibility to ensure the appropriateness of any aftermarket installation of an ADS or ADS component to a vehicle.

3.6.8 Distributors

Distributors are an existing party involved in in-service safety. Distributors buy vehicles then resell them to local entities who may be retailers, consumers or wholesalers. A distributor may be the Australian arm of an international vehicle manufacturer.

They could have a minor influence on in-service safety because they may interact with individuals or companies that operate or resell automated vehicles. Distributors could have a similar influence on in-service safety to dealers by providing relevant information they receive from the ADSE to third parties that they interact with.

3.6.9 Telecommunications service providers

Telecommunications service providers are existing parties involved in in-service safety. The providers will enable connectivity between the ADS and its external surrounds, or between an ADS and the ADSE or fleet operator.

In the consultation RIS we suggested that the failure of a telecommunications service could result in the unsafe operation of an ADS where an ADS function may rely on the service. We

acknowledge Telstra's feedback that an ADS must be able to make decisions in the absence of information from communications networks. Telstra stated that networks should be considered an enhancement to the safe operation of an automated vehicle rather than be viewed as a crucial source of data for ADS decision making. They suggested, for example, that an automated vehicle should be able to safely navigate an intersection using video recognition and other sensors where a communications link to the intersection is not available.

We categorise telecommunications service providers' influence as minor because the ADSE is expected to manage the risk of a communication network failure. An ADS that is unable to manage the safety risks involved with a telecommunications failure should not receive type approval. The ADSE's responsibility for this type of risk is reflected in the safety criteria at first supply. For example, the requirement for an ADS to be the product of safe system design – ensuring safe technology is developed and maintained for the life of the ADS.

Failures such as outages to telecommunications infrastructure are foreseeable, so the ADSE will need to ensure the ADS can operate safely in the event of these failures. Telecommunications service providers have not made any guarantees that their existing infrastructure is fit for automated vehicles to use. ADSEs must be prepared for ADSs to operate with this infrastructure as is.

3.6.10 Component (not ADS) manufacturers

Component manufacturers are existing parties involved in in-service safety. Some automated vehicles may use components provided by manufacturers that are not the ADS manufacturer – for example, mapping components. The NCC Group noted that on-board diagnostic devices that monitor driver behaviour and/or capture a vehicle's operational data can be supplied to vehicle owners. They suggested that using these devices may influence the in-service safety of automated vehicles.

Component manufacturers may have a minor influence on the in-service safety of automated vehicles because their components may be integrated with the ADS at the design stage. Their failure may lead to loss of important functionality of the ADS. However, we categorise their influence as minor because, as discussed in section 3.6.9, the ADSE has responsibilities to ensure ADSs can operate safely in the event of these types of component failures. Additionally, manufacturers of these components are several steps removed from the manufacture of the automated vehicle.

3.7 Stakeholder feedback

We sought feedback on whether we had accurately identified the parties with an influence in in-service safety and accurately described their role. Stakeholder feedback received on the description of a party and their role is included under the heading of the relevant party in sections 3.4, 3.5 and 3.6.

We also sought views on:

- any additional parties that have an influence on in-service safety
- the level of influence parties will have on in-service safety.

Feedback on these two issues is summarised below.

3.7.1 Additional parties

The majority of stakeholders agreed that we had identified the key parties with a role in in-service safety.

FCAI disagreed with the concept of an ADSE. FCAI considered that in the vast majority of cases the legal entity that will seek to bring an ADS to the Australian market will be a manufacturer as defined under the ACL.¹⁴ We note that transport ministers have already agreed to creating the ADSE as a new legal entity (National Transport Commission, 2018c). We discuss the inadequacy of existing regulation on ADSEs in section 4.4.1.

Some stakeholders suggested other parties with a role in in-service safety:

- **Insurers**

Several stakeholders suggested that insurers should be recognised as a party that has an influence on in-service safety. TMR QLD submitted that insurers offer a range of cover – product and public liability, workers compensation, comprehensive motor and compulsory third party – that will influence other parties identified as having a role in in-service safety.

DPTI SA considered insurers will use automated vehicle data to price risk through determining premiums. The actions of insurers will influence the behaviour of other parties identified, such as ADSEs, and will incentivise parties to prioritise safety.

- **Digital platform operators**

Several stakeholders discussed the role of digital platform operators. This party would provide a digital network that an automated vehicle would connect to, enabling the vehicle to communicate with everything – for example, other vehicles, physical and digital infrastructure and other road users. It is expected that the platform operator would collect information from an array of sources, prioritise it and redistribute it to road participants (ANCAP, Telstra, a vehicle manufacturer, Victorian industry session).

3.7.2 Degree of influence of identified parties on in-service safety

Submissions generally agreed with most of our assessments of the degree of influence parties will have on in-service safety.

TMR QLD submitted that until there is a clear view on how the first-supply safety criteria will be implemented it is difficult to accurately assess parties' degree of influence. An understanding is needed of the extent that obligations imposed on ADSEs at first supply will extend to a vehicle's in-service operation. For example, ADSEs will be responsible for providing adequate education and training to relevant parties. If this obligation extends to parties listed in Figure 6, then their influence on in-service safety will reduce. The safety criteria are listed in Appendix B. As discussed in section 3.4.1, DITRDC is currently working on an implementation plan for the safety criteria. Rickets Point Power Pty Ltd submitted that much of the influence we attributed to a number of parties such as remote drivers, vehicle owners, road managers, telecommunications service providers, repairers and modifiers should sit with the ADSE. They also expressed the view that several parties categorised as having a minor influence on in-service safety will be so remote or limited as to be irrelevant.

¹⁴ The ACL, sch 2, s 7 defines a 'manufacturer' broadly to include a person that produces or assembles goods. The term also includes other entities like those that hold themselves out to be a manufacturer, importer and supplier. There can be more than one manufacturer under the ACL for the same good.

Some stakeholders suggested that, as technology develops, the parties capable of influencing automated vehicle safety could expand and a party's level of influence could change (Queensland Government consultation session, Truck Industry Council, Western Australian Government). A number of stakeholders considered that automated vehicles will create a whole new supply chain. They suggested that automated vehicles are likely to be the product of complicated arrangements using in-house skills, external subcontractors and the purchase of external components. Some submitted that the majority of these entities are likely to be based outside Australia (Graeme Pattison, a vehicle manufacturer).

The NTC recognises these stakeholder views, however, notes that transport ministers have decided that ADSEs will be required to have a corporate presence in Australia. This obligation creates a nexus between the company that vouches for the ADS and Australia's legal system so that there is an entity to bring legal action against if necessary.

Several submissions suggested adjustments to the degree of influence of some parties.

- **Registered owners**

During consultation sessions and in submissions a number of stakeholders suggested that owners should be assessed as having a major influence because:

- owners of light and heavy vehicles have existing servicing and maintenance obligations and will have oversight of the in-service operation of an automated vehicle (AAAA, NSW industry session, a government agency). ConnectEast submitted that depending on their actions, registered owners can have a significant impact on worst-case scenarios.
- a registered owner may potentially have an influence on the safety of an automated vehicle at the point of sale, for example, in providing accurate information and documentation about the vehicle to the new owner (a government agency).
- heavy vehicle owners have a responsibility to check a vehicle's width, height, mass, the range of vehicle combinations and road environments. These responsibilities should not just rest on the ADSE (Victorian industry consultation session).

- **Repairers and modifiers**

AAAA did not support the assessment of repairers and modifiers as having a major influence on in-service safety. They emphasised that the vehicle owner should ensure regular servicing and maintenance by appropriately qualified aftermarket service providers. They also commented on the manufacturer's role in integrating warning systems for the driver if systems are not operating as designed.

TMR QLD submitted that the market for repairs and modifications to automated vehicles is uncertain. The type of services these parties will provide, their risk profile, and the position of the ADSE to limit the involvement of non-approved parties, is subject to speculation. Because these issues are unknown, assessing the level of influence is difficult.

- **Vehicle inspectors**

Several stakeholders suggested that vehicle inspectors will have a major influence on in-service safety. The most common reason for that view was their current duties to ensure the safe operation of a vehicle (FCAI, VACC, Victorian industry session).

TMR QLD submitted that the role and degree of influence that vehicle inspectors will have is unknown. For example, vehicle inspections may not be necessary to assure safety depending on the obligations placed on an ADSE. They suggested that some of the uncertainty will be removed when the detail of first-supply obligations on an ADSE, and the scope of any in-service safety duties on an ADSE, are settled.

- **Road managers**

RACQ submitted that road managers' assessed level of influence should be elevated from moderate to major 'during lower automation levels and while the technology is still maturing'. ConnectEast also supported a higher level of influence. They emphasised that road managers will need to understand the ODD that an ADS has been designed for.

The basis for stakeholders' suggested reassessment is that infrastructure that road managers are responsible for (such as line markings and signage) directly affects the safe operation of automated vehicles (FCAI).

We received a counter view from a state government. They advised that updates to the road network is a long process, even if there was standardisation of features that ADSs could interact with – such as line markings, digital maps and signage. They considered that:

ADSEs will need to ensure that ADSs will operate safely on existing infrastructure and should not depend on governments to make specific infrastructure improvements for bespoke AV technologies (Queensland Government).

- **Second-hand dealers**

VACC submitted that these dealers should be assessed as having a moderate influence rather than minor, given they have existing obligations to ensure vehicles are sold in a safe condition.

- **Heavy vehicle operators**

Heavy Vehicle Industry Australia submitted that the vehicle operator is the major entity influencing the in-service safety of a heavy vehicle. It submitted that the greatest risk for safety of automated heavy vehicles is incompatibility of the setup parameters for the ADS and the actual vehicle configuration and transport task the vehicles are undertaking. It submitted that the operator is the entity that chooses which vehicles to use for the task, the environment in which the vehicles operate, the load restraint (which may have a significant impact on the performance of the vehicle), repairers and modifiers.

3.8 NTC conclusions

3.8.1 Additional parties with an influence on in-service safety

Accurately identifying parties that regulation should apply to is an important element of designing regulations to ensure the in-service safety of automated vehicles. Taking into account stakeholder views, we are satisfied that the key parties with a role in in-service safety have been identified.

We have not included insurers as a party. We recognise the important role insurers will play. However, the purpose of identifying parties with a role in in-service safety is to consider how they are currently regulated and if additional regulation is required. Insurers are currently subject to prudential regulation. It is not appropriate to regulate them through regulatory reforms for automated vehicles or transport generally. We note IAG's comments that insurance will complement in-service safety regulation by offering products that protect against risk of ADS or ADSE failures.

We have not included digital platform operators as a party. It is unclear what role digital platforms will play in the automated vehicle ecosystem. We note commentary that industry is developing technology that will not rely on external digital platforms for safety data (International Transport Forum, 2018). We may need to consider them in the future once

their form and function are better understood – for example, if ADSs use digital platform services to make safety-critical decisions.

3.8.2 Degree of influence of identified parties on in-service safety

Most of the parties we identified are entities that exist today in the transport ecosystem. We identified four new parties that we assess as having a major influence on in-service safety of automated vehicles – the ADSE, ADSE executive officers, the fallback-ready user and remote drivers.

We acknowledge feedback that making accurate predictions on parties that are relevant to in-service safety is difficult. The parties capable of influencing automated vehicle safety could expand and a party's level of influence could increase or decrease as technology develops. We also recognise that there are likely to be many entities involved in the design, production and assembly of automated vehicles, with complex commercial arrangements guiding those relationships.

Entities within party groupings may have varying degrees of influence on in-service safety. For example, repairers will have a variable risk profile because their control of elements of in-service safety will depend on the scope of repairs they undertake and the influence of other parties such as ADSEs and registered owners.

In response to stakeholder feedback we have reassessed registered owners as having a major influence on the in-service safety of automated vehicles. This reflects their broad oversight obligations to ensure the safe operation of a vehicle through maintenance and repairs.

We have not adjusted our assessment of the degree of influence of repairers and modifiers as being likely to have a major influence on the in-service safety of automated vehicles. However, we acknowledge that their role is still unclear and do not propose that any additional regulation be placed on them at this time.

We have retained our original assessment that road managers have a moderate, rather than a major, influence on the in-service safety of automated vehicles. Road managers are responsible for infrastructure and networks that the vehicles rely on to operate safely and will be subject to existing duties. However, we consider that automated vehicles will need to be able to cope with the existing infrastructure. The ADSE will need to have systems in place to bring the vehicle to a safe stop or hand back control to a human driver if it is not able to drive safely.

We have retained our original assessment of vehicle inspectors and second-hand dealers as having a minor influence. Vehicle operators are responsible for testing for faults and certifying repairs rather than fixing faults directly. As such, we consider that their influence is minor. Similarly, we consider that second-hand dealers will have a minor influence, with the potential to indirectly affect the safe design or safe operation of an automated vehicle. Any existing duties to ensure vehicles or components sold are in a safe condition will continue to apply.

We agree with Heavy Vehicle Industry Australia that heavy vehicle operators have a critical role in ensuring heavy vehicles, automated or otherwise, operate safely. Heavy vehicle operators are defined in the Heavy Vehicle National Law as: 'the person responsible for controlling or directing the use of – (a) for a vehicle (including a vehicle in a combination) – the vehicle; or (b) for a combination – the towing vehicle in the combination'. We have not adjusted our assessment of commercial operators (not ADSEs or registered owners) because this term captures a broader range of commercial operators than solely heavy

vehicle operators. We define it to include operators controlling (light) vehicle fleets and providing mobility services or hire vehicles to the public. We have retained the influence of commercial operators as minor. In relation to any responsibilities applying to heavy vehicle operators, we believe that these would be most appropriately regulated through registered operator responsibilities and duties under the Heavy Vehicle National Law (and equivalent heavy vehicle regulation in the Northern Territory and Western Australia). Regulation of heavy vehicle operators under the Heavy Vehicle National Law is described in chapter 4.

Feedback relating to the parties' liability is considered in chapters 4 and 5. Chapter 4 discusses the existing regulatory frameworks that apply and new regulation that we propose should apply to various parties identified in this chapter.

4 Regulatory frameworks for in-service safety of automated vehicles

Key points

- International standards are a critical part of regulating automated vehicles, but international reform takes time and may not address some in-service safety issues. Australian reform needs to occur alongside international developments.
- Road safety is a priority for all Australian governments. Current regulation to ensure road safety comprises road and traffic laws and more general laws including consumer protection, negligence and WHS laws.
- There are gaps and inadequacies in the current regulation to provide for the in-service safety of automated vehicles. The most significant gaps relate to regulation of new parties and road users such as ADSEs, ADSE executive officers, remote drivers and fallback-ready users.

4.1 Purpose of this chapter

The purpose of this chapter is to outline:

- why international regulatory frameworks are insufficient on their own to provide for in-service safety of automated vehicles on Australian roads
- the inadequacies or 'gaps' in current Australian regulation in providing for the in-service safety of automated vehicles
- the parties we propose should be covered by new regulation.

4.2 International regulatory frameworks are insufficient to provide for in-service safety

Like Australia, other countries are considering how to regulate automated vehicles. At the international level, this is occurring through United Nations Economic Commission for Europe (UNECE) forums. The two key forums are:

- the Global Forum on Road Traffic Safety (WP.1), which administers the Geneva Convention¹⁵ and the Vienna Convention aimed at establishing standard traffic rules to improve international road safety¹⁶
- the World Forum for Harmonization of Vehicle Regulations (WP.29), which develops international vehicle standards.

In the consultation RIS we detailed recent developments of WP.1 and WP.29. Since the consultation RIS (in September 2019), WP.29 has adopted a revised framework document

¹⁵ *Convention on Road Traffic*, opened for signature 19 September 1949, 125 UTS 3 (entered into force 26 March 1952) art 8.5 ('Geneva Convention').

¹⁶ *Convention on Road Traffic*, opened for signature 8 November 1968, 1042 UNTS 17 (entered into force 21 May 1977) art 8.5 ('Vienna Convention').

on automated/autonomous vehicles (Economic Commission for Europe, 2019). It contained detailed WP.29 work priorities and timelines. The document:

- provides guidance to WP.29 subsidiary working parties, identifying the key principles for the safety and security of automated vehicles, including validation for system safety, object detection and response, and documentation of a vehicle's ODD by vehicle manufacturers
- proposed that specific work on the priority areas such as the functional requirements of automated vehicles, the approach to over-the-air software updates and data storage systems for automated vehicles be completed between late 2019 and 2021.

In the consultation RIS we acknowledged that, in global terms, Australia is a secondary and relatively small market. This means Australia benefits from international regulatory decisions and from aligning its rules with international standards. If Australia imposes standards for automated vehicles that are inconsistent with international regulation, manufacturers may not make their automated vehicles available in Australia. This would deprive Australians of some of the benefits of automated vehicles or delay these benefits.

International vehicle standards developed by WP.29 will be a critical and ongoing part of regulating automated vehicles. The Road Vehicle Standards Act incorporates vehicle standards agreed at WP.29 and implemented by Australia. The approach to the safety of automated vehicles at first supply is for an ADSE to obtain approval under the Road Vehicle Standards Act. This recognises the need for consistency with international standards.

The international regulatory framework is, however, insufficient to provide for in-service safety for the following reasons:

- International agreements will not address many in-service safety issues that will need to be decided for Australia such as allocating responsibility for controlling a vehicle or the duty of care owed by ADSEs to road users under Australian law.
- Liability issues are outside of the Conventions and are for individual countries to determine.
- International agreements will not mean ADSEs are recognised as a legal entity in Australia.
- To have domestic legal effect, internationally agreed standards need to be implemented by legislation in Australia.
- Despite progress to changes on international law governing driving and vehicle standards, international regulatory reform takes considerable time.

If Australia waits for international developments to settle before beginning its regulatory reform process, achieving national consensus and changing laws could take years and still fail to address all relevant issues. Reform work at the national level needs to occur alongside international developments. Australia's framework needs to be flexible to accommodate international regulatory decisions and technological advancements as they develop.

4.2.1 Stakeholder feedback

Some stakeholders commented on international consistency, international standards and the timing of Australia's reforms.

DITCRD and another government stakeholder submitted that Australia's regulatory framework should not get ahead of international developments. DPTI SA, IAG and a vehicle manufacturer noted the need for Australian automated vehicle regulation to align with international standards.

FCAI submitted that developing road and vehicle regulations for automated vehicles is underway through WP.1 and WP.29, and that any in-service regulation should follow the international lead. Truck Industry Council submitted that international standards need to be implemented before introducing any duty of care on an ADSE; introducing a duty of care now would halt automated vehicle deployment in Australia.

A government stakeholder and a vehicle manufacturer further submitted that any unique Australian requirements could lead to a delay in automated vehicle deployment in Australia.

4.2.2 NTC conclusions

Aligning with international vehicle standards will be a critical and ongoing part of regulating automated vehicles. This is recognised by Australia's approach to automated vehicles when first supplied to the market. However, neither WP.1 nor WP.29 will establish the legal consequences for automated vehicles that fail to operate at an acceptable level of safety in service. It is likely that agreement on any in-service safety requirements would take many years to develop and would still leave significant gaps for governments to address.

Due to Australia's federation and the role of states and territories in regulating vehicle use, developing the legal arrangements for automated vehicles is a uniquely Australian challenge. States and territories will need to be satisfied that automated vehicles have an ongoing, locally enforceable obligation to operate at an acceptable level of safety before they will allow those vehicles to operate in automated mode on their road network.

If Australia is to access the benefits of automated vehicle technology as it becomes available, work on these issues needs to occur at the national level now, rather than at the much later unknown time when all international standards have been developed and implemented.

4.3 Summary of gaps in Australian regulatory framework for in-service safety of automated vehicles

Australia thoroughly regulates conventional vehicles and drivers. This is because of the risk to human life posed by unsafe or inadequately controlled vehicles and the high standards of personal safety expected by the Australian community and governments. This regulation was developed for a time and road network that preceded automated vehicles and was not designed to accommodate them.

In chapter 3 we identified the parties that have an influence on ensuring in-service safety of automated vehicles and provided our assessment of how significant their influence is (major, moderate or minor). As described in chapter 3, we have modified our descriptions of some parties and their level of influence on the in-service safety of automated vehicles based on stakeholder feedback.

We summarise the parties we consider are sufficiently covered under existing regulation and the parties we consider as not sufficiently covered in sections 4.3.1 and 4.3.2 respectively.

In section 4.4 we focus on parties that we consider have a major influence on in-service safety, and whether these parties are adequately covered by existing regulation. Appendix D provides an analysis of the regulation that applies to parties we identified as having a moderate or minor influence on in-service safety.

4.3.1 Parties the consultation RIS suggested are sufficiently covered under existing regulation

In the consultation RIS we explained that existing regulation is likely to place sufficient requirements and incentives on the following parties to ensure in-service safety of automated vehicles:

- component (ADS) manufacturers
- vehicle manufacturers
- registered owners
- road managers
- commercial operators
- human drivers
- passengers
- other road users
- vehicle inspectors
- dealers
- second-hand dealers
- distributors
- telecommunications service providers
- component (not ADS) manufacturers.

In the consultation RIS we suggested that these parties are broadly covered either by existing purpose-built legislation or more general law. If any additional obligations are required, we considered this would be best managed through incorporation into existing regulation.

4.3.2 Parties the consultation RIS suggested are not sufficiently covered under existing regulation

In the consultation RIS we suggested that existing regulation does not place sufficient requirements and incentives on the parties listed below to ensure in-service safety. We assessed these parties as having a major influence on in-service safety because their role directly affects the safe design or safe operation of an automated vehicle:

- ADSEs
- ADSE executive officers
- fallback-ready users
- remote drivers
- repairers.

The consultation RIS outlined that relying on existing frameworks to cover the role of ADSEs and ADSE executive officers could leave significant gaps in the in-service safety of automated vehicles. The ADSE has a central role in overseeing the system performing the driving task, and there is currently no regulation focused on ADSEs or the performance of the driving task by ADSs. ADSE executive officers would similarly be covered only by a patchwork of existing legislation, which was not designed to regulate their responsibilities where the corporation is the entity responsible for the driving task.

Current state and territory driving laws were developed with the assumption that the person operating a vehicle is present with that vehicle. Driving laws do not contemplate the circumstances or risks of human drivers who may be driving a vehicle remotely, including from a different state or territory.

Ministers have already decided that fallback-ready users should have legal duties that relate to the safe operation of an automated vehicle; however, this is a policy decision that has not yet been implemented into Australian law.

Repairers have duties under general WHS frameworks that cover safety risks they may create through negligent repairs. Other legal frameworks including liability in negligence and under various consumer protection laws also oblige repairers to perform their work safely. In the consultation RIS, we suggested these frameworks may be insufficient to cover the influence of repairers on in-service safety.

4.4 Parties with a major influence on in-service safety

This section describes the regulation that applies to those parties we assessed in chapter 3 as having a major influence on in-service safety. These are parties whose role directly affects the safe design or safe operation of an automated vehicle.

4.4.1 ADSEs

ADSEs are a new party. There is limited regulation that may apply to cover their role in the in-service safety of automated vehicles. The existing regulation, outlined below, is a patchwork of obligations. It is unlikely to be sufficient to cover the major influence of ADSEs on the in-service safety of automated vehicles.

Agreed first-supply requirements

The Road Vehicle Standards Act will regulate automated vehicles and automated vehicle components at first supply to the Australian market. Transport ministers have agreed that ADSEs will need to meet a set of safety criteria (Appendix B). They will also need to continue to comply with the safety criteria once the automated vehicle is in service. The approach is primarily designed to deal with known risks at the time the ADS is supplied to the market. Some of the first-supply criteria also have ongoing elements related to an ADS's safety in service; however, the first-supply regulation will not cover all in-service risks.

Negligence

Generally, an ADSE's duty of care in negligence will oblige it to take reasonable care to ensure that the use (or foreseeable misuse) of its ADS does not result in a collision with another vehicle, road user or stationary object. However, it is difficult to know with greater certainty the standard of care to which a court would expect an ADSE to adhere to show it had taken reasonable care.

In some cases liability in negligence may provide insufficient deterrent to ensure ADSEs address risks because it invites the ADSE to weigh up the cost of addressing the risk against potential exposure to litigation. Also, because it involves enforcing private rights, there is no proactive enforcement of the ADSE's duty in negligence. It requires a person to have been injured in some way before it can be enforced by a court.

Work health and safety law

Most of Australia applies harmonised WHS legislation that requires employers to take reasonably practicable steps to eliminate or mitigate risks associated with their business or

undertaking.¹⁷ These statutory duties are owed to a number of parties, not just employees. Each state and territory has its own regulator, and each regulator's functions are very general. The extent to which WHS law applies to ADSEs and their operation of ADSs is unclear. An injury caused by a dangerous or faulty ADS soon after the automated vehicle enters service might be covered by a duty under the WHS model law. However, it is less clear whether an ADS failure that occurs after the vehicle has been in service for several years would also be covered under the ADSE's WHS duties.

A further limitation of relying on WHS law for ADSEs is that it is enforced by multiple state-based regulators. They are not experts in ADS technology and may have different enforcement priorities and differing interpretations of the WHS law's application to automated vehicle safety.

Australian Consumer Law

The ADSE may have certain obligations under the ACL,¹⁸ but that law focuses on the relationship between consumers and suppliers, manufacturers or importers at the point in time the transaction occurred. Claims for injury caused by a safety defect are limited to personal injury, damage to certain classes of consumer goods and damage to private property.¹⁹ The ACL is concerned with consumer protection, not the broader goal of public safety. It does not, for example, extend to damage to public infrastructure such as roads, which, if damaged, could also pose a risk to safety. The ACL does not place a pre-market obligation or general safety duty on suppliers to ensure products are safe before they are sold, meaning suppliers would not be obliged by the ACL to eliminate or mitigate the safety risks of automated vehicles.

Vehicle recalls

As the supplier of an ADS to the Australian market, the ADSE can be subject to vehicle recalls. A vehicle or vehicle component may be subject to a recall if a 'safety or ADR non-compliance issue is identified' (Department of Infrastructure, Transport, Regional Development and Communications, 2018).

The minister responsible for administering the Road Vehicle Standards Act will be accountable for recall notices involving automated vehicles and ADS components.²⁰ The Act gives the minister the broad power to issue recalls for safety purposes or noncompliance with national road vehicle standards.²¹ For example, a recall notice could require the ADSE to make vehicle owners aware of a fault and offer a free repair. The precise requirements of recalls under the Road Vehicle Standards Act will be finalised when rules under that Act are made. Vehicle recall powers are relatively broad but have limitations in ensuring the in-service safety of automated vehicles because:

- it takes a long time for recalled vehicles to be removed from the road network

¹⁷ Model WHS Law. The frameworks in Western Australia (*Occupational Safety and Health Act 1984*) and Victoria (*Occupational Health and Safety Act 2004*) are not based on the model law but their application to automated vehicles is similar.

¹⁸ Due to the agreed first supply requirements for automated vehicles, an ADSE will be the type approval holder under the Road Vehicle Standards Act and therefore the importer or manufacturer for the purposes of the ACL.

¹⁹ ACL, ss 138–141.

²⁰ Until the Road Vehicle Standards Act commences, recalls will continue to be issued under the ACL.

²¹ Road Vehicle Standards Act, s 37 and *Road Vehicle Standards Rules 2019* pt 8.

- recalls disproportionately affect the registered owner of the vehicle, who will lose the use of the vehicle while its ADS component is repaired.

4.4.2 ADSE executive officers

ADSE executive officers, like ADSEs themselves, are a new party. Some existing legislation creates specific obligations on officers of corporations that may apply to ADSE executive officers, including in a way that might encourage these officers to exercise due diligence for the ADSE's safety obligations. These include executive officer duties in WHS law, the Heavy Vehicle National Law, and passenger transport legislation. However, these are a patchwork of obligations that will only apply to some automated vehicles and only some of the time. Corporations law, discussed in more detail below, also appears insufficient to cover the role of ADSE executive officers.

Corporations law

Australian corporations law defines an officer of a corporation to include the director or secretary of the corporation, or a person who makes decisions that could affect the corporation or its financial standing.²²

The *Corporations Act 2001* (Cth) requires directors and officers of a corporation to discharge their duties with reasonable care and diligence. It also obliges those persons to discharge their duties in good faith and in the best interests of the corporation.²³

When acting in the best interests of the corporation, an executive officer may act in a way that advances public safety, such as when he or she ensures their product's safety to avoid exposing the corporation to litigation or the brand damage that would result if the product caused injury. However, public safety is not the object of the Corporations Act, and the duties are owed to the corporation²⁴ and not the public.

Road Vehicle Standards Act

As type approval holders under the Road Vehicle Standards Act, ADSE executive officers will be subject to the executive officer liability provisions of that Act²⁵ if the ADSE commits certain offences under the first-supply framework (discussed in chapter 1) in circumstances where the executive officer:

- knew that the offence would be committed
- was in a position to influence the conduct
- failed to take reasonable steps to prevent the offence.

The Road Vehicle Standards Act focuses on the ADSE's importation and supply of an automated vehicle or ADS to the market. It was not developed to regulate the safe operation of automated vehicles in service.

²² *Corporations Act 2001* (Cth) s 9.

²³ *Corporations Act 2001* (Cth) ss 180, 181.

²⁴ *ASIC v Cassimatis (No 8)* [2016] FCA 1023 at [481]-[483] per Edelman J.

²⁵ *Road Vehicle Standards Act 2018* (Cth) ss 33-34.

4.4.3 Vehicle and component (ADS) manufacturers (where they are not the ADSE)

Vehicle and vehicle component manufacturers are well-established parties in Australian law.

The requirement that an ADSE must vouch for the safety of its ADS at first supply should sufficiently cover any in-service risks arising from the components within the ADS. The requirement would incentivise an ADSE to ensure the components selected for its ADS are of suitable quality, which is an assessment the ADSE is best placed to make given its expertise in its product. If a component in an ADS is found to be faulty, the ADSE – as the type approval holder – would need to address the problem.

Where a vehicle or vehicle component (ADS) manufacturer is not an ADSE, the NTC does not see a benefit in any additional regulation targeted at the party itself.

Negligence law, the ACL and contract law are probably sufficient to cover the role of vehicle and ADS manufacturers in the in-service safety of automated vehicles because vehicle and ADS manufacturers:

- owe a duty of care to road users under negligence law to ‘take such care as a reasonably prudent manufacturer would take in the circumstances’²⁶ (this requires the designer of the product to consider the suitability of the design and associated problems and risks)
- are covered by the consumer guarantee and safety defect provisions under the ACL
- would have a contractual relationship with the ADSE. The ADSE could use contract to minimise its risk if any in-service safety issues arise because of the design of the ADS or automated vehicle, placing strong incentives on manufacturers to provide safe products.

4.4.4 Remote drivers and fallback-ready users

Remote drivers and fallback-ready users are new parties with limited existing regulation that could apply to them.²⁷ Rules that regulate other road users were not designed with remote drivers or fallback-ready users in mind, and more specialised regulation could better manage any safety risks involved with these new road users.

Duties on fallback-ready users

In May 2018 transport ministers decided that fallback-ready users should have legal duties to remain sufficiently vigilant, be appropriately licensed and comply with drug, alcohol and driver fatigue obligations.

Negligence

It is likely that fallback-ready users and remote drivers will owe a duty to other road users to take reasonable care and will risk liability in negligence law where their carelessness causes injury or property damage.

²⁶ *Middleton v Erwin* [2009] NSWSC 108.

²⁷ Some state and territory driving legislation may inadvertently capture these parties in some way – for example, if they are technically a ‘driver’ or ‘person-in-control’ of a vehicle. Where this does occur, it is a legal technicality and an example of legislation being disrupted by new technologies, rather than a case of governments making a considered decision on how to regulate these new parties.

State and territory criminal law

Driving laws, such as the road rules, were developed with an assumption that a vehicle's driver is physically present with the vehicle under his or her control. There is a significant gap in the coverage of these laws to remote drivers, particularly those who are outside the jurisdiction that the vehicle is in. Even if state driving laws applied to remote drivers operating from outside the state, there would be significant practical enforcement difficulties to overcome – for example, identifying the person in control of the vehicle and ascertaining whether a remote driver is influenced by drugs or alcohol. Even assuming those practical enforcement issues were overcome, a court could decide that a remote driver is not the driver under the road rules or for driving while intoxicated offences.

A remote driver could be prosecuted under various criminal negligence offences²⁸ or crimes involving the use of a vehicle²⁹ in state and territory law.

4.4.5 Repairers

Repairers are established, regulated parties. However, existing regulation specific to repairers and the ACL is generally not concerned with public safety but rather with how repairers should deal with their customers.³⁰ In particular, regulation addresses the greater knowledge that repairers have than customers about the parts they use and quality of repairs ('information asymmetry'). Regulation aimed at ensuring consumers are better informed about the performance of repairs to their vehicle may have an indirect public safety benefit but it is not the law's object.

Vehicle repairers are covered under WHS law (owing a duty to those who could be injured due to poor vehicle repairs) and negligence law (a failure to take reasonable care in performing vehicle repairs and modifications).

4.5 Stakeholder feedback

In the consultation RIS we sought feedback on whether:

- we had accurately described the regulation that already applies to relevant parties that would help ensure the in-service safety of automated vehicles
- parties with an influence on in-service safety are sufficiently covered by Australia's current legal frameworks
- there are any new risks posed by second-hand ADS components, aftermarket modifications or the transfer of ownership of automated vehicles that may not be adequately addressed by existing regulation designed for conventional vehicles.

Generally, stakeholders submitted that the consultation RIS described the many laws that may help ensure the in-service safety of automated vehicles. Several key themes emerged about the adequacy of these laws to cover new road users.

²⁸ See, for example, *Criminal Code Act 1899* (Qld) sch 1 s 289.

²⁹ See, for example, *Crimes Act 1958* (Vic) ss 318, 319.

³⁰ See, for example, *Motor Dealers and Repairers Act 2013* (NSW) s 3.

4.5.1 Sufficiency of Australia's legal frameworks to cover in-service safety of automated vehicles – general feedback

Stakeholders generally submitted that the current law cannot accommodate the arrival of new road users that differ from conventional drivers.

Generally, stakeholders considered that much of Australia's driving and vehicle safety laws could, with some refinement, remain fit for purpose for automated vehicles. Importantly, this includes the division of responsibilities between Commonwealth (vehicle standards and import approval through the Road Vehicle Standards Act) and state and territory governments (vehicle registration and road rules).

ACCC submitted that relying on existing laws and frameworks to regulate automated vehicles will result in poor safety outcomes for road users, pedestrians and the general public. In particular, it submitted that the ACL is not the appropriate framework to regulate automated vehicles.

Truck Industry Council submitted that it was too soon to ascertain the adequacy of current regulation to cover any new risks, given the technology was still being developed.

4.5.2 Coverage of ADSEs and remote drivers

Most stakeholders considered that Australian laws developed for human drivers do not adequately cover situations where a corporation is responsible for the dynamic driving task, or where the driver is located outside of the vehicle (remote drivers) (AADA, ACCC, FCAI, a government stakeholder).

Submitters, particularly Australian governments, generally agreed that ADSEs and remote drivers will require specific regulation (ACCC, DITCRD, a government agency, TMR QLD, WA Government).

FCAI and GM Holden submitted that the current law (particularly the ACL and Road Vehicle Standards Act) is sufficient for ADSEs but inadequate for remote drivers.

4.5.3 Coverage of ADSE executive officers

Most stakeholders considered that the current law is inadequate to regulate ADSE executive officers. They considered they should be subject to specific due diligence obligations because they will have control over an ADSE's approach to safety and make decisions that affect the safety of an ADS. These include ICA, Maurice Blackburn, RACQ, TMR QLD, WA Government and a number of confidential government submissions.

DITCRD submitted that further analysis is needed on the necessity for executive officer liability, noting that a number of the decisions about the safety of ADSs provided in Australia will most likely be made by executive officers outside Australia.

AICD, FCAI and GM Holden submitted that duties under the Corporations Act and ACL are sufficient to cover any in-service safety risks within the control of ADSE executive officers.

ACCC strongly resisted the proposition that the ACL was the appropriate regime to regulate in-service safety of automated vehicles for numerous reasons including: the consumer product safety powers in the ACL are limited and generally only allow for post-market intervention; the ACL does not place a pre-market obligation or general safety duty on suppliers to ensure products are safe before they are sold; and the ACL's reactive powers to a novel technology with some unknown risks.

4.5.4 Coverage of repairers

A number of stakeholders stated that current regulation (particularly duties under WHS and consumer law) was sufficient to cover the role of repairers given their role in automated vehicle safety (AAAA, a government agency, ICA, NHVR, RACQ, Ricketts Point Power, TMR QLD). DITCRD submitted that consideration should be given to whether these frameworks, if currently insufficient, could be transitioned in a nationally consistent way to address any in-service risks particular to ADS repairs.

AADA submitted that repairers could be constrained in their actions by the directions given by the registered owner and, in the case of franchised operations such as new car dealers, by their franchisors.

Other stakeholders submitted that further regulation of repairers was required, such as a general safety duty applying to repairers (Australian Motorcycle Council, LIV, VACC, a government stakeholder). The NHVR suggested a general safety duty would be unsuited to repairers.

Some stakeholders proposed measures to ensure repairs are performed properly. Suggestions included requiring manufacturers to provide information to repairers (VACC), or that ADS repairs may only be performed by certain authorised technicians who hold sufficient insurance to meet any liability arising from poorly serviced ADSs (MTA Queensland).

Some stakeholders considered that any deficiencies in regulating repairers would be better managed at the state/territory level rather than in a national law focused on automated vehicles, and that this should be considered further once the scope of the ADSE's responsibilities are better known (TMR QLD, WA Government).

4.5.5 Other parties

Telstra and Transurban submitted that automated vehicles will receive digital versions of road information through C-ITS and therefore considered road managers should have an added, specific responsibility to maintain a digital environment that aligns with the physical environment. This would allow information such as speed limits and lane closures to be conveyed to an ADS.

Maurice Blackburn submitted that a vehicle's owner should not be able to refuse important software updates and should have an obligation to ensure relevant upgrades are actioned. Maurice Blackburn further submitted that software updates to ADSs should only be allowed after a thorough testing regime has been satisfied.

4.5.6 Second-hand ADS components, aftermarket modifications and transferring ownership of automated vehicles

Many stakeholders submitted that second-hand ADS components, modifications and ownership transfers could present new risks that are not adequately covered by existing regulation. They suggested there were risks posed by aftermarket modifications (including software updates) and the relatively less regulated second-hand market place (AAAA, AADA, FCAI, Maurice Blackburn, Truck Industry Council). Concerns generally focused on alterations to a vehicle that can affect the ADS's ability to operate safely.

Some stakeholders submitted that the ADSE has a responsibility to detect modifications and to safeguard its product from foreseeable misuse – for example, by running diagnostics and

deactivating its ADS when it detects tampering (DoT WA, Ricketts Point Power Pty Ltd, TMR QLD).

RACQ submitted that modifications could pose significant safety issues, particularly where the ADSE cannot identify that a modification has been made. RACQ referred to electronic stability controls, which can be adversely affected by changes to certain aspects of the vehicle such as wheel size and ride height.

Truck Industry Council submitted that there are considerable safety risks posed by non-genuine and second-hand service and repair parts, as well as aftermarket modifications that, in time, could require specific regulation. However, they stated that as automated vehicle technology is in its infancy, it is currently difficult to make specific recommendations for regulation. They suggested automated vehicles and ADSs should only be serviced or repaired using parts provided by the original manufacturer by authorised personnel suitably trained by the manufacturer.

4.6 NTC conclusions

4.6.1 Sufficiency of Australia's legal frameworks to cover in-service safety of automated vehicles

Based on our analysis and stakeholder feedback, we consider that ADSEs, ADSE executive officers, remote drivers and fallback-ready users are not sufficiently covered by Australia's current legal frameworks.

We consider that the laws applying to many established parties such as repairers and road managers are either fit for purpose or could, with relatively minor amendment, be updated to accommodate the new road environment brought about by the arrival of automated vehicles. One example of this would be the addition of new rules for fallback-ready users in the Australian Road Rules.

However, the arrival of new and disruptive road users, specifically corporations that will operate vehicles on public roads through ADSs (ADSEs) and remote drivers, necessitates a new form of regulation. We consider ADSEs and – to the extent they are in a position to influence ADSE compliance – ADSE executive officers should be the focus of a national framework targeted at the unique new risks they may present.

4.6.2 The influence of ADSE executive officers is not adequately covered

We consider current duties in the Corporations Act that allow for a weighing of public safety against other corporate interests are insufficient.

An ADSE executive officer may, when acting in the best interests of the corporation, also act in a way that advances public safety. However, this is not the object of the duties. Duties under the Corporations Act are owed to the corporation, not the public or road users who may be injured by a faulty ADS.³¹ A director's duty to the corporation obliges him or her to ensure the corporation complies with its duties under Australian law.

The duty for directors and officers of a corporation to discharge their duties with reasonable care and diligence is qualified by the 'business judgement rule'. It acknowledges

³¹ *ASIC v Cassimatis (No 8)* [2016] FCA 1023 at [481]–[483] per Edelman J.

corporations are entitled and expected to take risks, including some risks that may harm the corporation if they don't pay off.³²

The role played by Volkswagen's executive officers in allowing the diesel emissions scandal to occur has become a case study in corporate governance (Crete, 2016). Those officers' duties to act in the best interests of the corporation did not prevent a breach of the law and the harm it caused, both to Volkswagen and the public. Public safety cannot be ensured by relying only on corporate governance frameworks.

Given the major influence ADSE executive officers may have over the ADSE's safe performance and our conclusion that existing regulation is insufficient, we consider that ADSE executive officers should have a statutory obligation to ensure the ADSE complies with its general safety duty. In chapter 5, we discuss the creation of due diligence duties for ADSE executive officers.

4.6.3 Any gaps in regulating repairers should be addressed outside of a national law for automated vehicles

We consider repairers could have a major influence on in-service safety for automated vehicles. However, based on stakeholder feedback we are not proposing further regulation of repairers at this time. If further regulation of repairers is required, an automated vehicle national law may not be the appropriate vehicle for those duties. Any further regulation of repairers may more appropriately occur at the state/territory level, and possibly should apply to repairers of conventional as well as automated vehicles.

We consider the focus of the national law should be on managing in-service safety risks posed by these new parties when they are in control of vehicles on public roads.

4.6.4 Second-hand ADS components, aftermarket modifications and the transfer of ownership of automated vehicles could present new risks

We consider there may be certain risks that could in future warrant specific regulation of a vehicle's registered owner or user. We consider that this can more appropriately occur at the state/territory level and through existing frameworks and should not be the feature of a national law focused on ADSEs.

The form of any regulation of these parties should be developed when the ADSE's capabilities to diagnose and react to such issues are better known, and the ADSE's obligations under the law are decided.

³² *Vrisakis v Australian Securities Commission* (1993) WAR 395 at 449-450.

5 Regulating to ensure automated vehicles operate safely

Key points

- ADSEs should operate ADSs in accordance with a general safety duty.
- The law should also enable more prescriptive or performance-based regulation for the discrete circumstances where it is warranted, like the performance of the dynamic driving task.
- Where ADSE executive officers are in a position to influence the ADSE's compliance with its safety duty, the executive officer should have a duty of due diligence that obliges the officer to take steps to ensure the ADSE complies with its safety obligations.

5.1 Purpose of this chapter

The purpose of this chapter is to:

- detail three regulatory approaches: prescriptive rules, performance-based regulation and general safety duties
- describe the regulatory approaches we propose for the parties we identified in chapter 4 as warranting regulation in the automated vehicle national law specifically: ADSEs, ADSE executive officers, remote drivers and fallback-ready users.

5.2 Regulatory approaches to safety

The consultation RIS outlined in detail various regulatory approaches to safety. It also assessed their potential appropriateness for regulating the parties in a position to influence automated vehicle safety, specifically:

- prescriptive rules
- performance-based regulation
- principles-based general safety duties.

We suggested that regulation for in-service safety of automated vehicles would best be achieved through a combination of general safety duties supported by prescriptive rules where appropriate. The next section provides a summary of these three regulatory approaches to safety.

5.3 Prescriptive rules

Prescriptive regulation is a rule or statement that specifies in precise terms what is required.

Examples of prescriptive rules used in transport include blood alcohol limits, use of a mobile phone while driving or driving through a red light. These rules are inflexible and leave little room for interpretation.

Another example is a rule against operating a vehicle over a particular mass on a particular road. A vehicle can be weighed and determined with certainty as being either over or under the prescribed mass limit.

Prescriptive rules are best used when:

- standardisation is very important
- the risks are static and well understood
- there is an agreed or widely accepted standard for mitigating the risks and achieving a safety outcome, and the rule is unlikely to require changing
- the level of harm from noncompliance is severe, and a high level of certainty is desirable (regulated parties have neither the ability nor the need to be innovative in complying)
- some parties, particularly smaller businesses, prefer greater precision about what is required to comply.

5.4 Performance-based regulation

Performance-based regulation specifies the outcomes or objectives that must be achieved but not the means by which they must be met (Freiberg, 2017, p. 235).

Examples of performance-based rules used in transport include certain vehicle standards, such as that seatbelt buckles be ‘capable of withstanding repeated operation’³³ and emission limits that govern the concentration of pollutants that may be discharged by a vehicle.³⁴ Load restraint guidelines (which provide the rules for how to restrain loads so they do not fall off vehicles in traffic) require loads to be restrained in a way that ‘prevents the load from moving’ and is ‘capable of withstanding’ the vehicle’s movement (National Transport Commission, 2018d). In these examples the goal of the regulation is stated in quite clear terms; however, regulated parties have a great deal of flexibility in how they go about meeting the goal of the regulation. A seatbelt buckle could be made from whatever material or according to any design the vehicle manufacturer considers best meets the standard. Loads can be restrained through multiple means such as ratchet straps, ropes or containment.

Performance-based regulation is best used when:

- the outcome or goal can be tightly defined and a targeted output can be easily and objectively measured
- the targeted output has a clear link to the desired regulatory outcome
- parties are better placed than regulators to identify the best way to achieve the outcomes or objectives
- competition and innovation are likely to drive more efficient achievement of outcomes or objectives.

³³ Vehicle Standard (ADR 4/06 – Seatbelts) 2018.

³⁴ Vehicle Standard (ADR 79/04 – Emission Control for Light Vehicles) 2011.

5.5 General safety duties

A general safety duty is an example of ‘principles-based’ regulation, which moves away from relying on detailed, prescriptive rules towards more broadly stated principles (Black, et al., 2007).

While broad and general, these principles have a clear purpose, such as safety. Requirements that a party ‘act in the best interests of their client’, or ‘treat its customers fairly’ are examples of principles-based regulation.

The focus of the regulation is whether a party has achieved the regulation’s purpose, as opposed to whether prescriptive rules or performance-based outcomes or objectives have been met.

In the case of a safety duty for automated vehicles, a general safety duty would place an overarching and positive obligation on relevant parties to ensure the safe operation of the ADS. The standard that is usually used for general safety duties in Australia is ‘as far as reasonably practicable’. This is the standard that would probably be used for a general safety duty that applied to ADSs.

Although terms such as ‘safe’ are not quantitative as used in prescriptive rules, ‘safety so far as reasonably practicable’ has proven effective as a standard for evaluating conduct in other transport industries including heavy vehicles,³⁵ commercial passenger vehicles,³⁶ commercial marine vessels³⁷ and rail.³⁸ We discuss the ‘reasonably practicable’ standard in more detail in section 5.6.1.

ADSEs already owe a duty under Australian negligence law to take reasonable care to ensure the use of an ADS does not result in a collision with another vehicle, road user or stationary object. A statutory safety duty could:

- ‘codify’ the existing negligence duty – that is, create a written version of the duty in legislation
- provide greater clarity about what the duty means in the context of automated vehicle regulation
- allow a specialised regulator to enforce the duty
- attach a criminal sanction for breaching the duty (essentially making operating an automated vehicle without reasonable care a criminal offence).

Academic commentary suggests that transferring the common law duty of care into legislation provides leverage for regulators. It requires operators to maintain a reasonable level of risk awareness beyond mere compliance with directly applicable rules (Hopkins, 2012).

General safety duties are best used when:

³⁵ *Heavy Vehicle National Law Act 2012* (Qld) Chapter 1A.

³⁶ *Point to Point Transport (Taxis and Hire Vehicles) Act 2016* (NSW) pt 2.

³⁷ *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (Cth).

³⁸ *Rail Safety National Law Act 2012* (SA) sch (‘Rail Safety National Law’) ss 52-54.

- the outcome or goal of the regulation can be qualitatively rather than quantitatively (easily or objectively) measured
- other parties, such as consumers, have the capability to monitor compliance, reducing the need for an intrusive regulator
- a high degree of trust and good communication exists between the regulator and regulated parties, with parties willing to deal with the regulator in good faith (Baldwin, et al., 2012, p. 305)
- a regulator can provide guidance on how to comply with the safety duty when needed
- industry is diverse and acceptable practices are likely to change over time
- regulated parties are relatively sophisticated and capable of developing their own risk management strategies consistent with the general duty's application to their business
- competition and innovation are likely to drive more efficient compliance
- greater innovation in meeting regulatory objectives is desired.

5.6 General safety duty for in-service safety

5.6.1 General safety duty for ADSEs

Benefits of a general safety duty

General safety duties can provide flexibility and enable innovation. The approach works well where regulated parties, rather than a regulator, are best placed to come up with solutions to manage risks.

A general safety duty would allow a flexible approach to ensuring safety for each ADSE, rather than having prescriptive rules that attempt to cover different business models and contexts.

Governments have imposed general safety duties on parties in many industries including commercial passenger vehicles, marine vessels, rail, heavy vehicles and WHS. Such duties were introduced because governments decided that acts or omissions by parties in these industries could cause unreasonable risks to public safety, which warranted criminal sanctions.

The correlation with other effective uses of a general safety duty in transport suggests that a general safety duty may be the most appropriate approach for regulating ADSEs. This may be particularly appropriate for ADSEs given their role as systems managers and their corporate status. ADSEs are likely to be large, capable corporations and will probably develop their own innovative solutions to safety risks.

To satisfy a safety duty, an ADSE would be required to show it has systems in place to respond to safety risks. These could range from policies to ensure systemic software errors are quickly identified and addressed, to mechanisms that prevent an ADS from operating when it detects it is approaching the limits of its ODD. Many of these systems will have been a part of the Statement of Compliance ADSEs submitted when they applied for approval under the Road Vehicle Standards Act.

In the consultation RIS we described how a general safety duty could apply to regulating automated vehicles and sought feedback from stakeholders on whether this was an appropriate regulatory approach. We suggested such a requirement could improve public

safety through its coverage to both known and currently unknown risks. We asked for feedback on the potential limits of such a duty, and whether the duty should be qualified by what was ‘reasonably practicable’ for the duty holder (National Transport Commission, 2019a).

The CBA conducted by PwC concludes it is likely that an automated vehicle general safety duty, supported by some more prescriptive rules, will provide better outcomes in terms of safety than relying on existing regulatory frameworks or solely on prescriptive duties. It also concludes that a general safety duty is less likely to result in unnecessary costs to businesses than prescriptive rules.

What is reasonably practicable?

A duty to ensure safety would be qualified by what is ‘reasonably practicable’. What is considered ‘reasonably practicable’ varies between industries and over time as technology and practices evolve (Hopkins, 2012).

Legislation could define ‘reasonably practicable’ or provide a list of factors that could be relevant in determining whether an action is reasonably practicable. Alternatively, it could be left to the courts to interpret (Stewart-Crompton, et al., 2008, p. 42).

The National Review into WHS laws concluded:

The standard of ‘reasonably practicable’ is a high one, requiring the duty holder to consider all of the circumstances and take measures that are commensurate to the likelihood and seriousness of the harm which may result from the relevant activities, and relieved only by consideration of what is not possible or what is clearly unreasonable in the circumstances. A duty holder must clearly understand that this standard must be met. (Stewart-Crompton, et al., 2008, p. 40)

In a submission to the NTC, the Victorian Government stated that what constitutes ‘reasonably practicable’ will evolve over time to reflect change in the global market (National Transport Commission, 2018c).

A specialised and responsive regulator that is tasked with providing relevant guidance to industry can mitigate any concerns that a general safety duty may be too broad. A single, specialised regulator would also avoid uncertainty and inconsistencies that can arise when multiple regulators are responsible for enforcing a similar duty.

The practical steps an ADSE would be required to take to discharge its safety duty are much like what would be required under Australian negligence and WHS laws. The duty would only be burdensome to those who but for the duty would have operated unsafely. ADSEs that intend to operate safely should not be deterred by a general safety duty.

Application on private land

Australian driving law is most concerned with vehicles when they are being driven on public roads, and not on private land. For example, the Australian Road Rules only apply to vehicles and road users on roads and road-related areas,³⁹ and vehicles are only required to be registered by state and territory vehicle registration law if they are to be used on public roads. The consultation RIS asked stakeholders: If there was to be a general safety duty for

³⁹ Australian Road Rules 2018 r 11.

ADSEs, should such a duty be limited to when the ADS is operating on public roads, like some other driving laws?

Generally, stakeholders considered the risks posed by ADSs on private land should also be addressed through the general safety duty if such a duty was introduced (AADA, Australian Motorcycle Council, DPTI SA, ICA, Maurice Blackburn, TMR QLD, VACC, WA Government).

Private cause of action linked to a general safety duty

Some frameworks that impose a standard to be enforced by a public regulator also provide a cause of action for injured persons where that standard is breached. For example, breaches of duties in the Corporations Act can be enforced by both shareholders⁴⁰ and the regulator, the Australian Securities and Investments Commission. Similarly, the ACL is publicly enforced by ACCC but also provides remedies for injured persons.⁴¹

If a general safety duty provided a cause of action, those injured by an ADSE's lack of care could pursue the ADSE for its breach of the safety duty. Additionally, if a group of people suffered loss or injury due to the same breach of the safety duty, the action could be brought by one person on behalf of the larger group via a class action. This could provide a more direct avenue for injured parties to access compensation compared with litigation in negligence.

Allowing injured parties to litigate safety duty breaches would mean the duties owed by regulated parties could be upheld without first relying on a regulator to take action. Allowing private enforcement of the general safety duty could reasonably be expected to increase the likelihood of compliance for ADSEs. It would increase the potential for regulated parties to be held accountable for failures to comply with the duty. ADSEs may face increased costs due to greater exposure to litigation.

ADSE executive officer due diligence

As ADSEs are corporations, their actions and omissions, including those involving compliance with regulatory requirements, will necessarily be influenced by certain senior officers. Large pecuniary penalties where ADSEs breach their safety duty would punish the company's shareholders rather than the people responsible for the ADSE's breach. Therefore, many other regulatory frameworks that govern corporations impose separate requirements on senior officers to ensure the corporation's obligations under the law are achieved.

Chapter 4 suggested that current executive officer regulation is inadequate to meet the expectations of Australian governments when it comes to safety for automated vehicles.

Comparable regulatory frameworks operating in transport such as heavy vehicles,⁴² WHS,⁴³ point-to-point transport,⁴⁴ rail⁴⁵ and vehicle standards⁴⁶ have addressed this gap through a

⁴⁰ *Corporations Act 2001* (Cth) ss 180-181.

⁴¹ Australian Consumer Law s 138.

⁴² *Heavy Vehicle National Law* s 26D.

⁴³ *Work Health and Safety (National Uniform Legislation) Act* s 27; *Occupational Health and Safety Act 2004* (Vic) s 144.

⁴⁴ *Point to Point Transport (Taxi and Hire Vehicles) Act 2016* (NSW) s 133.

⁴⁵ *Rail Safety National Law* s 55.

⁴⁶ *Road Vehicle Standards Act 2018* (Cth) s 33.

separate requirement on executive officers to exercise due diligence. This is usually in relation to ensuring their corporation discharges its own safety requirements under the law.

When an ADSE's executive officer is in a position to influence the ADSE's compliance with the law, the Corporations Act's duties to act in the best interests of the corporation⁴⁷ would have them take steps to confirm the company's products do not operate in a way that could expose the ADSE to risks such as brand damage, recalls or litigation.⁴⁸ Given those obligations, an appropriately calibrated due diligence requirement in the automated vehicle law would impose minimal additional burden but would cover occasions where the executive officer's duties under the Corporations Act are insufficient to ensure the ADS operates safely.

Vehicle manufacturer offices in Australia tend to be more focused on public affairs or dealership aspects of the business. They may not have a role in parts of the business that influence ADS safety such as developing and implementing software updates. If ADSE executive officers based overseas are the more likely parties to create risks to safety on Australian roads through a failure to exercise due diligence, it appears to follow that the law would require extraterritorial application similar to the Road Vehicle Standards Act.⁴⁹

5.7 Combination of prescriptive rules and general safety duty for in-service safety

In the consultation RIS we noted that the different parties involved in automated vehicle safety required different regulatory approaches, depending on the party and the task at hand.

A general safety duty approach is suitable for most risks involving the ADSE. However, we suggested that national law should enable more prescriptive regulation when appropriate.

A general safety duty alone would not achieve the level of consistency and predictability that road users require from each other in a dynamic road environment. Human drivers are regulated through more prescriptive rules in the Australian road rules. This prescription ensures vehicles behave in a way that is consistent and predictable for other road users.

A general requirement that an ADS 'drive safely' would leave too much to interpretation and would be insufficient to ensure that automated vehicles always stop at red lights. The consultation RIS asked whether the ADS's performance of the dynamic driving task should, like human road users, be more prescriptively regulated.

Similarly, in the consultation RIS we suggested that the risks involved with teleoperation of vehicles by remote drivers could warrant some prescriptive rules around readiness to drive (the remote driver should not be impaired by fatigue or intoxication). Something as prescriptive as a specialised remote driver licensing framework may also be appropriate.

⁴⁷ The effect of the first supply decision is to bring ADSEs under the *Corporations Act 2001* (Cth) ss 180, 181, 184. Foreign corporations would have similar obligations under the laws of other countries.

⁴⁸ *ASIC v Cassimatis (No 8)* [2016] FCA 1023 at [481]–[483] per Edelman J.

⁴⁹ *Road Vehicle Safety Act* s 10.

5.8 Stakeholder feedback

5.8.1 Automated vehicle regulation should be nationally consistent

Stakeholders strongly submitted in favour of national consistency, agreeing that inconsistent regulations would be a barrier to introducing automated vehicles in Australia, and result in added costs for Australian consumers (all Australian governments, ACCC, ANCAP, IAG, ITS Australia, LIV, MTA Queensland, RACQ, Toyota, VACC). Even those stakeholders that did not support in-service safety regulation on the ADSE and ADSE executive officer agreed that any new regulation should be nationally consistent (AAA, FCAI, GM Holden).

5.8.2 ADSEs should be subject to a general safety duty

Most submitters supported creating a general safety duty on ADSEs, including its application to ADSs when engaged on private land (all Australian governments, AADA, AICD, Australian Motorcycle Council, EasyMile, ICA, Kate Hunt, Maurice Blackburn, RACQ, Ricketts Point Power Pty Ltd, Transurban, VACC). In supporting a general safety duty, DPTI SA noted similarities between ADSEs and 'common carriers' found in legal frameworks for pipelines, shipping, telecommunications and mass transit.

One jurisdiction said an overarching general safety duty is the preferable approach to regulating ADSEs because it:

- would cover both known and unknown safety risks
- is suited to the dynamic environment in which automated vehicles will operate
- will ensure ADSEs are proactive in addressing any potential safety risks.

ACCC submitted that a general safety duty is the most effective way of achieving optimal safety outcomes over the lifespan of an automated vehicle, including future risks that may not be immediately apparent.

Some submitted that the law should be flexible enough to exempt some vehicles used exclusively on private land such as mine site and farms, which are adequately regulated by other frameworks such as WHS (a government agency, TMR QLD).

Some industry stakeholders considered that a general safety duty is not appropriate, generally on the grounds that it would be too great a burden for ADSEs, and that current regulation is sufficient (FCAI, GM Holden, Truck Industry Council).

Some stakeholders considered that a general safety duty is particularly desirable as a starting point, and that more prescriptive regulation may be required once more is known about the industry (Australian Motorcycle Council, Transurban, VACC).

5.8.3 Executive officers in a position to influence ADSE safety should exercise due diligence

Australian governments generally supported ADSE executive officers having a specific duty of due diligence, linked to the ADSE's safety duty, provided such a duty was consistent with relevant COAG principles. DITCRD, while supporting the general safety duty for ADSEs, submitted that further analysis was required on the practical aspects of extending a due diligence requirement to executive officers.

AICD submitted that executive officers should not be subject to further duties because directors of Australian companies are already bound by duties under the Corporations Act,

including duties to act with care, skill and diligence. These duties oblige them to familiarise themselves with new laws and implement frameworks to manage new risks and ensure compliance. AICD agreed with the NTC's proposition that in the context of ADSs, this duty will typically require directors to take steps to protect the ADSE from reputational risk or exposure to litigation arising from an unsafe ADS product. AICD also submitted that regulation should be cognisant of the difference between an ADSE's senior management and directors.

A number of submissions cautioned that any due diligence requirement should capture the correct people in a company, specifically those in a position to control particular risks, and not those whose roles involve other aspects of the business (AICD, FCAI). Some cautioned that executive officer liability could deter manufacturers from entering the Australian market (AADA, FCAI, GM Holden).

5.8.4 On the cause of action

There was strong support for the principle of ensuring injured parties have legal avenues to compensation. A number of stakeholders provided in-principle support for a statutory cause of action linked to a general safety duty (a government stakeholder, Australian Motorcycle Council, ICA, Kate Hunt, Maurice Blackburn, TMR QLD, Transurban, VACC).

ICA submitted that a cause of action linked to a general safety duty would provide a clear path to recover from an ADSE while also ensuring the ADSE is further incentivised to mitigate any safety risks that the vehicle poses in service. ICA considered that a statutory duty would give insurers the right to recover against the entity whose negligence gave rise to the insured person's injury. ICA suggested that this would have the benefit of keeping premiums down because the insurer could recover the cost where the insured is the innocent party.

Some stakeholders considered that actions in negligence and the ACL may suffice and a new, statutory cause of action may not be required (AICD, FCAI, WA Government). Some submitted that other frameworks such as insurance could be considered (AADA, DPTI SA).

5.8.5 Where prescription is warranted

Stakeholders generally supported enabling prescriptive regulation for the discrete areas of automated vehicle safety where general duties would be insufficient (three jurisdictions). One jurisdiction submitted that the mix of general duties and prescription would capture all eventualities, provide stronger incentives to focus on the risks within a particular party's control and provide regulators with clearer enforcement pathways and tools.

In its CBA, PwC concludes it is likely that a general safety duty supported by some more prescriptive rules will provide better outcomes in terms of safety.

DITCRD submitted that a general duties approach should be supported by prescriptive approaches such as regulatory guidance materials for industry or prescriptive laws that could clarify and operate in conjunction with an overarching general duty. Specifically, DITCRD considered prescriptive approaches could:

- provide certainty to industry about the standard expected by governments
- alleviate community concerns about the safety and predictability of ADSs by setting reasonable expectations
- avoid unintended or perverse outcomes.

ADS performance of the dynamic driving task

Given the decision of ministers that the ADSE is to be legally responsible for the dynamic driving task when its ADS is engaged, if prescriptive rules were made, the regulated party would be the ADSE.

Stakeholders generally submitted that automated vehicles should behave in a way that is predictable and consistent, both for safety and efficient movement of traffic, and that some prescriptive rules are required for ADSs performing the driving task (Australian Motorcycle Council, RACQ, Ricketts Point Power Pty Ltd, TMR QLD, Transurban, VACC). We discuss approaches regulating the dynamic driving task in more detail in chapter 6.

Remote drivers

Remote drivers share many risks with conventional drivers such as competencies (sufficient driving skill) and ensuring they are not affected by fatigue or intoxication. For conventional drivers these risks are addressed through imposing prescriptive rules such as driver licensing frameworks and strict blood alcohol limits. Submitters generally identified that the remote operation of a vehicle could also involve different safety risks to the operation of a vehicle by an ADS, or the operation of a conventional vehicle.

Human Integrated Internet of Things (HiloT) noted the unique role remote drivers may have, potentially acting as a human interface between the ADS and the occupants of the vehicle, complementing the safe deployment of automated vehicles, and operating from remote operating centres that could also be responsible for data collection and analysis.

Generally, submitters that commented on the regulation of remote drivers considered remote drivers should be subject to focused, prescriptive regulation.

It was noted that enforcing requirements such as licensing, training and fitness to drive will not be able to occur at the roadside, and a different enforcement model is required. TMR QLD submitted that a prohibition on remote operation of vehicles in Australia by remote drivers based overseas should be considered in the first instance. This was a common view in the various workshops held by the NTC.

FCAI submitted that any future regulation of remote drivers should be addressed separately to the regulation of vehicle manufacturers.

5.9 NTC conclusions

5.9.1 ADSEs should operate their ADSs in accordance with a general safety duty

We consider a principles-based, general safety duty is the appropriate regulatory approach for ensuring ADSEs manage the safety risks that are within their control. This approach provides a flexible approach for ADSEs. It addresses their role as corporations with responsibility for the safe performance of driving systems, without creating prescriptive rules that could hinder innovation.

A duty to operate safely is no more than the standard the law expects of human drivers in control of conventional vehicles. The practical steps an ADSE would be required to take under the duty are much like what they would be required to take under negligence. We consider a general safety duty should not deter ADSEs that intend to operate safely from entering the market.

A general safety duty could improve public safety through its application to both known and currently unknown risks. It is an efficient way to transfer the safety standard expected of

human drivers into something that corporations overseeing systems can implement and comply with.

The duty should apply at all relevant times the ADS is engaged, including when it is on private land such as residential driveways.

At this stage, we are not convinced that a private cause of action should be a feature of the safety duty. Those injured by ADSE breaches of the safety duty will have various actions available to them in negligence and under the ACL. We consider that the merits of a private cause of action linked to a general safety duty should be explored in greater detail in the next stage of work on compliance and enforcement (discussed in chapter 11).

5.9.2 ADSE executive officer due diligence

We consider it necessary for the law to expect ADSE executive officers to exercise due diligence regarding the ADSE's compliance with the safety duty. We agree with the submissions of most stakeholders, particularly Australian governments, that if a corporation is to be responsible for public safety, its compliance with its safety obligations will depend on the diligence of its own senior officers.

An ADS operating in breach of the general safety duty would be a severe hazard with potentially disastrous consequences. It is appropriate to place the bulk of the responsibility on the ADSE; however, leaving that responsibility solely to corporations would be insufficient given the consequences of the breach. It is reasonable for the regulatory framework to expect the ADSE's executive officers to exercise due diligence.

COAG has developed principles⁵⁰ for imposing personal criminal liability on directors and other corporate officers as a consequence of a corporate offence. We consider that given their relationship and position of influence within the ADSE, a due diligence requirement on ADSE executive officers is consistent with those principles.

We agree with the stakeholders that identified that many Australian-based ADSE officers will not be in a position to influence ADSE safety. They should not be liable for managing risks that are not within their control.

A due diligence requirement would mean that if an ADSE contravenes the safety duty, the law would consider the acts or omissions of certain ADSE senior officers that led to the breach. It would **not** mean an executive officer would be vicariously liable for the ADSE's acts or omissions.

Any duty of due diligence should, consistent with the COAG principles, be limited to those who are in a position to influence the ADSE's compliance with its general safety duty. An executive officer who was not in a position to influence the conduct of the ADSE in relation to its contravention, or who used all due diligence to prevent the contravention by the corporation, would not be held liable for the ADSE's failures.

5.9.3 Enabling prescriptive regulation where it is warranted

The general safety duty should be the central feature of a national regulatory framework; however, the law should enable prescriptive regulation for the limited circumstances where it is warranted. Transport ministers have already decided that fallback-ready users should be

⁵⁰ COAG Principles on Directors' Liability Provisions, adopted December 2009, and are provided in Appendix E.

subject to certain prescriptive rules similar to conventional drivers, such as those concerning blood alcohol and readiness to drive.

Two other areas have emerged as potentially warranting more prescriptive regulation: the dynamic driving task (discussed in more detail in chapter 6) when performed by ADSs, and remote drivers. We consider the automated vehicle national law should provide the head of power for more prescriptive rules to be made governing those activities.

As described in chapter 4, we consider the automated vehicle national law should not, at least in the first version, regulate repairers in any way that affects their legal rights or duties. We consider substantive regulation of repairers should remain the responsibility of state and territory governments. This would not preclude a national regulator publishing material that might assist repairers.

Some prescription is warranted to regulate the performance of the dynamic driving task by ADSs so they behave consistently and predictably for other road users. The Australian Road Rules contain the essential behaviours that ADSs should be consistent with; however, they are not the appropriate instrument for regulating the driving task when it is performed by a machine. The national law should provide a head of power for new rules with national application. While it should be consistent with the Australian Road Rules, the code would be more like an in-service, performance-based vehicle standard, which would allow the rules to be expressed in a way that an ADS can comply with. The code should accommodate current and future salient jurisdictional differences.

We are not proposing the specific regulation at this time, only that the national law provides a head of power for prescriptive rules to be made if Australian governments decide such rules are necessary.

6 Regulating the dynamic driving task for automated vehicles

Key points

- The Australian Road Rules are uniform rules for road users. These rules help to ensure driver behaviour is predictable to other road users.
- Automated vehicles will also need to be predictable to other road users.
- The road rules are generally nationally consistent on key driving obligations – for example, when a driver must give way to another road user.
- The road rules were designed to address the risks presented by human road users. They list obligations that humans can understand and comply with. The road rules were not designed to regulate an ADS.
- The Automated Vehicle Law should include a head of power to enable regulation of the dynamic driving task, when performed by an ADS.

6.1 Purpose of this chapter

The purpose of this chapter is to:

- consider what driving rules are required to regulate an ADS's performance of dynamic driving tasks
- detail further work that will be done to implement ADS driving rules in Australian law.

6.2 The dynamic driving task

Driving can be divided into 'strategic' and 'dynamic' tasks:

- Strategic tasks include trip planning, such as where and when to travel, and route selection.
- Dynamic driving tasks include the operational and tactical actions required to operate a vehicle, such as steering and speed. An ADS is a combination of hardware and software components designed to perform the 'dynamic driving task'.

The SAE standard J3016 provides the common international understanding about what the dynamic driving task involves (SAE International, 2018). It describes the dynamic driving task as:

All of the real-time operational and tactical functions to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints, and including without limitation:

- *Lateral vehicle motion control via steering (operational);*
- *Longitudinal vehicle motion control via acceleration and deceleration (operational);*
- *Monitoring the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical);*
- *Manoeuvre planning (tactical); and*
- *Enhancing conspicuity via lighting, signalling and gesturing, etc. (tactical).*

6.3 Relevant Transport and Infrastructure Council decisions

In May 2018 transport ministers agreed that Australia would develop a purpose-built national law to regulate the on-road operation of automated vehicles. Ministers agreed, among other matters, that this law should:

- provide that an ADS may perform the dynamic driving task
- define the dynamic driving task in a way that aligns with the SAE standard J3016
- provide the dynamic driving task obligations
- provide that the ADSE is responsible for compliance with dynamic driving task obligations when the ADS is engaged.

Transport ministers agreed that an ADSE must demonstrate the ability of its ADS to comply with relevant road traffic laws.⁵¹ This chapter considers how to implement this decision.

6.4 Human driver risks compared with an ADS

6.4.1 Human drivers

Human drivers make decisions based on information gathered through their senses and drawing on previous experience and situational awareness to predict the behaviour of other drivers. Road rules and other laws that apply to human drivers are designed to regulate a road environment where risks are attributable to human faults including: impatience (leading to speeding and tailgating); impulsiveness (leading to running red lights and unsafe lane

⁵¹ See appendix B for the full list of safety criteria.

changes); impairment by alcohol, drugs or fatigue; and distraction (for example, mobile phone use).

6.4.2 ADS

An ADS emulates the driving task performed by humans, within the specific conditions under which it is designed to function (ODD) – for example, location, weather conditions and driving modes. However, an ADS achieves safe driving through very different means, relying on components such as sensors and software. Many of its risks relate to failures of vehicle components. These include hardware and software failures, such as a sensor failing to detect a lane is closed or a software failure that leaves the ADS unable to process and react to data, and cybersecurity failures.

There are some things that humans do well, which an ADS may not easily replicate; for example, '[h]uman drivers are excellent reasoners about other drivers' behaviours, based on their experiences, even with a small amount of data (eye contact)' (Campbell, et al., 2010).

However, the ADS is immune to many inherent human risks such as fatigue, impatience, impairment or distraction. As the risks posed by ADSs differ from those posed by human drivers, it follows that regulation of automated vehicles could also differ to the rules for human drivers.

6.5 Prescription in driving rules

Chapter 5 discussed the circumstances where prescriptive regulation is appropriate and concluded that prescription is warranted when standardisation is important, and a rule is unlikely to require regular changes.

The European Commission's High-Level Expert Group on Artificial Intelligence noted in its *Ethics guidelines for trustworthy AI* that predictability is required for people to trust artificial intelligence systems (High-Level Expert Group on Artificial Intelligence, 2019). Trust is emerging as a key theme in the discussion of testing, validation and regulation of automated vehicles (AI4People, 2018).

6.6 Rules for human drivers – the Australian Road Rules

6.6.1 Australian Road Rules

All road users have a general duty to drive safely under Australian negligence law. However, the model Australian Road Rules are necessary to ensure the safe and efficient movement of traffic. They aim to provide nationally consistent rules for 'road users', which includes drivers, cyclists, passengers and pedestrians.⁵² The road rules are a relatively prescriptive list of rules that human road users must comply with.

The Australian Road Rules, maintained by the NTC, are model law and have no legal effect until implemented under state or territory law.

⁵² Australian Road Rules r 3.

6.6.2 State and territory implementation of road rules

States and territories generally incorporate the model Australian Road Rules into their own road traffic laws. However, not every provision is replicated in each state and territory, and jurisdictions deviate from the model law when they consider it appropriate. There are also several provisions in the model Australian Road Rules that specify matters for state and territory governments to decide.⁵³

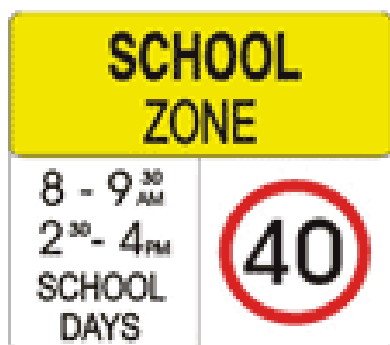
When the model law is amended, states and territories implement updates to their own law in their own time, and subject to their other reform priorities. As a result, despite efforts towards national consistency, the road rules vary across states and territories.

State and territory governments can also amend their road rules at any time they consider it appropriate. This means there will continue to be some variation between jurisdictions.

6.7 Differences in state and territory road rules with implications for automated vehicle regulation

The differences in the road rules between jurisdictions may have implications for automated vehicle regulation. State and territory transport agencies have analysed variations of their road rules against the model law. Their analysis suggests the road rules are largely consistent when it comes to the dynamic driving task. However, there are some jurisdictional differences that may pose a problem if applied to an ADS. For example, school zones in most states and territories have variable speed limits based on school hours, like those in Figure 8.

Figure 8. School zone variable speed sign



However, in South Australia school zones have a speed limit of 25km/h (illustrated in Figure 9) any time a child is in the vicinity, which includes a child who is on the road, footpath, median strip or on a bike. The rule applies 24 hours a day all year around and not, for example, only on school days (Department of Planning, Transport and Infrastructure, 2019).

An ADS could be programmed to slow to a set speed in certain areas at specific times of the day, as required in most Australian school zones. However, a variable speed limit like that in South Australia, which requires a driver to identify a child, may be difficult for an ADS.

⁵³ For example, many road rules leave open the place for 'another law' of the jurisdiction to alter the rule, including for fundamental rules such as the definition of a 'road' (r 12) and the penalty for breaching a road rule (r 10).

If an ADS cannot distinguish a child from adults or other objects, the only way an ADSE could ensure compliance with the road rule would be to program the ADS to decrease its speed to the lower speed limit at all times it is in a school zone. This could create a hazard if frustrated human drivers attempt to overtake slow-moving automated vehicles.

Figure 9. School zone sign in South Australia



6.8 Obligation on ADS to ‘drive safely’

We sought stakeholder feedback on whether there should be specific driving rules for ADSs, similar to the road rules for human drivers, or whether ADSs obligations would be adequately captured by a requirement to ‘drive safely’.

6.8.1 Stakeholder feedback

No stakeholders supported the option of regulating performance of the dynamic driving task solely by requiring the ADS to drive safely. They considered this would not achieve an appropriate level of road safety, predictability or consistency for other road users.

Two government agencies considered it inappropriate to require an ADS to simply ‘drive safely’ without knowing how that obligation would be operationalised – for example, when can a vehicle exceed the speed limit yet be assessed as driving safely (DPTI SA, another government agency).

RACQ commented that this approach could result in automated vehicles driving in a way that is overly cautious, which could have safety implications. Similarly, Kate Hunt queried how ‘safely’ would be defined and the likelihood of other road users accepting this approach.

DPTI SA noted that the safety criteria for first supply of an ADS to the Australian market requires an ADSE to demonstrate how an ADS will:

- comply with relevant road traffic laws and how the vehicle will respond safely in circumstances where strict compliance is not possible
- respond and interact in a predictable and safe way with other road users.

DPTI SA considered that these first-supply obligations mean that an in-service obligation to simply ‘drive safely’ is not feasible.

AADA supported ADSs simply being required to drive safely in environments where they are not likely to encounter human drivers. TMR QLD also considered this approach might work if situations emerge where automated vehicles operate on dedicated infrastructure.

6.9 Approaches to regulating the dynamic driving task

The NTC reviewed international approaches to regulating the dynamic driving task.⁵⁴ We identified four approaches that could reasonably be used to regulate the dynamic driving task for automated vehicles in Australia:

- Approach 1: create a national automated vehicle driving code
- Approach 2: require ADSs to substantially comply with the dynamic driving task road rules in each state and territory
- Approach 3: regulate ADSs through the Australian Road Rules
- Approach 4: create rules under the Road Vehicle Standards Act.

A mixture of these approaches could be used – for example, requiring substantial compliance with the Australian Road Rules may be suitable as an interim measure while a national driving law for automated vehicles is drafted. We have adopted our description of approach 1, based on feedback from consultation.

Chapter 9 analyses feedback we received on the four options to address in-service safety risks of automated vehicles. Some dynamic driving task approaches would be more straightforward to implement under some options than others. For example, a single national driving code for automated vehicles would be simpler to implement if there was a single regulator and law with national application than if each state and territory was to regulate automated vehicles separately.

6.9.1 Approach 1: Create a national automated vehicle driving code

How it would work

A head of power in the automated vehicle national law (discussed in chapter 5) would allow for prescriptive rules to be made governing the dynamic driving task.

Initially, the automated vehicle driving code might only capture the dynamic driving task obligations in the state and territory road rules. While still being a single instrument that applies nationally, the code could account for the minor variations in dynamic driving task obligations in state and territory road rules. The national automated vehicle driving code would be updated if a state or territory amended their road rules in a way that altered the dynamic driving task obligations.

At a later time, the head of power could be used to create dynamic driving task rules that are more specifically targeted at an ADS.

6.9.2 Approach 2: Require ADSs to ‘substantially comply’ with the dynamic driving task road rules in each state and territory

How it would work

⁵⁴ See consultation RIS, 94–95, which can be accessed at <https://www.ntc.gov.au/sites/default/files/assets/files/NTC%20Consultation%20RIS%20-%20In-service%20safety%20for%20automated%20vehicles.pdf>.

State and territory governments would legislate to require an ADS to ‘substantially comply’⁵⁵ with the road rules related to the dynamic driving task in a state or territory. The states and territories could exempt the ADS from complying with rules unrelated to the driving task, or that cannot apply to an ADS. They could assign responsibility for any obligations that an ADS cannot perform – for example, to a fallback-ready user. Breaches could also provide grounds for a recall under the Road Vehicle Standards Act.

6.9.3 Approach 3: Regulate ADSs through the Australian Road Rules

How it would work

The ADS would be included as a new type of road user in the Australian Road Rules. State and territory governments would amend their road rules to implement the change. Instead of requiring substantial compliance with the rules written for human drivers (approach 2), specific rules could be made for the risks that are unique to automated vehicles.

6.9.4 Approach 4: Create rules under the Road Vehicle Standards Act

How it would work

The Road Vehicle Standards Act regulates new vehicles and vehicle components as they enter the market. In granting approval for an automated vehicle or ADS component to be supplied in Australia, the minister can impose conditions on the ADSE, which could include conditions about performance.

Under this approach, rules regulating the performance of the dynamic driving task would be made for ADSs under the Road Vehicle Standards Act. If the ADS failed to perform the dynamic driving task as required by the rules, that could be grounds for a recall. Rules and recall notices would be made by the Commonwealth minister.

6.10 Stakeholder feedback

Automated vehicles should operate predictably and nationally consistent rules are desired

Stakeholders agreed that automated vehicles should operate in a way that is predictable and consistent, and that this is necessary for safety and efficient movement of traffic. Stakeholders also agreed that national consistency should be achieved to the greatest extent possible (ICA, ITS Australia, Western Australian consultation). For example, Transurban noted that consistent application of rules across jurisdictions would minimise the need for ADSEs to track rule variations. RACQ expressed support for harmonising the road rules as far as practical.

Some stakeholders did not explicitly support a particular approach but provided general support for ADSs being required to comply with relevant road rules or behave the same as human drivers (AADA, DPTI SA, EasyMile, FCAI, GM Holden, ICA, Ricketts Point Power Pty Ltd, TMR QLD, Truck Industry Council, two other jurisdictions, VACC).

⁵⁵ An example of ‘substantial compliance’ used in vehicle standards can be found in the *Road Vehicle Standards Rules 2019* (Cth) r 76. Substantial compliance with a standard can be adequate if the noncompliance is only minor and inconsequential, the vehicle complies with standards to an extent that makes it suitable for use on public roads, and the vehicle would not pose a risk to public safety.

Several stakeholders considered that some prescriptive rules will be required for ADSs when performing the driving task. RACQ recommended developing specific rules that account for ADS limitations; for example, in school zones a rule could set an ADS-specific speed limit or require a driver, not the ADS, to be in control. DITCRD submitted that prescriptive rules about on-road behaviour of an ADS may be appropriate.

Some stakeholders considered prescriptive regulation would be easier to enforce, particularly during the mixed fleet period when the on-road environment will be complex. (ACT consultation session, Australian Motorcycle Council, RACQ, TMR QLD, Transurban, VACC).

We received suggestions that a government body, possibly the national regulator, could monitor and collate road rule variations and provide them to ADSEs. This would reduce the compliance burden on ADSEs and minimise related consumer impacts and provide greater safety benefits (ICA, RACQ).

We also received feedback that regulation needs to be future-focused and move from relying on prescriptive road rules that nominate actions to be followed, towards outcomes-based regulation (consultation sessions, Kate Hunt, Maurice Blackburn).

FCAI and GM Holden considered that only minimal changes to the road rules are required to accommodate the ADS performing the dynamic driving task safety. FCAI suggested that:

It would be sufficient to require the ADS to continue to comply with the road rules in-service and be exempt from the road rules that can only be carried out by a human driver.

Some stakeholders suggested that there may be a need for an interim approach to regulating the dynamic driving task.

We received the following feedback on the four approaches to regulating the performance of the ADS driving.

Approach 1: create a national ADS driving code

Most stakeholders that supported approach 1 submitted it would take considerable time to develop and implement. Stakeholders suggested that further research occur to better understand how automated vehicles will operate on the road environment (ICA, RACQ, TMR QLD). Transurban supported developing a driving code as a single set of rules for ADSs. They suggested that the code could be within an automated vehicle national law or embedded in the Australian Road Rules (approach 3). The Australian Motorcycle Council suggested that the feasibility of developing machine-readable code be explored.

Approach 2: require the ADS to substantially comply with the road rules

There was some support for approach 2. One jurisdiction commented that it is unclear how substantive compliance would be implemented by governments and that this approach could result in inconsistencies between jurisdictions.

Some stakeholders considered that approach 2 may be suitable as an interim measure (Maurice Blackburn, TMR QLD, Transurban). It could be used while a longer term approach is developed that could involve ADS-specific driving rules or a less prescriptive safety management approach.

Approach 3: regulate the ADS through the road rules

A number of stakeholders supported approach 3, particularly as an interim measure. EasyMile and Transurban considered that automated vehicles could be regulated through the Australian Road Rules, making them subject to the same rules as other road users, with ADS-relevant exemptions.

However, several stakeholders submitted that the driving performance of an ADS should be regulated differently from human drivers because the risks posed by ADSs are different. Some stakeholders stated that it will be difficult to modify a regulatory tool that was designed for human capabilities (notably, attention spans and reaction times) and apply it to machine performance failures (AADA, TMR QLD and another jurisdiction). Kate Hunt questioned whether applying the prescriptive nature of the road rules to ADSs would achieve adequate safety outcomes, given the uncertainties surrounding ADS technology and the possibility of rapid technological improvements.

Transurban expressed support for a single set of regulatory rules and considered that a combination of approach 3 and approach 1 (national ADS driving code) could achieve this.

Approach 4: create rules under the Road Vehicle Standards Act

We received little feedback on regulating ADSs through rules in the Act. TMR QLD considered that it may be appropriate to use the Road Vehicle Standards Act to regulate the ADS's performance of the dynamic driving task. They submitted that this would align with the transport ministers' decision to rely on the Road Vehicle Standards Act to regulate ADSEs at the point of first supply and noted that using the Road Vehicle Standards Act would:

... avoid the need to adapt human-based driver frameworks for ADSs ... as they are poorly suited for driving in-service safety outcomes for AVs. Instead, vehicle standards compliance mechanisms could be used to manage the safety of ADSs under the control of ADSEs and penalise breaches in a manner proportionate to the risk.

Transurban considered that the approach was not particularly feasible because the legislation and the Commonwealth government agency administering the Road Vehicle Standards Act are too far removed from the operational environment of automated vehicles.

Support for an interim approach

Several stakeholders expressed support for relying on the road rules as an interim approach to regulating the dynamic driving task for vehicles across levels SAE 3–5. Some of the reasons provided for an interim approach included:

- there are too many unknowns about how automated vehicles will operate on Australian roads and it is a safe interim approach to support a range of scenarios (a government agency, Kate Hunter,)
- it will ensure the regulations reflect international standards and are sufficiently flexible to adapt to changing technologies (RACQ).

6.11 NTC conclusion

Stakeholders told us that ADSs should be required to operate in a predictable manner. Based on strong stakeholder feedback and our analysis we consider it is insufficient that an ADS simply be required to 'drive or operate safely'.

There was support for applying some degree of prescriptive regulation to the operation of ADSs to help ensure vehicles operate consistently and predictably for other road users.

The Australian Road Rules contain the essential behaviours that ADSs should be consistent with. However, they are not the appropriate instrument for regulating the driving task when it is performed by a machine. As an interim approach for initial deployment of automated vehicles we agree with stakeholders that suggested that regulation of the dynamic driving task should align with the relevant road rules. This will provide predictability for road users in each state and territory. In the long term, we consider that the preferable approach would be to harmonise ADS dynamic driving task rules so they are consistent across the country. Harmonisation would reduce costs to ADSEs and barriers to investment in Australia.

We are not proposing a detailed regulatory approach at this time and acknowledge that it may be necessary to develop an interim approach. However, we conclude that if ADSs are to behave consistently and predictably to other road users an approach that enables prescriptive regulation of the dynamic driving task should be developed.

We propose that the automated vehicle national law (discussed in chapter 5) provides a head of power to make prescriptive rules to enable regulation of the dynamic driving task when performed by an ADS. Those rules would have national application. As an interim measure they could accommodate any pertinent jurisdictional differences that affect the dynamic driving task such as significant derogations from the model road rules.

7 Governance arrangements for the in-service safety of automated vehicles

Key points

- We expect the commercial deployment of automated vehicles will be initially limited; however, the scope of the regulatory task remains uncertain. Governance arrangements should be flexible and responsive to circumstances as they develop.
- The regulator will require a range of functions and powers. Some of these will be essential from the beginning, while others could be added over time. Detailed powers will be considered further in the next phase of in-service work.
- A single national regulator, rather than separate state and territory regulators, will best achieve nationally consistent regulation.
- The regulatory function could potentially sit within a new or existing independent or government body.
- Detailed funding arrangements will be developed once transport ministers agree on a regulator; however, funding could potentially come from a mix of government funding and cost recovery.

7.1 Purpose of this chapter

The purpose of this chapter is to outline the governance arrangements of a regulator for the in-service safety of automated vehicles. It considers:

- the scope of the regulatory task
- the functions and powers a regulator would need to effectively regulate in-service safety
- the institutional arrangements⁵⁶ that could accommodate the regulator's functions and powers
- the regulator's funding arrangements.

We have updated the sections below based on stakeholder feedback to the consultation RIS.

7.2 Context of governance arrangements

A regulatory body would be required to administer the new in-service safety duties and obligations proposed in chapter 6. This body or bodies will be the regulator for the in-service safety of automated vehicles.⁵⁷

⁵⁶ In this decision RIS, 'institutional arrangements' refers to the structural features of a regulator.

⁵⁷ References to 'the regulator' in this chapter should be read as covering either a single regulator or multiple regulators.

Currently the Commonwealth Government and state and territory governments share responsibility for regulating road transport.

The Commonwealth Government regulates the safety of new and imported conventional vehicles at first supply to the Australian market. It will also regulate the safety of automated vehicles at first supply.

Once conventional vehicles are on roads, responsibility for safety shifts to state and territory governments through their transport agencies and the NHVR. These agencies administer in-service vehicle standards for light and heavy road vehicles. This in-service system covers licensing, registration and roadworthiness.

The regulator for in-service safety of automated vehicles will need to ensure the relevant parties can assure the safety of an ADS over its full life cycle. Its responsibilities will be analogous to the responsibilities states and territories have to ensure vehicles are roadworthy and that drivers comply with road rules.⁵⁸

7.3 Requirements for an effective regulator for in-service safety

The design of the regulatory body that will administer the in-service safety assurance system is key to the system's success. The regulator must have the correct mandate (functions), regulatory tools (powers), structure (institutional arrangements) and funding to be able to effectively regulate in-service safety.

Government stakeholders have agreed that the following principles should guide the design of an in-service regulator:

1. The regulator ensures in-service automated vehicle safety risks are comprehensively addressed by the relevant duty holder.
2. The regulator ensures a nationally consistent approach to in-service safety in cooperation with Commonwealth, state and territory governments.
3. There are clearly defined roles and responsibilities for the Commonwealth, states/territories, industry and users to facilitate market entry, consumer confidence and safety.
4. The regulator can accommodate international standards as they develop.
5. There is minimal overlap and duplication with existing regimes.
6. The size of the regulator is efficient and scalable.
7. The regulator can recover some or all of the efficient costs of its regulatory activities.⁵⁹

7.4 Scope of the regulatory task

The scope of the regulatory task will inform the functions and powers a regulator will need to effectively manage in-service safety.

⁵⁸ Licensing and registration functions would remain with existing state and territory regulators.

⁵⁹ Principles agreed by the Automated Vehicles Senior Advisory Group in November 2018. This group consists of senior officials from Commonwealth, state and territory governments and is chaired by the NTC.

The nature, growth and size of the automated vehicle market and hence the scope of the regulatory task remains uncertain at this stage:

- The market could consist of a small number of established operators who are used to complying with Australian road transport frameworks (for example, conventional vehicle manufacturers), or it could largely consist of new entrants (for example, software developers and commercial operators), some of whom may have a different attitude towards compliance.
- The in-service regulatory framework itself could influence the types of parties entering the market.
- Implementation of the first-supply safety assurance system could influence the types of parties entering the market.
- Automated vehicle technology could be ready for commercial deployment to overseas markets in the next couple of years as previously publicly stated by vehicle manufacturers, or manufacturers could continue a more recent trend of pushing back expected deployment timeframes.
- Business models could shift towards more shared fleets, or private ownership could remain the dominant model. And consumers could be quick to adopt the technology or slow to embrace it due to safety or other concerns.

It is reasonable to assume that initially commercial deployment of automated vehicles will be limited. This has implications for decisions on the governance arrangements for the regulator. It may reduce upfront costs to have a regulatory model based on existing in-service governance arrangements for regulating conventional vehicles, or to have a smaller national regulator that increases its regulatory task as the market itself increases.

As noted in principle 6 above, it is important that the size of the regulator is efficient and scalable to manage an evolving market. However, in the long term, setting up an initial regime and then a further regime to account for the growth of the market may be an inefficient regulatory approach.

7.5 Functions

A regulator will need to undertake a range of functions to ensure in-service automated vehicle safety risks are comprehensively addressed by relevant duty holders. Its key function will be to ensure relevant parties assure the safety of an ADS over its full life cycle. This may require the regulator to undertake both proactive and reactive functions, and different types of duties may influence the reliance placed on different functions. Regulatory functions could be mandatory or permitted by legislation but not required.

In the consultation RIS (section 8.4) we described the functions we considered a regulator would need to ensure in-service automated vehicle safety risks are comprehensively addressed and asked for feedback. We have considered this feedback (described further in section 7.7) and present an updated list of proposed functions below.

The deployment of automated vehicles may be limited at first, and the regulator should be scalable in order to respond to the changing market. This may mean the regulator's functions should be more limited at first. In ordering the list of functions below, we have started with the most essential functions first.

- Monitoring – to proactively observe regulated parties' compliance with their duties over the life of an ADS. This would include monitoring to ensure compliance with in-service aspects of the first-supply safety criteria – for example, cybersecurity breaches. This

function will be particularly important for administering a general safety duty. (Specific monitoring and enforcement powers to enforce compliance are discussed in the next section.)

- Education and guidance – to help regulated parties understand their rights, responsibilities and obligations, and to help them mitigate and further avoid identified safety risks.
- Court applications and proceedings
 - to make applications in court to use particular enforcement powers (for example, injunctions or directions to act)
 - to conduct proceedings against regulated parties for breach of duties
 - to defend proceedings related to its decisions or exercise of functions.
- Consultation with jurisdictions (if the regulator was a national body) – to understand jurisdiction-specific issues.
- Research – into incidence and prevention of accidents, and trends in the use and safety of automated vehicles.
- Creating standards – to develop prescriptive duties relevant to in-service safety as necessary.
- Customer service – to house or share housing of any required customer-facing functions itself.

The regulator’s final functions will be determined when the automated vehicle national law is drafted, which will occur once all key policy decisions on the regulatory framework for automated vehicles are agreed by ministers. Depending on the legislative drafting, functions may be specified individually or grouped thematically, or just the high-level objectives of the regulator may be outlined. The legislation will specify powers for the regulator to support the functions.

7.6 Powers

Our overarching assumption is the in-service safety regulator will require a range of tools to enable it to respond to noncompliance in a way that is proportionate to the risk and the ability of the duty holder to address that risk.

The powers a regulator would need broadly fit into two categories – compliance and enforcement.⁶⁰ We note that detailed compliance and enforcement powers (including sanctions and penalties) will be further considered in the NTC’s next phase of work on in-service safety.

The regulator will most likely need the following compliance and enforcement powers:

- investigation powers to monitor safety risk and compliance including:
 - inspection

⁶⁰ Detailed compliance and enforcement powers for in-service safety will be addressed in the next phase of the NTC’s work on in-service safety of automated vehicles. That work will be guided by the outcomes of this RIS process, as well as the NTC’s work on government access to cooperative intelligent transport systems and automated vehicle data.

- audit
- rights of entry (for example, to enter business premises to access records relevant to an in-service safety breach)
- power to require data and information
- enforcement powers including:
 - access to, collection and sharing of data from ADSEs⁶¹ for the purpose of enforcing road traffic laws and general safe operation of the ADS (it may be necessary to have data sharing arrangements with relevant agencies such as police, road managers and insurers)
 - formal warnings
 - infringement notices
 - injunctions
 - improvement notices
 - fines
 - enforceable undertakings
 - criminal prosecutions
 - directions to act – for example, to issue updates or undertake repairs
 - variation or withdrawal of permissions to operate (such as varying the automated vehicle's ODD).

7.7 Stakeholder feedback — regulatory task, functions and powers

7.7.1 The scope of the regulatory task remains uncertain

We asked stakeholders whether we accurately described the scope of the regulatory task. Some stakeholders considered we had described it well. Others considered it difficult to precisely determine the scope of the regulatory task because of the uncertainty surrounding the automated vehicle market in Australia. Areas of uncertainty included:

- deployment timeframes (TMR QLD)
- the nature of the Australian automated vehicle industry (DPTI SA and a government agency)
- business models (DITCRD and a government agency)
- rates and nature of uptake by consumers (DITCRD)
- the complexity of ADS functionality and associated safety cases (Ricketts Point Power Pty Ltd)
- the pace of technological change (DITCRD)
- the impacts of a mixed fleet as it transitions from predominantly human drivers to predominantly ADSs (a government agency)
- international regulatory approaches (DITCRD)

⁶¹ This requirement comes from the 'data sharing and recording' safety criteria, which ADSEs must self-certify against at first supply.

- the reach of first-supply arrangements into in-service safety (DPTI SA and TMR QLD).

Despite these uncertainties, some stakeholders identified expected trends or influences:

- FCAI considered deployment would be slow because the technology would need to be proven, and it relies on high-definition mapping of ODDs being available.
- DPTI SA anticipated there would initially be few ADSEs and they would be likely to be international firms.
- A government agency submitted that initially automated vehicles in Australia would be high-end luxury vehicles.
- TMR QLD considered that increasing the perceived value of automated vehicles and decreasing costs will most likely result in higher uptake over time.
- Ricketts Point Power Pty Ltd considered the regulatory task would be more complex in the earlier stages of commercial deployment (level 3) because of the human factors involved in lower levels of automation.

Some stakeholders noted current uncertainties and the ability of government intervention to also shape the market. Examples included:

- the impact of the regulatory approach (including compliance and enforcement) on the market (DPTI SA and TMR QLD); for example, a general safety duty on ADSEs could lead to ADSEs preferring to deploy shared fleets where they could manage risks more directly, over deploying automated vehicles for private ownership
- the impact of the regulatory approach on existing frameworks (TMR QLD).

Stakeholders considered that the regulator and framework should be designed with the uncertainties described above in mind. The WA Government and RACQ considered it should be scalable as numbers of automated vehicles increased – starting small and increasing in size over time. HiloT considered the regulator should be dynamic in its operations, and that regulations would need to be constantly reviewed and updated.

7.7.2 The regulator will need a broad range of functions and powers to ensure in-service safety risks are properly managed by regulated parties

Most stakeholders supported the functions and powers considered in the consultation RIS.

Functions

Additional functions suggested included:

- monitoring for trends in automated vehicle safety and use (ICA) and research into incidents and prevention of automated vehicle-related accidents (TMR QLD)
- regular and effective consultation with states and territories to deal with unintended consequences and regional issues – if the regulator was a national body (MTA Queensland)
- promoting public awareness of automated vehicle issues and maintaining public confidence in their use (TMR QLD)
 - (We have not included it as a proposed function for the in-service regulator as we consider it would not be appropriate for the regulator to be promoting the use of automated vehicles. Its focus should be on promoting the safe operation of automated vehicles in service.)
- cybersecurity (VACC)

- (We have not included it as a proposed function for the in-service regulator because DITCRD (the first-supply regulator) will have an enforcement role for cybersecurity risk relevant to vulnerabilities in ADS design.)

One government agency considered the regulator would not have many proactive functions and powers such as guidance and inspection because it would not have the expertise to assess complex ADSs.

TMR QLD suggested that mandatory no-fault reporting requirements could support a general safety duty. ADSEs would report safety issues to the regulator without being subject to punitive regulatory action in the first instance. The regulator could work with an ADSE to ensure the safety issue is remedied and improved safety management practices are implemented.

Ricketts Point Power Pty Ltd considered the regulator should ensure the ADSE develops a set of work practices documented in a manual of standards and hold the ADSE accountable.

RACQ identified the US NHTSA as an effective model and suggested that similar functions, activities and powers could be adopted in Australia.

Powers

Some stakeholders suggested additional powers that were not mentioned in the consultation RIS. These included powers to:

- give directions to act – for example, updates, repairs and corrective action (AADA, ICA)
- allow the regulator to do anything required to perform its monitoring and enforcement functions (TMR QLD)
- enforce compliance with road rules (AADA) – we note the regulator’s role would supplement and interact with the role of police and DITCRD (the first-supply regulator)
- remove authorisation for an ADSE to assure the in-service safety of an ADS (Ricketts Point Power Pty Ltd) – we note the ability of an ADSE to ‘be an ADSE’ is a decision of the first-supply regulator when granting type approval.

OVIC submitted that government data collection, use and disclosure of data should be balanced with privacy protections to appropriately limit this use to specific purposes, in particular safety and network efficiency. These powers should also align with community expectations. In particular, the risk of reidentifying individuals should be fully considered before allowing open data. There was a risk that this could affect public trust.

TMR QLD referred to recent royal commission findings as evidence of the need for the regulator to have a range of enforcement tools and an ‘enforcement culture’.⁶²

A government agency considered enforcement powers centred on ADSEs’ reputational risk will be a greater driver of compliance than fear of prosecution, as perceptions of safety were tied to global value for these companies.

⁶² TMR QLD referred specifically to the Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry and the New South Wales Independent Commission Against Corruption into Election Funding, Expenditure and Disclosure.

There was some support for the in-service regulator to have a power to recall automated vehicles. We consider the Road Vehicle Standards Act provides a sufficiently broad recall power that could be used to recall automated vehicles for in-service safety breaches. This will depend on appropriate information flows from the in-service regulator to the first-supply regulator about a relevant breach. To avoid duplication, we do not propose a specific recall power for the in-service regulator.

7.7.3 Functions and powers for enforcing prescriptive or general safety duties may not greatly differ

Stakeholders had mixed views on whether the regulator's functions and powers would differ depending on the types of duties it administered. Ricketts Point Power Pty Ltd, RACQ and TMR QLD considered the regulator's powers and functions would not differ. Other submitters noted there could be differences in the reliance placed on particular powers and the level of resourcing required for them.

If the regulator was enforcing prescriptive duties only, this might require more administrative effort (FCAI). Additionally, the regulator would have more limited flexibility in applying its compliance and enforcement powers (DPTI SA).

If the regulator was also enforcing general safety duties, the regulator might:

- spend a greater proportion of resources on proactive audit and investigation functions plus education and information sharing to support industry (TMR QLD) and less on enforcement due to risks being identified and mitigated before breaches occurred (RACQ)
- work more closely with ADSEs to rectify safety issues, with escalating enforcement action depending on action taken by ADSEs (TMR QLD)
- require external advice on occasion about applying the 'so far as reasonably practicable' standard (FCAI).

7.7.4 Other relevant points from submissions

DPTI SA noted the importance of a clear delineation of functions between the levels of government and different agencies to ensure a consistent enforcement approach. Another government agency noted the importance of understanding the regulator's role in enforcement and interactions with other enforcement bodies, particularly police and the NHVR.

The IAG considered a new independent body would be needed for testing the functionality of automated vehicles and to report findings. Retesting or regular testing might be needed to ensure continued safe operation through the life of the vehicle, especially after repair and recalibration.

7.8 NTC conclusions — regulatory task, functions and powers

7.8.1 The scope of the regulatory task is uncertain

The nature, growth and size of the automated vehicle market are uncertain at this stage. This uncertainty extends to: the level and nature of risks posed by automated vehicles; the timeframes and business models for deployment; and the level of consumer confidence in the technology. However, through consultation and monitoring we know that this technology is being developed internationally and being readied for deployment. Australia participates in international forums to contribute to international standards and understand individual

national frameworks being developed. It is important to use this opportunity to create a regulatory framework that ensures the safe deployment and operation of automated vehicles in Australia.

7.8.2 The regulator should undertake a broad range of functions and requires appropriate powers to support these functions

The regulator will need to undertake a range of functions to effectively manage regulated parties. To enable the effective performance of their functions the regulator will require an appropriate range of powers. Key functions include those essential for regulating parties such as monitoring ADSEs and conducting court proceedings. Additional functions, like public education and safety research, would help to improve safety outcomes over time and encourage the deployment and use of safer technology.

The regulator will need a broad range of compliance and enforcement powers so it can take escalating enforcement action proportionate to the level of safety risk or noncompliance by regulated parties. These powers will need to be considered in more detail in the next phase of work on in-service safety. We will need to consider the compliance and enforcement tools that existing bodies already have at their disposal and ensure a clear delineation is made between the different frameworks and levels of governance.

7.8.3 The regulator will need the right expertise and ‘culture’ in order to be effective

Notwithstanding the functions and powers assigned to the regulator, it will need the right expertise and culture to effectively regulate in-service safety. Appropriate powers, sufficient funding, staff capability and institutional arrangements that support a compliance approach will be instrumental to achieving a safer on-road environment. Clear accountability mechanisms will be a key part of establishing a culture where risks are managed effectively.⁶³

7.8.4 The regulator may not need to be large initially

We agree with stakeholders that the scope of the regulatory task will most likely be limited initially. We consider a scalable regulatory function will be an effective way to manage the regulatory task while ensuring the regulator’s mandate is responsive to developing the market over time.

7.9 Institutional arrangements

The functions and powers of the regulator will determine the most appropriate institutional arrangements to support those requirements. There are three key institutional questions to resolve:

1. Should the regulator be an independent agency or a government agency?
2. Should the roles and responsibilities be administered at the state/territory level, at the national level, or through a combination of both?
3. Should the regulator be a new agency or form part of an existing agency?

⁶³ The final report of the Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry notes that ‘[c]lear accountability is vital to effective governance. It ensures that issues are resolved, and resolved effectively. It fosters a culture where risks are managed soundly’ (Hayne, 2019, p. 407).

7.9.1 Level of independence

Safety regulators in Australia have varying levels of independence. Some regulatory functions are administered wholly within a government department. For example, the first-supply regulator for conventional vehicles is the relevant federal government minister and DITRDC, under the *Motor Vehicle Standards Act 1989* (Cth). Other regulators like the NHVR and the Office of the National Rail Safety Regulator are established by statutes as body corporates but have a level of government oversight – for example, Ministerial Board appointments and annual reporting to ministers.

The benefits of a government regulator or greater government oversight for in-service safety include:

- it may be easier to establish data-sharing arrangements with other government agencies, particularly enforcement agencies
- public accountability for using coercive state powers
- potential increased consumer confidence in the safety of automated vehicles.

The main argument for a regulator with more independence is to diminish outside influence, particularly political influence. Government regulators may be more responsive to lobbying or media attention due to the political and electoral pressures. A more independent regulator may be more agile in its ability to avoid these pressures, meaning the goal of public safety is less vulnerable to compromise. It is also important for industry and the public to have confidence in the impartiality of a regulator that can effectively stop the participation of regulated parties in the market.

More independence may be beneficial where ‘a consistent approach over a long period of time is needed to create a stable environment’ (New Zealand Productivity Commission, 2014, p. 218). For in-service safety of automated vehicles, a consistent approach will be important to create certainty for regulated parties about their obligations over the full life cycle of ADSs.

7.9.2 Single national regulator or multiple state and territory regulators

The in-service safety regulator for automated vehicles could be a single national regulator or multiple state and territory regulators. There are examples of both across safety regimes in Australia. For example, WHS has regulators in each state and territory (and Comcare in the Commonwealth), whereas therapeutic goods are regulated nationally by the Therapeutic Goods Administration.

A single national regulator best achieves the creation of a single market, and consequently the greater likelihood of achieving a consistent, national approach to safety. Regulated parties operating across jurisdictions would face the same duties, and a single regulator would be more likely to provide consistent application of enforcement mechanisms.

Other benefits include:

- There would be greater ability to enforce duties against ADSEs operating nationally and to manage systemic safety risks in fleets deployed nationally.
- Inefficiencies (including duplication of effort and cost) created by having eight separate in-service regulators for automated vehicles instead of one would be avoided.
- Regulated parties operating across multiple states and territories (such as ADSEs that are commercial fleet operators) will face lower compliance, administrative and delay costs from dealing with one regulator.

- As a consequence of the potential decreased compliance costs for industry and costs to state and territory governments of individually enforcing duties, consumers may in turn benefit from additional costs not being passed on to them.
- Some states and territories, particularly smaller jurisdictions, may find it difficult to attract the specialist expertise required to effectively regulate automated vehicle technology, which could lead to adverse safety outcomes in these jurisdictions.
- Access to data will be more efficient because there will not be a need to create data-sharing mechanisms between multiple in-service regulators.

Using state and territory regulators has some advantages. It would allow in-service regulation for both automated and conventional vehicles to be administered together (with the NHVR). This avoids fragmenting the regulation of road safety. States and territories may be able to utilise existing processes, and consumers might find the system more accessible given familiarity with these processes.

State and territory regulators would be better able to tailor the regulatory framework to respond to local priorities if these were significant enough to warrant local variation.

There is the potential for consistency in safety approaches through nationally consistent rules administered at the state/territory level, or mechanisms like mutual recognition or formal governance arrangements. However, consistency would be less than that achieved through a national regulator.

7.9.3 New or existing body

A new regulatory function will not necessarily require a new regulatory body. If the regulator is an existing body it could create efficiencies, and it is likely that establishment costs for government would be lower.

The existing bodies that might be most suitable, based on their relevant structures, knowledge and responsibilities, are DITRDC and state and territory road transport agencies.

If DITRDC was to regulate both first-supply and in-service safety for automated vehicles, this could:

- reduce costs for industry, which would only need to deal with one regulator for automated vehicles
- remove potential confusion about who regulates in-service issues that are also relevant at first supply, and avoids different approaches emerging between regulators
- remove potential barriers to data flows between first-supply and in-service regulators
- concentrate the technical expertise for regulating automated vehicles in one agency
- more effectively manage interactions between new international standards/ADRs and safety requirements not yet covered by international standards that still need to be administered in service.

If state and territory road transport agencies (and the NHVR) were the in-service regulators, this could:

- allow regulatory processes for managing in-service safety for automated vehicles to be incorporated into in-service safety processes for conventional vehicles
- remove confusion for regulated parties, who would only need to deal with one regulator for in-service safety even if they owned both automated and conventional vehicles

- reduce potential barriers to data flows about on-road issues such as network operations, which could aid safe operation of automated vehicles.

This decision would be better informed by more certain market predictions. However, if the number of ADSEs was small at first, it could be a further reason to incorporate the in-service regulator function into either DITRDC or state and territory road transport agencies.

On the other hand, if the regulator was a new body, its staff, structure and governance could be established specifically to address the regulatory functions associated with in-service safety of automated vehicles.

It would be a significant departure from their current roles for either DITRDC or state and territory road transport agencies to be the in-service regulator. DITRDC's regulatory role and functions, powers and expertise largely apply to first-supply matters that focus on vehicle design rather than on-road behaviour. Similarly, state and territory road transport regulators (and the NHVR) would need very different expertise from that currently needed to regulate conventional vehicles – for example, to detect software problems arising from cybersecurity failures. Developing or attracting this expertise may be a costly challenge, particularly for smaller jurisdictions.

Upfront government set-up costs to establish a new regulatory function within either of these existing bodies might still be substantial.

7.10 Funding

The regulator will require appropriate funding to effectively carry out its functions and will ideally reflect an equitable distribution of benefits received by users of the system. Funding arrangements will be closely tied to the governance arrangements chosen for the regulator.

If the regulator is a state/territory-level regulator, each state and territory would determine its own funding arrangements. If the regulator is a national-level regulator, Commonwealth, state and territory governments would agree a national funding model together. Funding could come from government contributions and/or cost recovery from industry and/or consumers from fees and levies, commercial charges, fines and penalties, and general taxation (Australian Government, Department of Finance, 2014, p. 2).

The Australian Government's cost recovery guidelines state its overarching cost recovery policy is that, 'where appropriate, non-government recipients of specific government activities should be charged some or all of the costs of those activities' (Australian Government, Department of Finance, 2014).

Another option would be for Australian governments to provide the seed funding required to establish the regulator. All or part of the seed funding could be provided on the basis that it will be repaid once the regulator is able to recover the full costs of its operations.

7.11 Stakeholder feedback — institutional arrangements and funding

We asked stakeholders whether we had accurately captured the benefits of the regulator being: (a) a government body or an independent body; (b) a national body or state/territory-level bodies; and (c) an existing body or a new body. Stakeholder feedback on the benefits of RIS options will be discussed in chapter 9.

The Australian Motorcycle Council, Kate Hunt, Ricketts Point Power Pty Ltd, TMR QLD, Transurban and VACC generally considered the RIS accurately captured the benefits of the different institutional arrangements.

7.11.1 Level of independence

HiloT considered a government body (at the national level) would be able to ensure uniform implementation of regulations. TMR QLD noted the Commonwealth Government's ability to regulate corporations to oversee ADS safety and ADSE compliance.

The WA Government considered a statutory body siting outside government structures, with appropriate governance and performance requirements, would offer agility and independence to manage large manufacturers and political agendas.

7.11.2 Single national regulator or multiple state/territory regulators

Submitters identified the key benefit of a single national regulator is its ability to provide a nationally consistent approach to safety and compliance (DITCRD, HiloT, LIV, TMR QLD, a government agency). ITS Australia and MTA Queensland agreed but noted the importance of responsiveness to regional differences between states and territories, particularly those with large remote rural regions.

HiloT noted the cost efficiencies of having a single national regulator.

TMR QLD noted that safety issues within an ADSE's control will most likely be systemic fleet-wide issues that should be addressed at the national level. It considered states and territories would find it challenging to enforce a general safety duty on ADSEs that will most likely be large corporate entities operating nationally. The WA Government also noted it would be cost prohibitive for states and consumers to take action against these ADSEs.

TMR QLD suggested that where there was still a role for states and territories, governance arrangements setting out roles should be formalised. Another government agency considered robust governance arrangements for state and territory regulators could reduce the risks of significant derogation from a national law. For example, a senior officials group that reported to the Transport and Infrastructure Council could oversee proposals for derogations.

A government agency considered a national regulator would, in the short term, further fragment and complicate the regulation of road safety (including registration and licensing). FCAI considered that while the administrative burden of dealing with multiple regulators for conventional vehicles is significant, it would be more costly to further separate out in-service regulation for automated vehicles.

7.11.3 New or existing body

Stakeholder feedback on whether the regulator should be a new or existing body was closely linked to their views about whether there should be a single national regulator or multiple state and territory regulators.

DPTI SA and TMR QLD suggested using existing resources would minimise upfront costs. However, TMR QLD suggested further analysis would be required to assess an existing body's ability to exercise the required functions and powers. It also suggested a need to ensure appropriate communication and referral protocols can be established for states and territories.

Some stakeholders identified DITCRD as being an appropriate existing body to house the in-service regulator if there was a national regulator. Reasons given included:

- DITCRD's role as first-supply regulator for conventional and automated vehicles (ACCC)
- DITCRD already has the required powers (ACCC, FCAI) (ACCC noted that powers were sufficient under the Road Vehicle Standards Act but not the Motor Vehicle Standards Act)
- technical expertise on automated vehicles would be concentrated in one business area, creating automated vehicle experts (WA Government)
- the risk of a new regulator becoming redundant if new duties are quickly surpassed by international standards (a government agency).

Ricketts Points Pty Ltd submitted DITCRD would not be an appropriate regulator based on limitations in implementing its responsibilities under the Road Vehicle Standards Act and its input into the NTC's consultation processes to date.

Another existing body, the ACCC, provided strong feedback that it was not an appropriate in-service regulator, even on an interim basis. It considered it did not have the required specialist knowledge or technical expertise. It also noted that being the regulator would divert resources from its market surveillance and hazard assessment functions for consumer goods and product-related services. This diversion of resources may ultimately lead to adverse safety outcomes for consumers and the general public.

RACQ referred to previous reforms that may have failed due to 'stagnant workplace cultures and barriers'. They considered it would be better to have a new body rather than an existing body that might already be under-resourced or under-performing.

The WA Government noted that there was only benefit in a new national regulator if its functions are not duplicated in existing regulatory frameworks. It, along with other governments and transport agencies, considered that states and territories should continue their existing functions (for example, licensing and registration).

7.11.4 Other stakeholder feedback on institutional arrangements

HiloT commented on the membership of the regulator, stating it needed members from existing government bodies and from industry.

Some stakeholders were hesitant to comment on the appropriate institutional arrangements until other issues were further clarified – for example, compliance and enforcement arrangements (a government agency) and funding (another government agency).

A number of stakeholders considered that interim institutional arrangements had benefits. These will be discussed in chapter 9.

7.11.5 Funding models and cost recovery for a regulator

We sought preliminary views from stakeholders on funding, noting that we will consider funding arrangements in detail once ministers have agreed how in-service safety will be regulated.

Stakeholder feedback on how the regulator should be funded was mixed.

Some stakeholders considered the regulator should be funded from both government contributions and cost recovery from industry (Australian Motorcycle Council, Kate Hunt, RACQ).

HiloT considered the regulator should be funded solely by government to avoid being influenced by regulated parties. FCAI did not support a new regulator but noted if a regulator was established it should be government-funded.

TMR QLD and DPTI SA considered there should be full cost recovery from industry.

AADA considered funding should come from levies on the sale and operation of ADSs.

Ricketts Point Power Pty Ltd supported government funding in the first decade, transitioning to partial industry funding when the regulatory approach and overall costs and benefits were clearer. TMR QLD acknowledged some government contributions may be needed while the market was small.

TMR QLD noted that before a funding model could be agreed, the scale or cost of regulatory activities needed to be clarified; expected cost savings to government and industry that could offset funding contributions should be identified. It also noted that broader heavy vehicle road user charging or market reform programs should not be adversely affected.

Some stakeholders suggested how funding should be collected. RACQ suggested state and territory government contributions could be based on numbers of automated vehicles registered within their jurisdiction. TMR QLD suggested revenue collection could be through annual operation or accreditation fees for ADSEs and a fee for each of their ADSs.

RACQ considered funding mechanisms should be enshrined in legislation to mitigate political impacts on the functions and effectiveness of the regulator. TMR QLD noted that sufficient funding was necessary for the regulator to enforce compliance.

7.12 NTC conclusions — institutional arrangements and funding

7.12.1 The regulator should be a national body

The potential for national inconsistency to be a barrier to entry is a fundamental part of our problem statement. As noted in chapter 2, there is a risk that regulation will not be transferable across jurisdictions, leading to additional and unnecessary costs for regulated parties. If this acts as a disincentive to deployment in Australia, the Australian public may not be able to realise the full benefits of automated vehicles.

We agree with the majority of stakeholders that a single national regulator would be best able to achieve a nationally consistent approach to in-service safety. A national regulator is better placed to manage systemic ADS risks and enforce duties against large ADSEs operating nationally. A single regulator also avoids the inefficiencies caused by having eight separate regulators, such as duplicated costs, which may impact not only government but industry and consumers.

7.12.2 Other arrangements will be further considered

States and territories will still have important roles in ensuring automated vehicle safety on public roads, particularly in data sharing and compliance and enforcement. It will be important to delineate roles clearly and identify how state and territory agencies (and other

relevant bodies) will interact with a national regulator in the next phase of work on in-service safety.

The level of independence will be discussed further in chapter 9 when we consider stakeholder feedback on the options. The appropriateness of an existing body such as DITRDC being regulator depends on which option is chosen and will need to be considered further once ministers agree on a reform option.

Funding arrangements will need to be considered further once institutional arrangements and functions and powers have been determined. We agree with stakeholder feedback that a mix of funding sources will be appropriate. Government funding is particularly important for establishing the regulator and in the early stages of deployment in order to encourage an emerging industry. The regulator must be funded at a level that enables it to comprehensively enforce compliance with the duties it administers.

8 Legislative implementation models

Key points

- A national law that regulates automated vehicles in service could be implemented through state and territory legislation, or through Commonwealth legislation with the assistance of the states and territories.
- Regardless of the approach chosen, states and territories would continue to regulate all aspects of vehicle use currently regulated at that level.
- The role of the national in-service regulator could be tightly defined, and we do not envisage a transfer of current powers and functions of states and territories to a national regulator.

8.1 Purpose of this chapter

The purpose of this chapter is to outline:

- models for achieving a national law within Australia's federal structure (and how this could be achieved using state and territory legislation or Commonwealth legislation)
- potential transitional and constitutional issues.

Based on feedback from stakeholders, we amended our presentation of the legislative implementation models in section 8.3 to more clearly identify the responsible level of government and to ensure approaches are consistently described.

8.2 Achieving a national law within Australia's federal structure

In the consultation RIS we explained how inconsistent regulation could impede the deployment of automated vehicle technology in Australia. The need for national consistency is also discussed as part of the problem statement in chapter 2, where we explain why nationally inconsistent approaches and multiple regulators could be a regulatory barrier to market entry. It is discussed further in chapter 10, where we describe stakeholder support for a national approach as the preferable end state. This highlights the need to achieve a national law for the in-service safety of automated vehicles.

Australia's federal structure divides legislative power between state and Commonwealth levels of government. Relevant key features of Australian legislative power are:

- Commonwealth laws must be supported by a 'head of power' in the Constitution. Anything the Commonwealth cannot make laws about is reserved for the states.
- Where a valid Commonwealth law is inconsistent with a state law, the state law is invalid to the extent of the inconsistency.⁶⁴

This division of legislative power means the two levels of government need to cooperate to achieve a national approach and a national law. Currently, the regulation of vehicles and

⁶⁴ *Australian Constitution*, s 109.

driving is split between the Commonwealth and the states/territories. The Commonwealth regulates the first supply of all vehicles to the Australian market. The states and territories regulate vehicles and driving in-service for all vehicles.

8.3 Legislative models for implementing a national law

A national law that regulates automated vehicles in service could be implemented through state and territory legislation, or through Commonwealth legislation with the assistance of the states and territories. The approaches are discussed below.

Regardless of the approach chosen, states and territories would continue to regulate all aspects of vehicle use currently regulated at that level including vehicle registration, human driving, passenger transport and road management. States and territories will therefore need to review their legislation to accommodate automated vehicles to ensure, for example, that any occupants of a vehicle are not unintentionally deemed the driver when the ADS is engaged.

8.3.1 State and territory legislation

Laws to regulate the in-service safety of automated vehicles could be made entirely in state and territory legislation.

Many ADSEs are likely to be global corporations with headquarters overseas. Compared with a law supported by the Commonwealth's external affairs power, the states could have relative difficulty regulating the actions of ADSEs with headquarters overseas.

In the consultation RIS we explained that a state/territory-based national law could be achieved either through a 'model law' approach or an 'applied law' approach. The two approaches are discussed below.

Model law

In a model law approach, model legislation is drafted and separately enacted by participating states and territories.

Model law could accommodate jurisdictional differences well but would result in inconsistencies because states and territories can deviate from the model law when they enact legislation. They will do so if they decide that parts of the model law do not meet the specific requirements of their state or territory.

In the consultation RIS we explained that state and territory implementation of the Australian Road Rules and the WHS law (both of which are model laws) has not achieved true harmonisation. The model WHS law is not applied by Victoria or Western Australia, and there are differences in application among those jurisdictions that do apply it (Boland, 2018, p. 108). Similarly, states and territories have deviated from the Australian Road Rules and implement updates to the model law in their own time, and subject to any other reform priorities they may have. As a result, despite efforts towards national consistency, the road rules vary across states and territories.

Model law precludes a single national regulator and requires each state and territory to have its own in-service safety regulator. Therefore, even if the law itself was substantially the same in each state and territory, it is likely that differing interpretations of the law and local enforcement priorities would impede a nationally consistent approach.

Applied law

An 'applied law' approach involves one state or territory (a 'host jurisdiction') enacting a law that is then applied by other participating jurisdictions.

Applied law could achieve a nationally consistent law if states and territories choose to participate and are willing to adopt the legislation of another jurisdiction. The ability of applied law to achieve true national consistency depends on how each state and territory implements the applied law. For example, a participating jurisdiction could specify that the host's law applies 'as in force from time to time', which would automatically apply future amendments to the host's law. However, a participating jurisdiction could also specify that the host's law applies at a particular time. This means that amendments to the host's law do not apply automatically in the participating jurisdiction. The participating jurisdiction could choose to modify the national law as it applies in the participating jurisdiction at any time. The resulting applied law scheme is therefore nationally inconsistent (Edwards, 2014, pp. 92-96). A state/territory-based applied law approach may therefore result in less national consistency than a Commonwealth law (which is discussed in section 8.3.2). In the consultation RIS we referred to the Heavy Vehicle National Law as an example of a state-applied law, which has not achieved nationally consistent law because both Western Australia and the Northern Territory do not apply it in their respective jurisdictions.

An applied law approach would require a single regulator based in a state or territory to administer in-service safety regulations. Although the regulator is created by the laws of participating states and territories, it could have national jurisdiction. This differs from a model law approach where there are separate regulators in each state and territory.

8.3.2 Commonwealth legislation

Commonwealth law

A national law for automated vehicles could be substantially achieved by a Commonwealth law. The Commonwealth could rely on its corporations and communications heads of power under the Australian Constitution to pass a national law that regulates ADSEs, its executive officers and remote drivers.⁶⁵ This law could impose safety obligations on these entities and establish a regulator to enforce those obligations.

A nationally consistent law could therefore be achieved through Commonwealth legislation, although some matters would need to be separately addressed in state and territory legislation. For example, a law regulating fallback-ready users does not appear to be supported by a Commonwealth head of power.⁶⁶ This means only the states can make laws to regulate that person. It is likely that states and territories would also need to clarify that their driving law only applies to human drivers, so the field is clear for the national law to regulate automated vehicles.

Commonwealth applied law

If the Commonwealth cannot legislate to regulate a relevant party, and it is desirable for the national law to regulate that party, an applied law approach may be necessary. For example, as noted under the 'Commonwealth law' heading above, the Commonwealth cannot regulate

⁶⁵ *Australian Constitution* ss 51(v), (xx).

⁶⁶ It would be possible for the Commonwealth to regulate fallback-ready users in one of the territories (*Australian Constitution* s 122).

fallback-ready users. Under an applied law approach, once the Commonwealth law is in place, each state and territory would legislate to apply the national law in their jurisdiction to regulate the fallback-ready user.

However, based on the parties identified in this RIS as requiring additional regulation, it is unlikely that a Commonwealth applied law approach would be needed. The fallback-ready user is the only party for whom we propose additional regulation that cannot be regulated under Commonwealth law. It may be more appropriate to regulate the fallback-ready user under the state and territory road rules because the road rules already regulate other human road users.

8.4 Stakeholder feedback

In the consultation RIS we sought feedback on:

- whether we had adequately and accurately captured the key legislative implementation models for in-service safety of automated vehicles
- any transitional or constitutional issues when establishing a national law and if they differ depending on the legislative implementation model used.

8.4.1 Coverage of key legislative implementation models

Most submitting stakeholders considered that the consultation RIS adequately and accurately captured the key legislative implementation models for in-service safety of automated vehicles (AMC, Kate Hunt, Maurice Blackburn, RACQ, Ricketts Point Power Pty Ltd, Transurban, VACC).

DPTI SA and TMR QLD submitted that the legislative implementation models should more clearly identify the responsible level of government.

FCAI submitted there is another legislative implementation model not captured in the consultation RIS. They submitted this model is a Commonwealth national law that is implemented by the states and territories like the current approach to ongoing compliance with the ADRs.

8.4.2 Constitutional and transitional issues

DPTI SA and TMR QLD submitted that specific constitutional issues will need further consideration once there is greater certainty about the scope of the national law. DPTI SA stated that early engagement of the Parliamentary Counsel's Committee is needed.

DoT WA and RACQ submitted that it is important for states to remain responsible for existing functions and functional areas. TMR QLD stated that existing heads of power allow the Commonwealth Government to legislate for ADSEs, ADSE executive officers and remote drivers 'without encroaching on existing state and territory functions'.

AADA submitted that regulation of ADSE executive officers and remote drivers raises issues of jurisdiction and extraterritoriality. AADA stated that executive officers in Australia would have limited influence on the ADSE's decisions and any executive officers based overseas would be outside the jurisdiction of Australian legislation. AADA also stated that legislation should require that remote drivers only operate in Australia and clarify which road rules apply to the remote driver.

Several stakeholders submitted on transitional issues that may arise. Some of the transitional issues raised included:

- the amount of time needed to adopt and maintain legislation, such as whether the legislation needs to pass through one or multiple parliaments (DPTI SA, TMR QLD)
- the need for appropriate communication and data sharing between insurers, state and national regulators and enforcement agencies (RACQ, TMR QLD)
- human drivers co-existing and interacting with ADSs, including determining who is liable when there is an incident (HiloT, RACQ)
- the need for a planned and well-understood shift of any responsibilities from states and territories to the national regulator (RACQ, TMR QLD)
- allowing sufficient time for both government and industry to upskill and develop relevant policies and capabilities (DPTI SA, TMR QLD)
- interaction of existing state and territory frameworks with the national law, including states and territories reviewing existing legislation to accommodate automated vehicles (TMR QLD, a government agency)
- different transitional issues would arise with each model (DPTI SA, TMR QLD).

8.5 NTC conclusions

8.5.1 Coverage of key legislative implementation models

We drew on stakeholder feedback to amend our presentation of the legislative implementation models in section 8.3 from the consultation RIS to clearly identify the responsible level of government. We have not discussed ad hoc state and territory-based legislation because this would not result in a national law, which is the focus of this chapter. We have also not discussed a referral of powers from the states to the Commonwealth for matters outside the Commonwealth's jurisdiction.⁶⁷ This approach requires jurisdictions to agree that transferring power to the Commonwealth is needed.⁶⁸ It appears the Commonwealth can regulate ADSEs, ADSE executive officers and remote operators without a referral, and matters falling outside the Commonwealth's power could instead be regulated at the state/territory level. As such, we do not think a referral of powers is required and have not explored it further.

In response to FCAI's submission, we note that the ADRs are part of a Commonwealth law that regulates the first supply of a vehicle to the Australian market. States and territories do not directly implement the ADRs in service. Rather, the ADRs form the basis of a model law (the Australian Light Vehicle Standards Rules or ALVSRs), which states and territories can choose to implement so they apply to in-service vehicles. The ALVSRs are based on the ADRs but also contain additional requirements. Consequently, the legislative implementation

⁶⁷ The Australian Constitution allows the states to refer legislative powers to the Commonwealth that it does not already have under the Constitution (*Australian Constitution*, s 51(xxxvii)). A referral would only occur if jurisdictions agreed that they wanted the Commonwealth to regulate automated vehicles and the Commonwealth lacked the power to do so. It appears the Commonwealth does not require a referral to regulate ADSEs, ADSE executive officers and remote drivers. Matters that might fall outside the Commonwealth's power to regulate are more likely to be regulated at the state/territory level (for example, through the Australian Road Rules) than by a referral of state/territory power to the Commonwealth.

model suggested by FCAI aligns with the model law approach discussed in this chapter and is not an additional legislative implementation model.

8.5.2 Constitutional and transitional issues

Most stakeholders that submitted on this issue support states and territories remaining responsible for existing functions. As discussed in section 8.3, states and territories would continue to regulate all aspects of vehicle use currently regulated at that level. Therefore, they will need to review their legislation to accommodate automated vehicles. The role of the national in-service regulator would be tightly defined, and we do not envisage a transfer of current functions or powers of state and territory authorities to a new national regulator. We will engage with the Parliamentary Counsel's Committee on how best to implement the in-service regulation, with a view to informing subsequent decisions of transport ministers.

Our analysis indicates that Commonwealth law could validly apply to global corporations with overseas headquarters.⁶⁹ However, we acknowledge there may be practical difficulties in enforcing obligations against ADSE executive officers based overseas. We also note that, compared with a law supported by the Commonwealth's external affairs powers, the states could have difficulty in regulating corporations with overseas headquarters. This is a disadvantage of the state applied law model when compared with the Commonwealth law model. In response to AADA's submission on remote drivers, we note that the ADSE will most likely need to comply with the road rules of the state or territory in which its ADS is operating. It is likely that the remote driver would be subject to the same requirements, irrespective of the state or territory in which the remote driver is physically present.

In relation to other transitional issues raised:

- We agree that the amount of time needed to implement and maintain legislation differs between legislative implementation models. For model law and applied law to be implemented, it needs to pass through multiple parliaments. Under a model law approach, law needs to pass through multiple parliaments every time updates to the model law are made. Commonwealth law would only need to pass through a single parliament, which would allow for faster implementation and maintenance.
- We agree that sufficient time is needed for both government and industry to upskill and develop relevant policies and capabilities.
- We recognise that human drivers and ADS 'drivers' will need to co-exist for the foreseeable future. Our approach to regulating the dynamic driving task for an ADS 'driver' (outlined in chapter 6) would provide predictability for human drivers and other road users in a mixed fleet.
- We will consider issues around ascertaining who is responsible for a vehicle in the event of an incident and data sharing and communication between relevant entities as part of the next stage of our in-service safety work. The next stage of work will consider compliance and enforcement for automated vehicles.

⁶⁹ *XYZ v Commonwealth* (2006) 227 CLR 532.

9 Options to address the problem

Key points

- This decision RIS presents options to address the problem set out in chapter 2.
- Option 1 is the baseline option. It does not introduce any new safety duties or obligations for the in-service safety of automated vehicles at the national level. Instead, in-service safety is managed separately by each state and territory through existing regulatory frameworks.
- Option 2 introduces new in-service duties enforced by state and territory regulators under state and territory laws based on a national model law. There are two versions of this option which differ in terms of the form of obligations, one with prescriptive safety duties (option 2a) and the other with general safety duties (option 2b).
- Option 3 introduces new in-service general safety duties enforced by a single national regulator through Commonwealth law.
- Option 4 introduces new in-service general safety duties enforced by a single national regulator through state and territory applied law.
- A full independent assessment by PwC of the costs and benefits of each option has been published with the decision RIS.

9.1 Purpose of this chapter

The purpose of this chapter is to:

- present the options considered in this decision RIS
- show how the options would work in practice
- discuss the key advantages and disadvantages of each option.

We give our assessment of which option provides best for in-service safety in chapter 10.

9.2 Structure of the options

All reform options incorporate the key elements discussed in this decision RIS: parties, safety duties, governance arrangements and legislative implementation.

In previous chapters we analysed the range of alternate forms these elements could take. For example, a regulator could be an independent or government body, sit at the state/territory or national level, and be a new or existing body. Safety duties could be general or prescriptive. The duties could apply to only one party or a range of parties. The analysis in those chapters has informed the development of the options in this chapter.

We have assembled the reform options by choosing the most effective and practical combinations of elements to address the problem statement. The sections below have been updated based on stakeholder feedback to the consultation RIS, with further detail about this feedback in section 9.9.

9.3 Assumptions and considerations

9.3.1 Parties the reform options apply to

As discussed in chapter 5, we consider ADSEs should be covered by a general safety duty with corresponding due diligence obligations for ADSE executive officers. In options 2b, 3 and 4 these are the parties that will be covered by general safety duties. In option 2a, ADSEs and ADSE executive officers are covered by prescriptive duties rather than general duties.

We also consider that ADSEs, remote drivers and fallback-ready users should be subject to discrete prescriptive duties. For ADSEs, this includes prescriptive dynamic driving task obligations (discussed in chapter 6). The appropriate approach to regulating the dynamic driving task will most likely depend, at least in part, on the reform option chosen. We have assumed that the discrete prescriptive duties applying to these parties will be a constant under each of the reform options (options 2a, 2b, 3 and 4).

We are no longer considering a general safety duty on repairers following stakeholder feedback. This is discussed in chapter 5.

9.3.2 First-supply approach will be implemented

In November 2018 the Transport and Infrastructure Council agreed a safety assurance approach for the first supply of automated vehicles to the Australian market. The key feature is a set of safety criteria and obligations against which an ADSE must self-certify. This approach is outlined in chapter 1.

The safety criteria and obligations will be implemented through mechanisms under the Road Vehicle Standards Act. Accordingly, DITRDC is leading implementation of the first-supply safety assurance approach. DITRDC is consulting with government and industry as it develops the appropriate regulatory mechanisms.

The effectiveness of any in-service safety approach is contingent on implementing the first-supply approach, which should screen out inherently unsafe ADSs from initial supply to the Australian market.

9.3.3 First-supply approach will not cover all in-service risks of automated vehicles

As we described in chapter 4, the first-supply approach only addresses safety risks known at the time of first supply to the market. It does not provide sufficient mechanisms to address risks that emerge while an automated vehicle is in service. Additionally, some of the safety criteria have in-service elements without corresponding regulatory tools to enforce continuing compliance. For example, the requirement to provide appropriate education and training is ongoing and may include communicating with end users who are not the original vehicle owner or communicating information about the impact of system upgrades.

9.3.4 Detailed compliance and enforcement mechanisms will be developed once an option is agreed

Detailed compliance and enforcement mechanisms, including sanctions and penalties, will be developed once the Transport and Infrastructure Council agrees on an option for in-service safety. The NTC will publicly consult on compliance and enforcement options and subsequently make recommendations to the Transport and Infrastructure Council.

9.4 Summary of the options

The four options assessed in this decision RIS are:

Option 1 (baseline): Current approach: This option does not introduce any new safety duties or obligations for the in-service safety of automated vehicles at the national level. Instead, each state and territory manages in-service safety separately through existing regulatory frameworks.⁷⁰

Option 2: State and territory-based regulators enforce prescriptive safety duties (option 2a) or general safety duties (option 2b) under state and territory laws based on a national model law.

Option 3: A single national regulator enforces a general safety duty through Commonwealth law.

Option 4: A single national regulator enforces a general safety duty through state or territory applied law.

In the next sections we explain the key elements of each option and discuss how they would work. We then present the key advantages and disadvantages of each option. These qualitative arguments should be considered alongside PwC's full CBA of options. We provide a summary of the assessment in chapter 10.

9.5 Option 1 (baseline)

9.5.1 Description of the option

Option 1 does not introduce any new safety duties at the national level for the in-service safety of automated vehicles. Instead, in-service safety is managed separately by each state and territory through existing regulatory frameworks.

Under this option, the current system for managing the in-service safety of conventional vehicles would continue to apply and would cover automated vehicles as well. States and territories would retain exclusive responsibility for the in-service regulation of drivers and vehicles, including ADSs, and legislation aimed at achieving road safety outcomes.

Option 1 assumes that a new uniform national law that provides the dynamic driving task obligations of the ADSE will not be created. As a practical matter, state and territory governments would most likely need to amend their regulatory frameworks for an automated vehicle to operate on the roads under this option. Specifically, legislation would be needed to allow an ADS to perform the dynamic driving task and to impose any ADS-specific safety duties. These changes could include an offence for the ADSE if the ADS failed to comply with dynamic driving task obligations. This could provide for state and territory implementation of transport ministers' November 2018 decision that the ADSE must certify that the ADS can comply with relevant road and traffic laws.⁷¹

⁷⁰ However, as discussed in section 9.5, state and territory governments would most likely need to amend their regulatory frameworks for an automated vehicle to operate on the roads under option 1.

⁷¹ 'Compliance with relevant road traffic laws' is one of the safety criteria at first supply.

The safety of the automated vehicle would be managed through existing regulation, including the frameworks below. State and territory governments would each make any necessary amendments to regulate ADSEs and allow automated vehicles to operate legally. A full discussion of the existing regulatory frameworks is in chapter 4 and Appendix C.

State and territory regulatory frameworks

- Vehicle registration by state and territory road agencies to ensure a vehicle is 'roadworthy'. Registration can be granted with conditions to further ensure safety. Once registered, vehicles can be issued defect notices when they fail to meet safety standards in service.
- Road access decisions made by road managers at the state/territory or local level.
- Light-vehicle standards made at the state/territory level. These require vehicles to continue to comply with ADRs while they are in service.
- Driver licensing for fallback-ready users.
- Duties on the fallback-ready user in an SAE level 3 automated vehicle when the ADS is engaged. Under option 1, state and territory governments would probably need to legislate to place obligations on the fallback-ready user to help ensure they remain alert to system errors or requests to intervene. This could provide state and territory implementation of transport ministers' May 2018 decision to regulate the fallback-ready user.
- Parties that were considered 'persons conducting a business or undertaking' would be subject to safety duties under WHS laws.⁷²
- General safety duties or other types of obligations on taxi, private hire and rideshare service operators implemented in state and territory legislation.
- Regulation of motor vehicle dealers and repairers.
- Police enforcement and implementation of the road rules.
- Common law tort of negligence. Parties, including ADSEs, owe a duty of care to other road users for property damage or personal injury caused by an ADS.
- Criminal law – for example, penalties for dangerous driving causing death or injury.

National-level/Commonwealth regulatory frameworks

- The Road Vehicle Standards Act⁷³ has compliance and enforcement mechanisms that can be used to enforce some of the in-service elements of the safety criteria and obligations that an ADSE certified against at first supply. As the type approval holder, an ADSE would need to comply with any recalls concerning their vehicle or a vehicle component.
- The Heavy Vehicle National Law requires heavy vehicles to comply with the ADRs while they are in service. This applies in states and territories that participate in the Heavy Vehicle National Law (all except the Northern Territory and Western Australia).

⁷² The frameworks in Western Australia and Victoria are not based on model WHS law, but their application to automated vehicles is similar.

⁷³ The first-supply safety criteria and obligations are being incorporated into a range of legislative instruments under the Road Vehicle Standards Act. The availability of compliance and enforcement mechanisms under the Act differs according to the legislative instrument being breached. The range of compliance and enforcement mechanisms includes, among others, infringement notices, enforceable undertakings, civil penalty orders and recalls for vehicles and vehicle components.

- The Heavy Vehicle National Law places general safety duties on parties in the heavy vehicle transport supply chain to ensure the safety of their transport activities. There are also prescriptive requirements for heavy vehicles – for example, about mass and dimension.
- The ACL gives guarantees for products sold, hired or leased by businesses, including vehicles and services such as vehicle repairs. This applies if the cost of the product or service is under \$40,000, or over \$40,000 and bought for personal or household use.

As described in chapter 4, this framework leaves a number of gaps for in-service risks caused by automated vehicles.

9.5.2 How it would work

After an ADS is approved at first supply, the automated vehicle would have access to the entire road network, subject to any registration conditions placed on it by a state or territory government. These registration conditions may need to be more comprehensive than under other options because of the lack of automated vehicle-specific duties to manage in-service safety. Registered owners, including ADSEs where they are also the registered owner, would not have certainty about what conditions will be imposed until they register with the state or territory regulator.

Relevant parties would need to meet the duties and obligations described in section 9.5.1. These would differ from jurisdiction to jurisdiction.

Relevant parties would not be subject to nationally consistent in-service automated vehicle-specific safety duties or obligations or associated compliance and enforcement mechanisms but would most likely be subject to separate duties created in each state and territory. Compliance and enforcement mechanisms under the Road Vehicle Standards Act could potentially apply to the ADSE for certain in-service elements of the safety criteria and obligations. Existing state and territory in-service sanctions and penalties for noncompliance with conditions of registration, such as cancellation of registration, would affect registered owners rather than the ADSE.⁷⁴

The regulatory agencies would be accountable to their ministers and state or territory parliament.

9.5.3 Discussion

Advantages

The existing regulatory framework is well established and understood by parties who currently use it such as conventional vehicle manufacturers. This means there would be minimal disruption for these parties if they are moving into the automated vehicle market. Regulation could be ready in time for manufacturers to start commercial deployment, even if this is earlier than currently expected, if states and territories initially make limited legislative amendments to regulate ADSEs and allow automated vehicles to operate. These factors may potentially act as an incentive for industry to bring automated vehicle technology to Australia.

⁷⁴ In some cases, the registered operator or owner and the ADSE may be the same, such as commercial operators.

Retaining the same division of responsibilities between Commonwealth, state and territory government agencies that currently administer the existing regulatory frameworks would result in minimal disruption to government. Using the existing regulatory framework may minimise the upfront structural, organisational and regulatory changes needed to implement a new in-service safety regulatory model.

This option could be appropriate as a contingency if automated vehicles arrive before a national regulatory approach can be implemented.

Disadvantages

A key disadvantage of option 1 is that the lack of a nationally led approach would likely lead to states and territories separately implementing their own safety approaches for automated vehicles. Submissions received to the consultation RIS suggest a likelihood that some states and territories would create a general safety duty for ADSEs in their own legislation. This means the advantages for industry we suggested above of being able to use existing frameworks are unlikely to be fully realised. Without a nationally coordinated approach to regulation, industry and consumers would be required to comply with differing duties and obligations across the country. The cost associated with national inconsistency and the lack of a single national market is a key barrier to industry bringing automated vehicle technology to Australia. There is already inconsistency developing in regulatory approaches to automated vehicle trials across the states and territories.

The patchwork of legislation relied on in option 1 could result in overlapping requirements within multiple safety regimes. The different safety requirements across states and territories would inevitably increase compliance costs and create regulatory barriers to entry.

Another disadvantage is that existing regulation places insufficient requirements on ADSEs, ADSE executive officers, fallback-ready users and remote drivers. Parties would be covered by a fragmented legislative framework that could leave significant gaps in the in-service safety of automated vehicles. Some parties may have duties under existing laws. However, their application to those parties has not yet been tested in court. Additionally, the regulators that are responsible for enforcing those frameworks may lack the technical expertise required to effectively regulate automated vehicle-specific safety issues, particularly in smaller states and territories. State and territory regulators could also find regulating ADSEs operating nationally challenging.

It is more likely that in-service safety risks of automated vehicles could go unaddressed under option 1 than under the reform options. Risks that might emerge and pose a risk to safety include technological failure, cybersecurity failure and failure to function appropriately within an ODD. It is not clear that existing regulatory frameworks or market incentives are sufficient for the relevant parties to deliver a desirable level of safety risk management.

The lack of a national in-service approach may mean governments are more limited in their ability to ensure regulatory frameworks are responsive to technological advancements. This could in turn be a barrier to innovation and mean Australian consumers miss out on some of the benefits of automation.

Relying on existing frameworks for compliance and enforcement could lead to adverse outcomes for some parties. For example, cancelling the registration of an automated vehicle for an ADS issue would disproportionately penalise registered owners for system issues that are beyond their control.

Regulating automated vehicles would occur across multiple regulators in different frameworks across WHS law, consumer law, road transport laws and other regimes. The absence of clear, consistent legal duties to comply with would be confusing for industry and

act as a barrier to entry. There may also be instances where complying with a rule in one state involves breaching a rule in another. These issues could potentially be a greater barrier for new entrants to the vehicle market, like software developers, who might be unfamiliar with the relevant existing regulatory frameworks. Potential lack of clarity about the responsible regulator in particular circumstances could also create delays in safety interventions.

State and territory governments would need to recruit staff with the necessary expertise to regulate automated vehicles. This may be a particular challenge for smaller states and territories.

9.6 Option 2

9.6.1 Description of the option

Option 2 introduces new safety duties for the in-service safety of automated vehicles.

Governance arrangements

Regulators in each state or territory would manage the in-service safety of automated vehicles. Each state and territory would decide the governance arrangements for their regulator. The regulators may be new bodies or existing bodies with new powers. They may also be government bodies or bodies with a level of independence.

Duties

Option 2a

ADSEs, ADSE executive officers, fallback-ready users and remote drivers (teleoperation) would be subject to discrete prescriptive duties. For ADSEs, these would include obligations in addition to complying with dynamic driving task obligations.⁷⁵ The regulator would enforce the duties.

Option 2b

ADSEs would be subject to new general safety duties supplemented by some prescriptive duties as required, such as regulation of the dynamic driving task. ADSE executive officers would be subject to due diligence obligations associated with the general safety duty. The duties would be monitored and enforced by the regulator. These parties would need to ensure safe operation of the automated vehicle to a standard such as 'so far as is reasonably practicable.' An illustrative general safety duty is outlined in Appendix G.

Fallback-ready users and remote drivers (teleoperation) would be subject to discrete prescriptive duties.

Legislative implementation (model law)

Model law would set out the model safety duties and powers for the regulators. It is likely that the NTC would be responsible for developing the model law, and it would be agreed with states and territories.

⁷⁵ Appendix B of the consultation RIS provided examples of such prescriptive duties for illustrative purposes.

The model law itself would have no legal effect. Each state and territory would need to introduce new legislation based on the content of the model law to implement the safety duties and powers in their jurisdiction. The expectation would be that state and territory governments enact legislation that is consistent with the provisions of the model law. It is possible that states and territories may include provisions (or make omissions) that derogate from the model law. States and territories may choose not to implement the model law at all and instead fall outside a national in-service safety assurance system.

For the purposes of assessing this option in the CBA, PwC has assumed that all states and territories would enact legislation that is broadly consistent with the model law with potentially some derogations (rather than choosing not to implement the model law at all).

Each regulator would be accountable to the relevant state and territory minister and parliament.

9.6.2 How it would work

After an ADS is approved at first supply, the automated vehicle would have access to the entire road network, subject to any registration conditions or road access decisions made by the road manager.

Under option 2a, state and territory regulators would administer prescriptive safety duties and would therefore have a more reactive role focused on compliance and enforcement in the case of breaches of specific obligations. These reactive powers would largely consist of powers to investigate suspected contraventions. Regulators under this sub-option would have a range of sanctions and penalties available to them and enforcement powers that would be used to ensure compliance with the prescriptive duties.

Under option 2b, state and territory regulators would administer a general safety duty on ADSEs and due diligence obligations on ADSE executive officers (as well as the prescriptive duties placed on ADSEs, fallback-ready users and remote drivers). Regulators would have proactive monitoring and investigations powers to ensure ADSEs have proper safety management systems in place for managing safety risks before they arise. Regulators would have an active role in information sharing and education to encourage the parties covered by general safety duties to develop appropriate safety management systems. Regulators would also have a range of sanctions and penalties available to them and enforcement powers that would be used to ensure compliance with the general safety duty.

As noted above, state and territory governments may derogate from the model law. In this case, regulated parties might have variable obligations across the different states and territories. The state and territory regulators might also have different powers to enforce the duties they administer.

9.6.3 Discussion

Advantages

Like all the reform options, option 2a would address the known and anticipated in-service safety risks of automated vehicles through automated vehicle-specific legislation and prescriptive safety duties.

Option 2b would also address the unforeseen safety risks of automated vehicles by placing general safety duties on ADSEs and due diligence obligations on ADSE executive officers. This would incentivise these parties to proactively address emerging risks themselves, which should lead to better safer outcomes.

A general safety duty would encourage parties to take a proactive approach to identifying and responding to safety issues. With prescriptive duties, there is a risk that companies would focus narrowly on complying with the requirements, rather than identifying and addressing safety issues.

A general safety duty would also address the possibility of parties neglecting to address identified safety risks, based on an assessment that it makes more economic sense to risk a safety issue eventuating than to take steps to prevent the risk. While cost is a relevant factor in determining whether action to address a safety risk is 'reasonably practicable', such a test is a more objective standard than a party's own internal risk management decision making.

The term 'reasonably practicable' is a well-established legal concept that evolves over time. In a fast-changing technology environment, something that is not reasonably practicable today may become so in a few years' time, as technology develops. With a general safety duty, the regulatory framework does not need to be updated to reflect this. In contrast, prescriptive requirements might require regular updating.

Regulators and regulatory requirements would be clearly established in legislation, providing clarity for industry and consumers. These regulators would be specialised automated vehicle regulators. This would reduce the risk of multiple regulators within jurisdictions and potential confusion for industry because it has to meet safety requirements under a number of regulatory frameworks.

The use of nationally agreed model law would achieve greater consistency in safety approaches than option 1. This would be balanced with the states and territories retaining flexibility to derogate from the model law to suit the needs of their jurisdictions.

For state and territory governments, retaining control would allow them to develop their own governance arrangements for in-service safety. These arrangements may differ in scale according to the size of the automated vehicle market in each jurisdiction and specific local issues.

Options 2a and 2b could be more appropriate than the other options as a transition option for the initial stages of commercial deployment of automated vehicles, if existing state and territory transport agencies were to be the regulators for in-service safety. This would need to be balanced with the duplication of resource required to move from one in-service safety model to another.

Disadvantages

Option 2a would be less effective in addressing unforeseen safety risks. Industry may not be sufficiently incentivised to create safety management systems to monitor potential emergent safety risks. Regulators would not be able to take proactive action against an industry party if an unforeseen safety risk emerges because the regulatory framework would not be flexible. State and territory regulators could also find regulating ADSEs operating nationally challenging.

The institutional arrangements of options 2a and 2b would probably result in the most national inconsistency in safety approaches of the three reform options. This inconsistency could act as a regulatory barrier to market entry for some potential ADSEs. Regulated parties operating across states and territories would be faced with multiple approaches to compliance and enforcement. There may be a lack of clarity where automated vehicle regulation overlaps between states and territories. This would result in higher costs for industry because the costs of ensuring compliance would be multiplied across states and territories.

Regulated parties could face higher costs due to the need to comply with new automated vehicle-specific duties. Under option 2a, these costs may increase further over time when additional prescriptive duties are introduced to capture new risks as they emerge. However, this cost must be measured against potential increased cost to industry under option 1 due to the patchwork of legislation they would be subject to – particularly for parties that are already subject to duties in regulatory frameworks such as WHS and tort law.

There is the potential for inconsistent safety outcomes between states and territories where they derogate from the model law. This risk also arises because differing organisational practices may develop over time, affecting how regulators use their powers.

Upfront and ongoing costs to government would also be significant, especially if new regulatory bodies were established. Resourcing regulators in every state and territory would result in a duplication of effort and ongoing costs. State and territory governments would also compete for appropriately skilled regulators and staff; and attracting the appropriate expertise may be a challenge for the smaller jurisdictions.

9.7 Option 3

9.7.1 Description of the option

Governance arrangements

A single, national regulator would manage the in-service safety of automated vehicles. The regulator may be a government body or an independent body. The regulator may also be a new body, or an existing body given new functions and powers. The regulator would be created in Commonwealth law; however, state and territory governments would have specific responsibilities such as managing road access, roadside enforcement and data sharing.

Duties

ADSEs would be subject to new general safety duties supplemented by some prescriptive duties as required, such as regulation of the dynamic driving task. ADSE executive officers would be subject to due diligence obligations associated with the general safety duty. The duties would be monitored and enforced by the regulator. These parties would need to ensure safe operation of the automated vehicle to a standard such as ‘so far as is reasonably practicable.’ An illustrative general safety duty is outlined in Appendix G. Fallback-ready users and remote drivers (teleoperation) would be subject to discrete prescriptive duties.

Legislative implementation (Commonwealth law)

The Commonwealth Parliament would create a national regulatory framework for the in-service safety of automated vehicles.

As described in chapter 8, the Commonwealth Parliament may only make laws that are supported by a head of power in the Australian Constitution. The Commonwealth can regulate ADSEs and ADSE executive officers in a national law, but state and territory law would provide some other in-service regulations such as fallback-ready user obligations.

9.7.2 How it would work

After an ADS is approved at first supply, the automated vehicle would generally have access to the entire road network within its ODD. States and territories would have the ability to limit an ADS's ODD in their jurisdiction subject to any registration conditions placed on it by a state and territory government.

The regulator would enforce a general safety duty and any prescriptive rules on ADSEs, due diligence requirements on ADSE executive officers, and prescriptive duties on remote drivers (teleoperation) where used in conjunction with an ADS. The regulator would have proactive monitoring and investigative powers to ensure the relevant parties have proper safety management systems in place for managing safety risks before they arise. The regulator would also have an active role in information sharing and education to encourage regulated parties to develop appropriate safety management systems. The regulator would have a range of sanctions and penalties available to it and enforcement powers that would be used to ensure compliance with the general safety duty. Breaches of the national law would be enforced in the Federal Court of Australia.

While the Commonwealth would provide the regulatory framework for ADSEs, states and territories would be responsible for regulating human users of automated vehicles such as fallback-ready users and occupants (for example, requirements that occupants ensure children are properly restrained). The regulator would be accountable to a Commonwealth minister and the Commonwealth Parliament.

9.7.3 Discussion

Advantages

Like option 2, option 3 would address the known and anticipated in-service safety risks of automated vehicles through implementing automated vehicle-specific legislation. Like option 2b, it would also enable a regulator to address the unforeseen safety risks of automated vehicles by enforcing general safety duties on ADSEs and due diligence obligations on ADSE executive officers. A general safety duty and due diligence obligations would incentivise ADSEs and ADSE executive officers to proactively address emerging risks themselves, which should lead to better safety outcomes.

A general safety duty on ADSEs and due diligence duties on executive officers also addresses the possibility of parties neglecting to address identified safety risks. As noted under option 2b, a 'reasonably practicable' test is a more objective standard than a party's own internal risk management decision making. The term 'reasonably practicable' is a well-established legal concept, which evolves over time. This which would suit the regulation of fast-changing technology.

This option would achieve greater national consistency in safety approaches than option 1, as it would create a single market for automated vehicles. Regulated parties would face the same duties nationwide and the single Commonwealth regulator would ensure nationally consistent application of enforcement mechanisms.

These parties would face clear and consistent legal duties, simplifying their obligations and reducing compliance costs. This would also potentially send the greatest signal to industry that Australia is open to automated vehicles.

There would be one specialised automated vehicle regulator that regulates the in-service safety of automated vehicles nationally.

Government and the public might also benefit from the economies of scale of setting up a single regulatory function rather than a regulatory function in each state and territory.

This option would probably be the most efficient in managing the transition to any international in-service standards. The Commonwealth participates in international forums and has the constitutional power to implement international agreements. International standards are currently more focused on vehicle safety and component design, but in future there may be a shift towards requirements that also cover aspects of ongoing safety in service.

The use of a single, national parliament would mean the national law is relatively efficient to establish and maintain compared with options 1 and 2, which would require the cooperation and coordination of the eight state and territory parliaments. The regulator would be more directly accountable than option 4 because it would report to a single democratically representative parliament rather than a ministerial council.

Disadvantages

Although there is a lower risk of overlapping regulation than in options 1 and 2, some risk remains because the Commonwealth cannot regulate some in-service aspects of safety. States and territories would need to separately fill any gaps in the coverage of the national law.

As with the other reform options, if the regulator was a new body, the upfront costs to government to set up the regulator could be significant, as would the time needed to establish a national regulator.

Though there would only be one consistent set of national duties, as with option 2, compliance costs for parties covered by general safety duties may be higher than if there was no new automated vehicle-specific regulation. However, this cost must be measured against the potential increased cost to industry under option 1 due to the patchwork of legislation to which they would be subject.

Some industry stakeholders may consider a general safety duty an additional regulatory burden, which might act as a barrier to entry.

Some states and territories may be apprehensive about a Commonwealth regulator having responsibility for an aspect of in-service road safety, which has until now been considered a state and territory responsibility.

9.8 Option 4

9.8.1 Description of the option

Governance arrangements

A single, national regulator would manage the in-service safety of automated vehicles, separately established in each state and territory. The regulator would most likely be a new body because there is no obvious current state-based applied law regulator that could be given additional responsibility for automated vehicles. The regulator would be based in the state or territory that enacted enabling legislation (discussed below). State and territory governments would have specific responsibilities such as managing road access, roadside enforcement and data sharing.

Duties

ADSEs would be subject to new general safety duties supplemented by some prescriptive duties as required, such as regulating the dynamic driving task. ADSE executive officers would be subject to due diligence obligations associated with the general safety duty. The duties would be monitored and enforced by the regulator. These parties would need to ensure safe operation of the automated vehicle to a standard such as 'so far as is reasonably practicable.' An illustrative general safety duty is outlined in Appendix G.

Fallback-ready users and remote drivers (teleoperation) would be subject to discrete prescriptive duties.

Legislative implementation (state or territory applied law scheme)

A 'host' state or territory government would introduce a uniform national law for the in-service safety of automated vehicles. This law would be agreed by all states and territories. Participating states and territories would apply the host jurisdiction's law in their jurisdiction.

States and territories could also decide against entering the national scheme, as Western Australia and the Northern Territory decided for the Heavy Vehicle National Law. Participating states and territories could derogate from the law in their legislation; however, derogations would need to be explicitly stated in their law.

9.8.2 How it would work

After an ADS is approved at first supply, it would generally be entitled to access the entire road network within its ODD, subject to any registration conditions placed on it by a state or territory government.

The regulator would enforce a general safety duty and any prescriptive duties on ADSEs, due diligence requirements on ADSE executive officers, and potentially prescriptive duties on remote drivers (teleoperation) where used in conjunction with an ADS. The regulator would have proactive monitoring and investigative powers to ensure the relevant parties have proper safety management systems in place for managing safety risks before they arise. Regulators would have an active role in information sharing and education to encourage the parties covered by general safety duties to develop appropriate safety management systems. The regulator would have a range of sanctions and penalties available to it and enforcement powers that would be used to ensure compliance with the general safety duty.

Breaches of the law would be enforced in state and territory courts. If an act or omission of an ADSE simultaneously breached the general safety duty in more than one state or territory, the regulator would be required to select one state or territory court for prosecution. The regulator would be accountable to the COAG Transport and Infrastructure Council.

9.8.3 Discussion

Advantages

Like options 2 and 3, option 4 would address the known and anticipated in-service safety risks of automated vehicles through implementing automated vehicle-specific legislation. Like option 2b and 3, it would have a general safety duty on ADSEs and due diligence obligations on ADSE executive officers, which would enable a regulator to address the unforeseen safety risks of automated vehicles. A general safety duty and due diligence

obligations would incentivise ADSEs and ADSE executive officers to proactively identify and address emerging risks themselves, which should lead to better safety outcomes.

It would address the possibility of parties neglecting to address identified safety risks based on an assessment that it makes more economic sense to risk a safety issue eventuating than to take steps to prevent the risk. The 'reasonably practicable' standard is well-established legal concept that continues to evolve, which would suit the regulation of fast-changing technology.

This option would provide for some national consistency because the practical steps an ADSE would have to take to comply with the general safety duty would be the same in every state and territory. Like option 3, clear and consistent legal duties could simplify compliance obligations and costs for these parties and send a signal to industry that Australia is open to automated vehicles. There would also be similar cost benefits to government and the public from the economies of scale gained by setting up a single regulator.

Disadvantages

As with the other reform options, if the regulator was a new body, the upfront costs to government to set up the regulator under option 4 could be significant. As well, it could take a significant amount of time to establish a national regulator and implement and amend relevant laws in state and territory parliaments. Compliance costs for parties subject to general safety duties might also be higher. However, this must be measured against potential increased cost to industry under option 1.

A regulator under this legislative approach would most likely report to a ministerial council rather than a single parliament. Because the ministerial council is a step further removed from the voters who democratically elect their parliaments, greater care would need to be taken to ensure the regulator is accountable. If it appears to the public or the regulated entities that the regulator is not accountable, it could undermine the legitimacy of the regulator and the law.

Reporting to a ministerial council instead of a single parliament would also potentially lead to delays if changes to the national law are required.

Some industry stakeholders may consider a general safety duty an additional regulatory burden, which might act as a barrier to entry.

Some states might also be apprehensive about applying the law of another state in their jurisdiction, or when applying the law could implement significant derogations, which would result in inconsistent laws.

Enforcement would need to be taken through state and territory courts (as distinct from option 3, which would use the federal court system). For some breaches, such as where a faulty software update is simultaneously rolled out in multiple states and territories thereby breaching the risk-based general safety duty in each of those states, the regulator would need to select a single jurisdiction in which to enforce the law; this would involve one state's court considering the ADSE's breach of that state's law. The regulator would not be able to prosecute an ADSE in multiple states and territories for the same breach.⁷⁶ In many cases selecting the venue could be difficult; for example, it might be argued that the venue should

⁷⁶ Prosecuting an ADSE in multiple jurisdictions for the same breach of the safety duty would offend the doctrine of double jeopardy (that a person should not be tried for an offence charged on the same facts as an offence for which they have already been convicted or acquitted).

be based on the location of an incident such as a crash, the state of the vehicle's registration, or the location of the ADSE's head office (which may hold the relevant evidence). Although the ADSE would be held accountable for its breach of the general safety in one state, those from outside the state injured by the same breach, and other state governments, might prefer the ADSE be held accountable for the breach of their law. Instead they would have to accept the results of proceedings in another state.

9.9 Stakeholder feedback

9.9.1 Advantages and disadvantages of the options

Stakeholders generally considered we had accurately described how each option could work (FCAI, Maurice Blackburn, Kate Hunt, RACQ, Ricketts Point Power Pty Ltd, SA DPTI, TMR QLD, Transurban, VACC).

FCAI submitted that the disadvantages for option 1 were overstated in the consultation RIS because:

- it did not preclude a national approach, which it considered could be achieved through the ADRs and ACL
- ADSEs will generally be vehicle manufacturers, who FCAI considers are sufficiently regulated through the ACL
- risks should be addressed at the point that they eventuate
- current inconsistencies in state and territory regulation should be dealt with separately because this is a matter for conventional vehicles as well.

In contrast, TMR QLD submitted that under option 1 states and territories would have to regulate in an incremental and disparate way, which might cause inconsistency, overlap or gaps in the regulatory framework. ACCC submitted that relying on existing frameworks would exacerbate existing regulatory gaps between regimes, while overlaps could cause confusion about the responsible regulator. These issues would affect safety and increase the compliance and administrative burden on industry. ACCC also considered that governments' ability to react and keep pace with technological advancements would be limited under this option, in turn impacting on innovation and the ability to address new safety risks as they arise.

Regarding option 2 of the consultation RIS, TMR QLD noted the inefficiency of regulating nationally operating ADSEs at the state/territory level. It also agreed that state and territory law would still result in some national inconsistency. Implementation and amendments could also take a substantial period of time because changes would need to progress through all state and territory parliaments. These delays would exacerbate national inconsistencies.

Ricketts Point Power Pty Ltd submitted that it would be more efficient to have technical experts at the national level, and a government stakeholder at a consultation session suggested smaller jurisdictions may struggle to attract the required expertise.

TMR QLD considered that the Commonwealth's ability to regulate ADSEs at the national level means that option 3 is most able to achieve national consistency. It also noted that option 4 leaves open the possibility that some jurisdictions would decline to participate in the national framework, and it could take years for full implementation as states and territories progressively sign up. These outcomes would be a barrier to deployment.

RACQ considered that options relying on model or applied law risked inconsistent uptake and implementation across jurisdictions.

9.9.2 Stakeholders suggested differing phased approaches

Many stakeholders suggested an interim or phased approach to regulation, though the nature of the phases differed. The key reason for a phased approach was uncertainty about how the automated vehicle market will develop in Australia.

Examples of phased approaches included:

- option 1 transitioning to any reform option (EasyMile)
- a Commonwealth regulator enforcing prescriptive duties on repairers and modifiers and general safety duties on other parties transitioning to prescriptive duties as the market evolves (Australian Motorcycle Council)
- an interim approach of state and territory regulators (consultation RIS option 2b) transitioning to a Commonwealth regulator (option 3), with some limited functions being escalated to the Commonwealth regulator in the interim (RACQ)
- an interim approach of state and territory regulators transitioning to a national regulator (a government agency)
- an interim approach focusing on SAE level 3 vehicles transitioning to an approach for all automated vehicles (a government agency).

9.10 NTC conclusions

9.10.1 The options all have valid advantages and disadvantages

Regulated parties will be more familiar with the existing regulatory framework in the baseline option, though it is likely that states and territories would create new duties to regulate ADSEs and allow automated vehicles to operate legally.

All reform options create clear national duties that would address known and anticipated risks, with options 2b, 3 and 4 also providing regulatory tools to manage unforeseen safety risks. Options 3 and 4 are able to reduce barriers to entry by creating a more nationally consistent approach to in-service safety, and option 3 has features that also allow more effective regulation of nationally operating ADSE and efficient maintenance of the regulatory framework. The reform options would result in a framework that is less familiar to existing industry, with potentially higher costs if new regulatory bodies are established.

In chapter 10 we will assess how these options address the problem statement, incorporating the analysis presented in PwC's CBA.

9.10.2 Phased approaches

As noted in chapter 7, we consider it important to use this opportunity to create a regulatory framework that ensures the safe deployment and operation of automated vehicles in Australia. While we acknowledge the scope of the regulatory task is unclear, we consider a phased approach to in-service safety (consisting of an interim framework and an end-state framework) may be counterproductive, lead to unintended consequences and potentially be unnecessary. It would require the simultaneous development of two regulatory approaches by governments and the establishment of two separate frameworks. There is also a risk that the interim framework becomes entrenched, leading to delays or a potential stop to creating the end-state framework.

We do acknowledge that there may be a need for a contingency approach if automated vehicles arrive earlier than the development of the end-state regulatory framework. We discuss this in chapter 10.

10 Summary of assessment

Key points

- Options 1, 2a and 2b do not adequately address the in-service safety of automated vehicles.
- Either option 3 or option 4 could form the basis of the end-state regulatory framework. Both options address the problem statement by:
 - providing for known and anticipated, as well as unforeseen, safety risks
 - supporting national consistency by minimising variations and inconsistencies associated with having multiple regulators for an ADSE.
- PWC's CBA found that option 3 has the highest net benefit.
- Option 3 is preferable as an end-state regulatory framework because it provides better for national consistency than option 4.
- Relying on existing regulatory frameworks may have some merit as a contingency approach while we are developing the end-state regulatory framework.

10.1 Purpose of this chapter

The purpose of this chapter is to:

- summarise our assessment of the options, which incorporates stakeholder feedback and the PwC CBA
- recommend the preferable end-state regulatory framework to address the problem statement.

10.2 Problem statement and options for in-service safety for automated vehicles – consultation RIS

Table 4 is derived from the consultation RIS and shows at a high level whether each option addresses the problem statement outlined in chapter 2. Based on stakeholder feedback and further analysis, we have adjusted our assessment of option 3 'addresses risk of national inconsistency in safety approach' from 'considerably addressed' to 'largely addressed'.

Table 4. Problem statement and options for in-service safety for automated vehicles

<i>In our current regulatory environment, when automated vehicles become ready for deployment:</i>		Option 1 (baseline)	Option 2a	Option 2b	Option 3	Option 4
<ul style="list-style-type: none"><i>they may introduce new in-service safety risks that the</i>	Addresses known and anticipated safety risks	Not addressed	Largely addressed	Largely addressed	Largely addressed	Largely addressed

<i>In our current regulatory environment, when automated vehicles become ready for deployment:</i>		Option 1 (baseline)	Option 2a	Option 2b	Option 3	Option 4
<i>market will not eliminate or mitigate</i>	Addresses unforeseen safety risks	Not addressed	Not addressed	Largely addressed	Largely addressed	Largely addressed
<ul style="list-style-type: none"> <i>nationally inconsistent approaches to in-service safety and multiple regulators without clearly defined roles could be a regulatory barrier to market entry</i> 	Addresses risk of national inconsistency in safety approach	Not addressed	Moderately addressed	Moderately addressed	Largely addressed	Considerably addressed
	Addresses risk of multiple safety regulators within jurisdictions and overlapping or duplicated regulation	Not addressed	Considerably addressed	Considerably addressed	Largely addressed	Largely addressed

Key:



Risk not addressed

Risk moderately addressed



Risk considerably addressed

Risk largely addressed

PwC's independent CBA assesses option 3 as having the highest net benefit.

10.3 Stakeholder feedback

In the consultation RIS we sought feedback on which option most effectively addresses the problem statement.

Most stakeholders that responded to this question supported either option 3 or 4 (or an approach that aligns with these options) as the preferable end state. Some stakeholders that considered existing regulation sufficient supported option 1. Option 2 was not supported as an end state.

10.3.1 Support for a national approach as the preferable end state

Many stakeholders emphasised the need for a national approach. Some stakeholders did not support a specific option or option(s) but emphasised the need for national consistency through a national approach to in-service safety regulation (AICD, ANCAP, DPTI SA, EasyMile, ITS Australia, a government agency, a vehicle manufacturer). A government stakeholder submitted that national uniformity is needed and should be achieved without transferring control from the states and territories to the Commonwealth.

10.3.2 Support for option 3 or 4 as the preferable end state

Several stakeholders submitted that either option 3 or 4 is the preferred option for regulating the in-service safety of automated vehicles (ConnectEast, IAG, LIV, Maurice Blackburn, Transurban, VACC). Transurban and VACC stated that these options would minimise variations and inconsistencies associated with having multiple regulators for an ADSE. A government agency submitted that either option 3 or 4 is appropriate for level 4 and 5 automation.

DITCRD and ICA submitted that both options 3 and 4 are likely the more favourable long-term approaches once more is known about the deployment and use of automated vehicles.

While supporting either option 3 or 4, three stakeholders suggested option 4 may be preferable to option 3 (ConnectEast, Maurice Blackburn, Transurban). Transurban submitted that option 4 may be more cost-efficient than a standalone Commonwealth model because it would require less new operational infrastructure. Maurice Blackburn submitted that option 4 would be easier to implement because of the disadvantages of option 3. Maurice Blackburn considered these disadvantages include removing existing state and territory responsibilities and potentially creating overlap (or gaps) with state and territory coverage. Kate Hunt also supported option 4 but acknowledged the need for states and territories to commit to the national scheme for option 4 to provide national consistency.

Several stakeholders identified option 3 as the preferred option for end-state regulation. This is primarily because it is the most likely to achieve a nationally consistent and coherent approach, including nationally consistent enforcement, in the most cost-effective way (AADA, ACCC, Australian Motorcycle Council, DoT WA, Ricketts Point Power Pty Ltd, TMR QLD, a government agency).

- RACQ and TMR QLD submitted that end-state regulation that relies on model or applied law risks inconsistent uptake and implementation across jurisdictions.
- DoT WA and TMR QLD submitted that regulating ADSEs through Commonwealth rather than state law would enable more efficient implementation and maintenance of law through one parliament, which is needed in a rapidly changing area.

10.3.3 Support for option 1 as the preferable end state

FCAI, GM Holden and Truck Industry Council submitted that relying on existing regulatory frameworks (option 1) is sufficient, and new legislation is not required to achieve in-service safety for automated vehicles. FCAI and GM Holden stated that a national approach could be achieved through existing Acts and regulations and there is no need to create another national body.

10.4 Outcomes of the PwC cost-benefit analysis

PwC's independent CBA assessed that the options with the highest net benefit is option 3. PwC's full cost-benefit analysis is available on our website.⁷⁷

PwC ranked the options in the CBA based largely on its assessment of the likelihood that they would either delay or bring forward take-up of automated vehicles, which in turn would delay or bring forward realisation of the anticipated benefits of automated vehicles.

PwC's conclusions were that each of the reform options (options 2a, 2b, 3 or 4) would be an improvement on the base case (option 1). PwC assessed the likelihood of a delay in uptake as highest for option 1, followed by option 2a, option 4 and finally option 3.

Although option 1 has lower regulatory requirements, the potential for regulatory inconsistencies between jurisdictions and the impact on demand of poorer safety outcomes (or perceptions of safety) point to a high likelihood of delay in rollout.

⁷⁷ PwC's final CBA can be accessed at: <https://www.ntc.gov.au/sites/default/files/assets/files/PwC-CBA-In-service-safety-for-automated-vehicles.pdf>

Option 3 was assessed as having a higher net benefit than option 4 because of the higher level of national consistency provided by Commonwealth law relative to state and territory applied law.

10.5 NTC conclusions

10.5.1 Option 3 or 4 is the preferable end-state regulatory framework

As outlined in earlier chapters, gaps remain if we rely on existing regulatory frameworks. These gaps relate not only to coverage of in-service safety risks but also to national consistency, and therefore apply to both parts of the problem statement. Relying on existing regulatory frameworks (option 1) would not address the problem statement and would not be a viable end-state solution. Stakeholders did not support options 2a and 2b. They are not viable end-state solutions because they both risk national inconsistency. Option 2a provides prescriptive duties only and therefore also fails to address unforeseen in-service safety risks.

We consider the preferable end-state regulatory framework to address the problem statement to be either option 3 or option 4. This aligns with feedback from most stakeholders. As outlined in section 10.3, most stakeholders support either option 3 or 4, or both, or commented on the need for national consistency without supporting a specific option.

Both option 3 and 4 address the problem statement by providing for known and anticipated, as well as unforeseen, safety risks. Both options support national consistency by minimising variations and inconsistencies associated with having multiple regulators for an ADSE. We consider that options 3 and 4 are appropriate for all ADSs, including SAE level 3 ADSs.⁷⁸ While vehicles operating at SAE level 3 automation would have a fallback-ready user (who is not present at SAE level 4 and 5 automation), there is no clear reason why the ADSE of an SAE level 3 ADS should be regulated differently from an ADSE of a SAE level 4 or 5 ADS.

10.5.2 Option 3 is preferable

While some stakeholders supported option 4 over option 3, option 3 was more strongly supported overall. We agree with stakeholders that relying on model law (option 2) or state applied law (option 4) risks inconsistent implementation across jurisdictions.

PwC's CBA found option 3 to have the highest net benefit, primarily because it was assessed as the option least likely to lead to delay in the uptake of automated vehicles in Australia.

We consider option 3 is preferable because it:

- achieves a single market through federal jurisdiction and allows for nationally consistent enforcement through the Federal Court; this means it provides better for national consistency than option 4
- allows for more efficient implementation and maintenance of law through one parliament.

Option 3 achieves a national law while retaining control for the states – for example, for vehicle registration, human driving, passenger transport, road management and authorisation for access to public roads. It is only proposed to cover the gaps in current state

⁷⁸ In May 2018 transport ministers agreed that the ADSE is responsible for compliance with dynamic driving task obligations when the ADS is engaged at level 3, 4 and 5 automation.

and territory (and Commonwealth) legislation in providing for the in-service safety of automated vehicles. It should not remove existing state and territory responsibilities or create overlaps or gaps with state and territory coverage. Legislative implementation of option 3 would need to ensure there are no gaps and that any overlaps are managed.

10.5.3 Contingency approach

We recognise it may be necessary to develop a contingency approach while we are developing the end-state regulatory framework. While relying on existing regulatory frameworks is not a viable end-state solution, consistent with submissions from some stakeholders it may have some merit during very early deployments of automated vehicles. This contingency approach is based on option 1.

Our analysis suggests that option 2 (2a and 2b) is not a good contingency approach. Implementing option 2 most likely requires significant investment to update existing regulatory frameworks to include new safety duties. Because a general safety duty is the desired end state, updating existing frameworks to only include prescriptive duties (under option 2a) would be particularly inefficient. Implementing option 2 may also involve significant monetary outlay for each state and territory to set up its own framework and regulator to regulate automated vehicles. This could impede or delay the development and implementation of the end-state regulatory framework, which should be the focus going forward.

Despite these potential issues, it is prudent that Australian governments be prepared for the disruption caused by automated vehicles should they become commercially available before the end-state framework is finalised. We are therefore working with states, territories and the Commonwealth to develop a viable contingency approach to regulating automated vehicles, should it become necessary.

11 Recommended approach and next steps

Key points

- The next stage of work will examine compliance and enforcement of the in-service safety regulatory regime in detail, along with some other outstanding in-service safety issues.
- This additional stage of work will ensure that advice to ministers on in-service safety is comprehensive, enabling Australian governments to make an informed decision on legislative implementation in May 2021.

11.1 Purpose of this chapter

The purpose of this chapter is to outline:

- the next stage of work to cover outstanding issues for in-service safety, specifically, compliance and enforcement, regulation of in-service modifications that affect automation, and market exit and transferability of ADSEs
- when we anticipate transport ministers will be in a position to make a holistic, comprehensively informed decision on legislative implementation of the in-service safety regime.

11.2 Key features of the recommended approach to in-service safety

This decision RIS identifies the best regulatory approach to managing the in-service safety of automated vehicles as including:

- a specialised national regulator for in-service safety supported by necessary functions, powers and duties authorised to regulate the ADSE, ADSE executive officers and remote drivers (teleoperators)
- a general safety duty on the ADSE, supported by certain prescriptive rules where necessary
- due diligence obligations on executive officers of the ADSE to ensure the ADSE complies with the safety duty.

We assess options 3 or 4, which both include a general safety duty and a single national regulator, as best enabling efficient administration of these duties within a single national market. Either option 3 or option 4 could form the basis of the end-state regulatory framework. PwC's CBA supports this proposition, as do the submissions of most stakeholders (notably those of Australian governments).

11.3 Further work to support the ministers' decision on legislative implementation (option 3 or option 4)

Options 3 and 4 differ with respect to their approach to legislative implementation. Option 3 (Commonwealth law) appears preferable to option 4 (state and territory applied law). Option

3 is more likely to achieve national consistency, is more efficient to maintain, aligns with the regulation of automated vehicles at first supply, and allows for national enforcement through a single federal court system. PwC's CBA assessed option 3 as having the highest net benefit.

Through further targeted consultation with government agencies, we have identified additional work to support the ministers' decision on the appropriate legislative implementation approach. We outline the outstanding issues in section 11.4.

We anticipate that this decision RIS will support ministers to make decisions on the key features of the in-service safety regulatory regime in mid-2020. The outstanding issues can be analysed in the context of these decisions; for example, assuming they are subject to a general safety duty, an ADSE would need to take reasonable precautions to recognise any in-service modifications that may diminish the safety of their ADS. Without a general safety duty in place, modifications may require significant regulatory attention, most likely at the state/territory level. With the protection that comes with the ADSE general safety duty, lighter touch regulation could be feasible.

We have already started to work through further detail of how each option would operate in practice. The next stages of work will include additional detail on the differences between how option 3 and 4 would operate in practice. Jurisdictions have suggested that this work on outstanding issues be undertaken before asking ministers to decide between option 3 and 4. This will enable ministers to make an informed decision on the legislative implementation approach for the national law in May 2021.

We will also work with Australian governments on a contingency approach to regulating automated vehicles if they arrive in Australia before developing the end-state regulatory framework.

11.4 Outstanding issues

With the key features of the in-service safety regulatory regime decided, the NTC will undertake targeted consultation with stakeholders to refine Australia's policy approach to the following discrete areas.

11.4.1 Compliance and enforcement

The obligations of regulated parties should be the same regardless of whether option 3 or 4 is chosen – for example, the detail of the general safety duty. However, the compliance and enforcement arrangements will differ. In particular, option 3 would be enforced through the federal court system, while under option 4 a national regulator would enforce breaches of the national law through the various state courts.

The next stage of work will consider these issues in detail, as well as the design of a responsive and accountable regulator to oversee the regulatory framework and ensure regulated parties comply with the law.

This work will also consider:

- the functions and powers the regulator requires in order to monitor and enforce the requirements
- the interaction between the national regulator and other authorities such as local government and state and territory transport and law enforcement agencies

- arrangements for access to data held by ADSEs or inside a vehicle for the purposes of enforcement

11.4.2 Modifications that enable new automation features or that diminish the safety of vehicles approved at first supply

Vehicle manufacturers are now able to significantly alter a vehicle's capabilities through software updates. For example, Tesla has used software updates to enable advanced summon features (which allow a vehicle to leave a parking space and navigate around obstacles to its user who oversees the manoeuvre through their smartphone) and advertised its intention to the Australian market to activate what it calls 'full self-driving' through similar updates (Tesla, 2020).

Similarly, kits supported by open source software that are relatively easy to install are already available for purchase online (comma.AI, 2020). These kits can give conventional vehicles greater automation.

In-service modifications that enable automation are potentially disruptive technologies; however, that does not mean Australian law should not enable them, provided they meet acceptable levels of safety. It is likely that such modifications would allow more consumers greater access to automation because a person does not need to purchase a new vehicle in order to have automation features. Allowing in-service modifications would also improve competition in the automated vehicle market.

The next stage of work will consider in detail what regulation would be required to safely enable in-service modifications.

11.4.3 Market exit and transfer of ADSEs

As outlined in chapter 1, ministers decided that an ADSE for an automated vehicle or ADS would be the type approval holder for the vehicle or component under the Road Vehicle Standards Act. This allows a straightforward approval process, particularly for established industry, which is already familiar with type approval. It could, however, create complexities and potential regulatory barriers for some parties that may wish to perform the role of the ADSE through other pathways, and barriers to exit for type approval holders that may wish to no longer perform the role of the ADSE.

It is desirable that the Australian market be open to any business model that operates at an acceptable level of safety.

The next stage of work will consider in greater detail whether to enable, and if so how to safely manage:

- an ADSE choosing to exit the market, and consumers transferring from one ADSE to another
- pathways for prospective ADSEs to enter the market when they are not a type approval holder under the Road Vehicle Standards Act
- an ADSE's obligations when the corporate entity is wound up or there are significant changes to the ADSE's corporate structure
- how the above issues interact with the first supply safety assurance framework under the Road Vehicle Standards Act.

11.5 A holistic and informed decision in 2021

This decision RIS identifies the appropriate approach to regulating automated vehicles in Australia. There is significant work either underway or still to come that should inform the final decision of transport ministers:

- the NTC's work on compliance and enforcement and other issues outlined in section 11.4
- Austroads's projects on:
 - vehicle registration data necessary to support automated vehicles
 - optimal business and information systems architecture for providing road agency-owned data to manufacturers of automated vehicles, cooperative intelligent transport systems devices and maps
- outcomes of the various automated vehicle trials currently enabled by Australian governments.

It is therefore proposed that transport ministers be asked to make a final decision on legislative implementation (most likely a decision between option 3 and option 4, supported by an intergovernmental agreement) in May 2021.

May 2021 also allows the decision to be made once industry has had a further 12 months to mature, the market has taken greater shape, and more is known about the regulatory approaches of other jurisdictions including what is determined through international forums.

This staggered approach to decision making allows Australia's policy development to continue to advance and therefore provide industry and government certainty, without getting ahead of international developments.

Appendix A Summary of consultation

In July 2019 the National Transport Commission published the *In-service safety for automated vehicles consultation regulation impact statement* (consultation RIS) seeking feedback on the role and regulation of different parties involved in the safe operation of automated vehicles on Australian roads. The consultation RIS outlined the safety duties that should apply to these parties and the institutional and regulatory arrangements to support them.

We engaged in a thorough consultation program between 1 July and 26 August 2019. This involved hosting 15 information sessions with industry and government stakeholders around Australia.

The purpose of the information sessions was to inform stakeholders on proposed in-service safety for automated vehicles regulatory reform and encourage submissions to the consultation RIS.

We received 39 written submissions. These submissions came from transport agencies, manufacturers, automobile clubs, insurers, law firms, consultants and research bodies. A list of the public submissions is in the table below (note that four submissions opted to remain private).

Name of organisation	Abbreviation	Description
Australasian New Car Assessment Program	ANCAP	Independent vehicle safety advocate
Australian Automobile Association	AAA	National peak body representing automobile clubs
Australian Automotive Aftermarket Association	AAAA	Industry association representing the automotive aftermarket parts and accessories industry
Australian Automotive Dealers Association	AADA	Peak industry advocacy body representing franchised new car dealers in Australia
Australian Competition and Consumer Commission	ACCC	Australia's competition regulator and national consumer law champion
Australian Institute of Company Directors	AICD	Not-for-profit membership organisation for directors
Australian Motorcycle Council	—	National peak motorcycle rider organisation

Name of organisation	Abbreviation	Description
ConnectEast Pty Ltd	–	Owner and operator of Melbourne's EastLink tollway project
Department of Infrastructure, Transport, Cities and Regional Development	DITCRD	Commonwealth government department
Department of Planning, Transport and Infrastructure (SA)	DPTI SA	South Australian government department
Department of Transport (WA)	DoT WA	Western Australian government department
Department of Transport and Main Roads (Qld)	TMR QLD	Queensland government department
EasyMile	–	Automated Vehicle manufacturer
Federal Chamber of Automotive Industries	FCAI	National peak body for manufacturers and importers of light vehicles and motorcycles
GM Holden	–	Automobile manufacturer
Graeme Pattison	–	Individual
Heavy Vehicle Industry Australia	–	Industry advocate for manufacturers and suppliers of heavy vehicles
Human Integrated Internet of Things	HiloT	Technology company
Insurance Australia Group	IAG	Insurance company
Insurance Council of Australia	ICA	Insurance association
Intelligent Transport Systems Australia	ITS Australia	Independent not-for-profit incorporated membership organisation representing ITS suppliers, government authorities, academia, transport businesses and users

Name of organisation	Abbreviation	Description
Kate Mathews Hunt	–	Individual
Law Institute of Victoria	LIV	Peak body for legal professionals in Victoria
Maurice Blackburn Lawyers	–	Law firm
Motor Trade Association of South Australia	–	Peak employer organisation dedicated to protecting and growing the retail, service and repair sector for South Australia's automotive industry
National Heavy Vehicle Regulator	NHVR	Australia's first national, independent regulator for all vehicles over 4.5 tonnes gross vehicle mass
NCC Group	–	Information assurance firm
Office of the Victorian Information Commissioner	OVIC	Primary regulator and source of independent advice to the community and the Victorian Government about how the public sector collects, uses and shares information
Royal Automobile Club Queensland	RACQ	Insurance provider and automobile club
Ricketts Point Power Pty Ltd	–	Renewable energy company
Telstra	–	Telecommunications provider
Transurban	–	Road operator company that manages and develops urban toll road networks
Truck Industry Council	–	Australia's peak truck manufacturer and major component supplier group
Virtual Australia New Zealand Initiative	VANZI	Not-for-profit entity established to broker the creation of Virtual Australia New Zealand Digital Built Environment (VANZ/DBE)

Name of organisation	Abbreviation	Description
Victorian Automobile Chamber of Commerce	VACC	Automotive industry employer association

Appendix B Safety criteria for automated driving systems

B.1 Safety criteria

B.1.1 Safe system design and validation process

The applicant must explain why it chose particular design, validation and verification processes, and how these ensure a safe technology is developed and maintained for the life of the automated driving system (ADS). The life of the ADS should be set by the applicant and represent the amount of time the applicant proposes to support the ADS, including by way of software upgrades. The applicant's design and verification processes should cover all safety-critical issues such as unsafe maintenance, repairs, physical modifications and other system failure, as well as the ADS reaching the end of its life and no longer being supported by the applicant. For example, the applicant could design the ADS to disengage (temporarily or permanently), or for back-up systems to take over where safety-critical issues arise or the system otherwise fails.

Where the ADS is supplied as an aftermarket device (rather than a device already fitted to the vehicle), compatibility (that is, the vehicle types the ADS can be fitted to) should be specified as an element of system design.

The applicant should document decisions relating to the choice of design, validation and verification processes and include empirical evidence or research to support the safety assertions made. Such documentation could explain why particular processes were chosen. Where applicable, the applicant should use guidance, industry best practices, design principles and standards developed by established standards organisations.

B.1.2 Operational design domain

The applicant must identify the operational design domain (ODD) of the ADS and demonstrate how it will ensure the ADS is:

- able to operate safely within its defined ODD
- incapable of operating in areas outside of its defined ODD
- able to transition to a minimal risk condition when outside its defined ODD.

This could include documentation outlining the process for assessing and verifying the ADS's functionality both within and outside the defined ODD.

The applicant should also outline how it will review and manage changes to the defined ODD. Major changes to the ODD are likely to be significant modifications requiring the applicant to submit a new Statement of Compliance for approval before introducing the change into the market.

B.1.3 Human—machine interface

The applicant must outline how the human—machine interface (HMI) will facilitate interaction between the ADS and relevant parties (both internal and external to the vehicle) that allows the vehicle to operate safely.

In relation to human drivers and occupants, elements of the HMI interaction link with the education and training criterion. The information communicated by the HMI should include, but is not limited to:

- communicating to the human driver when it is safe for the driver to engage the ADS
- informing the human driver if the ADS is engaged and the level of automation engaged
- requesting the human driver or fallback-ready user take back control of the vehicle with sufficient time for the human driver or fallback-ready user to respond, including in an emerging hazard situation. In addition, the applicant should outline the safeguards to ensure a fallback-ready user is actually ready to take back control. This could include monitoring by the ADS of human readiness to take back control and alert systems where such readiness is not apparent
- drawing attention to potential safety risks related to human monitoring and readiness to re-engage with the driving task
- informing vehicle occupants of the ADS's current and intended actions to allow occupants to predict vehicle behaviour
- indicating whether the ADS is functioning properly or experiencing a malfunction.

In relation to parties external to the vehicle, the HMI should communicate information such as the ADS's state of operation should be communicated by the HMI via an external communication interface. This could, for example, take the form of an external screen.

The applicant must also outline how it designed and verified the HMI and reference any appropriate international standards or agreed guidelines for HMIs.

B.1.4 Compliance with relevant road traffic laws

The applicant must demonstrate how it will ensure the vehicle operates in compliance with relevant road traffic laws when the ADS is engaged. In particular, how the ADS will comply with:

- relevant road traffic laws, including any variations in each state and territory
- amendments to the relevant road traffic laws when they come into force.

This could include documentation outlining the process for assessing and verifying the ADS's compliance with relevant road traffic laws and the process for updating the ADS to comply with amendments to those laws.

The applicant must also demonstrate how the ADS will respond in a safe way where strict compliance with relevant road traffic laws is not possible. This requirement closely links with the on-road behavioural competency criterion.

B.1.5 Interaction with enforcement and other emergency services

The applicant must demonstrate how it will ensure that police can access accurate information about whether the ADS is engaged at a given time, the level of automation engaged and any handover of control requests. The applicant should also demonstrate how it may facilitate police access to this information in real time at the roadside.

The applicant must demonstrate how it will ensure safe interaction with emergency services (including but not limited to police, fire and ambulance services) more broadly when the ADS is engaged. This includes interactions on-road and at the roadside.

B.1.6 Minimal risk condition

The applicant must demonstrate how the ADS will detect that it cannot operate safely and the steps the ADS will take to bring the vehicle to a minimal risk condition.

This could include documentation outlining the process for verifying the ability of the ADS to detect and respond to such circumstances. The steps the ADS must take to bring the vehicle to a minimal risk condition are likely to vary depending on the reason why the ADS cannot operate safely, other traffic and road users present, and on the level of automation engaged. Therefore, a range of approaches to bring the vehicle to a minimal risk condition may need to be considered.

B.1.7 On-road behavioural competency

The applicant must demonstrate how the ADS will appropriately respond to foreseeable and unusual conditions that may affect its safe operation and interact in a predictable and safe way with other road users. This could include documentation outlining the process for verifying the ADS's:

- object and event detection and response capabilities
- crash-avoidance capabilities
- ability to respond to unusual events within its ODD
- on-road interaction with other road users, including vulnerable road users.

B.1.8 Installation of system upgrades

The applicant must demonstrate how it will manage system upgrade risks. This includes ensuring safety-critical system upgrades to the ADS are installed and do not result in the operation of an unsafe ADS.

The applicant must explain how it will notify registered owners/operators that a safety-critical upgrade has been installed or is available and needs to be installed. For such safety-critical upgrades, the applicant must also demonstrate how it will:

- detect failures to install upgrades (including failures of automatic updates, failures by registered owners/operators to take action when an upgrade is available, or failures in receipt of over-the-air software updates)
- detect system failures once upgrades are installed
- ensure the ADS is safely disengaged if such failures occur.

This could include documentation outlining the process for verifying the ADS's ability to:

- update automatically and notify the registered owner/operator of the update
- notify the registered owner/operator of available system upgrades
- detect and respond to failures to install upgrades
- detect and respond to any system failures following the installation of upgrades.

B.1.9 Verifying for the Australian road environment

The applicant must demonstrate how it has considered the Australian road environment in designing, developing and verifying the ADS, including its forward planning processes to ensure compliance with changes to the road environment (such as changes to road infrastructure).

This could include documentation outlining the process for verifying the response of the ADS to the Australian road environment such as interaction with road signs in various states and territories, and interaction with Australian flora and fauna.

B.1.10 Cybersecurity

The applicant must demonstrate:

- the capacity and competency of the ADS to minimise cybersecurity threats and vulnerabilities, including risks of cyber intrusion and other data security breaches
- the ADS's ability to detect and minimise the consequences of cyber intrusions and data security breaches that occur. Relevant consequences include those on road user safety and consequences for individual privacy following a data breach. One way to minimise negative effects on safety could be to include a manual override mechanism
- the applicant's processes for maintaining the ADS's capacity and competency to minimise cybersecurity threats, vulnerabilities and consequences of intrusions and breaches over the life of the ADS.

The applicant should refer to relevant legislation, industry standards and guidance for vehicle cybersecurity (domestic and international) and explain how it has incorporated these into its processes for designing, developing and maintaining the ADS.

B.1.11 Education and training

The applicant must outline the education and training it will provide to relevant parties about its ADS and how this will minimise the safety risks of using and operating the ADS.

Education and training should consider different types of vehicles (including light and heavy vehicles) and different types of vehicle users. Without limiting the education and training to be provided, such education and training should consider:

- training human drivers and fallback-ready users to safely disengage and re-engage the ADS and the driving task
- informing human drivers of their obligations and responsibilities, particularly any fallback-ready user obligations
- informing consumers of the ADS's capabilities by clearly describing its automated capability, its level of automation, use limitations, restrictions on modifications and any restrictions of the automated technology such as the operational design domain
- facilitating the maintenance and repair of the ADS, including post-crash before it is put back in service
- facilitating employee, dealer and distributor understanding of the technology and operation so relevant information can be accurately conveyed to consumers and purchasers
- ongoing education as required, including education and training to end users who are not the original vehicle owner and to communicate the impact of upgrades.

The development of education and training should be well documented. Such documentation could explain the reasons for the education and training chosen and how it will facilitate proper and safe use of the applicant's ADS. The automated driving system entity (ADSE) should also make use of best practice or standards.

B.2 Obligations

B.2.1 Data recording and sharing

The applicant must outline the ADS data it will record and how it will provide the data to relevant parties. Without limiting the data to be recorded and shared, the applicant must explain how it will ensure:

- the vehicle has real-time monitoring of driving performance and incidents, including event data records in the lead-up to any crash that identifies which party was in control of the vehicle at the relevant time
- the vehicle can provide road agencies and insurers with crash data
- relevant parties (including police) receive information about the level of automation engaged at a point in time if required
- individuals receive data to dispute liability (for example, data showing which party was in control to defend road traffic infringements and dispute liability for crashes) when the individual makes a reasonable request
- data is provided in a standardised, readable and accessible format when relevant
- data is retained to the extent necessary to provide it to relevant parties (the amount of time data is retained for may depend on the purpose(s) the information could be used for – for example, law enforcement and insurance)
- data relevant to the enforcement of road traffic laws and the general safe operation of the ADS (including data relevant to crashes) is stored in Australia. This does not require the applicant to store the data exclusively in Australia.

In responding to this criterion, the applicant should note that the *Privacy Act 1988* (Cth) places limits on the collection, use and disclosure of personal information, which may limit the data the applicant can record and share.

B.2.2 Corporate presence in Australia

The applicant must provide evidence of its corporate presence in Australia.

B.2.3 Minimum financial requirements




The applicant must provide evidence of its current financial position, its grounds for claiming it will have a strong financial position in the future and the level of insurance held.

Appendix C New and existing regulatory frameworks for the in-service safety of automated vehicles

The table below outlines how the proposed new automated vehicle national law fits with existing state, territory and Commonwealth regulation. It highlights which matters would continue to be regulated by states, territories and the Commonwealth and which matters would be regulated by the in-service regulator. It shows:

- elements that would be covered by a new national automated driving law and which a national in-service safety regulator would administer⁷⁹
- new duties on fallback-ready users, which would sit with state and territory regulators rather than the in-service safety regulator
- existing regulation that is relevant to automated vehicles. This includes regulation that needs to be implemented (for example, the first supply safety criteria and obligations into the Road Vehicle Standards Act (RVSA)).⁸⁰

Key:

	New automated vehicle national law and state and territory duties on fallback-ready users
	Existing Commonwealth law
	Existing state and territory (S&T) law (including national laws made under state and territory legislation)

Note the following abbreviations: ADR = Australian Design Rules; ADS = automated driving system; ADSE = automated driving system entity; DITCRD = Department of Infrastructure, Transport, Regional Development and Communications; MAII = motor accident injury insurance

⁷⁹ The decision RIS concludes there should be a new national automated vehicle law (as previously agreed by ministers) and a national in-service safety regulator.

⁸⁰ The existing regulation identified in this appendix may need to be amended to account for automated vehicles. Amendments would generally need to be made by the states and territories or the Commonwealth.

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
Importation / first supply	Importation	DITRDC	RVSA	ADSE
	International vehicle standards incorporation into ADRs	DITRDC	RVSA	ADSE
	First supply type approval	DITRDC	RVSA (safety criteria and obligations)	ADSE
Access, registration and licensing	Access to the road network	S&T and local road managers	S&T road management Acts, common law obligations	Road users
	Vehicle registration	S&T road transport agencies	S&T road safety Acts, motor vehicle registration Acts	Registered owner/driver
	Vehicle identification (number plates)	S&T road transport agencies	S&T road safety Acts	Registered owner/driver
	Human driver licensing requirements	S&T road transport agencies	S&T road safety Acts	Human driver
	Human driver trainer requirements	S&T road transport agencies	S&T road safety Acts	Human driver trainers
Managing automated vehicle safety in service	Ongoing compliance with conditions of type approval	DITRDC	RVSA	ADSE
	Ongoing compliance with ADRs (through vehicle registration)	S&T road transport agencies	S&T light vehicle standards	ADSE, registered owner
	Light vehicle combination requirements	S&T road transport agencies	S&T light vehicle standards	Registered owner/driver

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
	ADSE and remote driver in-service safety duties	National in-service safety regulator (new or existing body)	New automated vehicle national law	ADSE and remote driver (teleoperation)
	Repairs	S&T regulators (including fair trading agencies, transport agencies)	Various S&T Acts (including repairer Acts (where they exist), transport laws) ⁸¹	Repairer
		Australian Competition and Consumer Commission	Australian Consumer Law ⁸²	Repairer
	Recalls	DITRDC	RVSA	ADSE / supplier
	Roadworthy inspections	S&T road transport agencies	S&T light vehicle standards	Registered owner
	Defective vehicles	S&T road transport agencies and enforcement agencies	S&T road safety Acts	Registered owner
	Modifications to the ADS	National in-service safety regulator (new or existing body) (ADSEs)	New automated vehicle national law	TBC
		S&T road transport agencies (other parties such as owners)	S&T road safety Acts, motor vehicle registration Acts	Registered owner

⁸¹ These frameworks (and the Australian Consumer Law) generally have consumer protection objectives rather than road safety objectives.

⁸² The Australian Consumer Law is also incorporated into state and territory fair trading acts, which are administered by various state and territory regulators.

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
	Modifications to the vehicle	S&T road transport agencies	S&T road safety Acts, motor vehicle registration Acts	Registered owner
Automated vehicle behaviour on the road	Regulation of dynamic driving task performed by ADS	National in-service safety regulator (new or existing body)	New automated vehicle national law	ADSE
		with assistance from S&T enforcement agencies ⁸³		
	Road rules for existing human road users (e.g. pedestrians, cyclists)	S&T road transport agencies and enforcement agencies and local government	Australian Road Rules, S&T road safety Acts	Other human road users
	Duties of fallback-ready users	S&T road transport agencies	Australian Road Rules (TBC)	Fallback-ready user
	Roadside enforcement	S&T enforcement agencies	S&T road safety Acts	ADSE and human driver
End of life	ADS end of life	DITRDC	RVSA (safety criteria)	ADSE
		National in-service safety regulator (new or existing body) (ADSEs)	New automated vehicle national law	ADSE (TBC)

⁸³ Road rule breaches by an ADS 'driver' will most likely just indicate a breach of the general safety duty. This will be considered in more detail in the next phase of the in-service safety work looking at compliance and enforcement for automated vehicles.

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
		S&T road transport agencies	S&T road safety Acts, motor vehicle registration Acts	Registered owner
	Vehicle end of life	S&T road transport agencies	S&T road safety Acts, motor vehicle registration Acts	Registered owner
Civil and statutory liability	MAII injuries/deaths involving automated vehicles	S&T MAII regulators ⁸⁴	S&T MAII laws, transport laws	ADSE and/or human driver and/or registered owner
	Liability for non-MAII damage, injury and loss	n/a – private action	Civil liability Acts, common law obligations	ADSE and/or human driver and/or registered owner
National transport laws and automated vehicles	Heavy vehicles (other than ADSE and remote driver in-service safety duties)	National Heavy Vehicle Regulator (other than NT and WA), S&T road transport agencies (NT and WA), S&T enforcement agencies	Heavy Vehicle National Law (other than NT and WA), transport and work health and safety laws (NT and WA)	Parties regulated in the Heavy Vehicle National Law
	Transport of dangerous goods	S&T dangerous goods regulators	Dangerous goods Acts (incorporating the National Australian Dangerous Goods Code)	Persons involved in transporting dangerous goods

⁸⁴ Subject to decision by the Board of Treasurers on national approach to insurance for automated vehicles.

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
Other state and territory laws and automated vehicles	Commercial passenger vehicle (or point-to-point transport) operator duties	S&T commercial passenger vehicle (or point-to-point) regulators	S&T commercial passenger vehicle (or point-to-point) Acts	Commercial operators and drivers of commercial passenger vehicles
	Passenger vehicle (non-commercial) operator duties	S&T road transport agencies	S&T passenger transport Acts	Operators and drivers of passenger vehicles
	Work health and safety / person conducting a business or undertaking duties	S&T work health and safety regulators	S&T work health and safety laws	Persons conducting a business or undertaking
	Criminal law relating to driving and use of a vehicle	S&T enforcement agencies	Various S&T Acts	Human drivers
Other relevant matters	Product safety	Australian Competition and Consumer Commission	Australian Consumer Law	Automated vehicle manufacturers, ADS manufacturers
	Facilitating repairer access to technical vehicle repair information	N/A – policy work for mandatory scheme for sharing motor vehicle service and repair information led by the Commonwealth Treasury	N/A	Automated vehicle manufacturers, ADS manufacturers
	Responsibility of road managers to maintain, repair, etc. road infrastructure	N/A – risk of civil action, rise of premiums for public liability insurance, state government taking action against local government,	S&T and local government road management Acts	Road managers

Category	Element	Regulator(s)	Regulatory framework(s)	Regulated parties
		accountability to community to maintain roads		
	Telecommunications	Australian Communications and Media Authority	Telecommunications Acts	Telecommunications service providers
	ADSE corporate obligations	Australian Securities and Investments Commission	Corporations law	ADSE and ADSE executive officers

Appendix D Existing regulation for parties with moderate or minor influence

Parties with a moderate influence on in-service safety

This section describes the regulation that applies to the parties we assessed in chapter 4 as having a moderate influence on in-service safety. These are parties whose role indirectly affects the safe design or safe operation of an automated vehicle.

Road managers

Road managers are existing parties and are regulated through state and territory road management legislation. Australia's road infrastructure will change over time and may be developed to better provide for increased automation in vehicles. However, the first commercial deployments will require the automated driving system (ADS) of automated vehicles to function safely with existing public roads. Although road managers have a crucial role in ensuring road safety, they are not in a position to directly control the behaviour of ADSs. This suggests the current road management frameworks can remain fit for purpose when automated vehicles enter the road network, and any amendments to regulation of road managers should continue to be managed at the state and territory level.⁸⁵

Road management legislation and negligence

Road management legislation creates obligations for state, territory and local government road managers⁸⁶ and shapes a road manager's duty of care to road users.⁸⁷ For example, this might include a statutory duty to inspect, maintain and repair a road to a particular standard,⁸⁸ and to give notice before closing a road.⁸⁹

Road managers have a duty to take reasonable care to not create a foreseeable risk of harm to road users when exercising their powers.⁹⁰

Traffic management regulation

Traffic management is a function of road managers typically outsourced to private firms. It is largely regulated through contracts between road managers and traffic management companies, and relevant road management legislation. Work health and safety (WHS) law also applies to ensure traffic management occurs in a way that minimises risks to road users (NT WorkSafe, 2018).

⁸⁵ Road management legislation can impact the right of road users to access the road network. It may require review to ensure new road users such as automated vehicles (particularly unoccupied automated vehicles) and remote drivers are able to access public roads within their operational design domain.

⁸⁶ Most Australian roads are managed by state, territory and local government agencies. However, some publicly accessible roads are managed by private entities.

⁸⁷ The common law duty of care owed by road managers can be modified by state and territory road management legislation.

⁸⁸ *Road Management Act 2004* (Vic), s 40.

⁸⁹ *Roads Act 1993* (NSW) s 38B.

⁹⁰ *Brodie v Singleton Shire Council* (2001) 206 CLR 512.

Parties with a minor influence on in-service safety

This section describes the regulation that applies to those parties we assessed in chapter 4 as having a minor influence on in-service safety. These are parties that have the potential to indirectly affect the safe design or safe operation of an automated vehicle.

Commercial operators

Commercial operators are established parties, and there is existing regulation that covers them. Where commercial operators are also the registered owner of the vehicle, the regulation discussed in section 3.4.9 would also apply to them.

Our analysis suggests that existing regulation would sufficiently cover the role of commercial operators in the in-service safety of automated vehicles.

Heavy Vehicle National Law

The Heavy Vehicle National Law is currently being reviewed by the National Transport Commission, in part to 'support the use of new technologies' (National Transport Commission, 2018b, p. 1).

The Heavy Vehicle National Law applies in all states and territories except Western Australia and the Northern Territory. It gives commercial operators using heavy vehicles duties relating to vehicle maintenance and safe operation.

The Heavy Vehicle National Law 'chain of responsibility' creates obligations on certain participants in the heavy vehicle industry, including 'operators',⁹¹ to manage safety risks within their control.⁹² The chain of responsibility creates a general duty on these parties to 'ensure, so far as is reasonably practicable, the safety of the transport activities relating to the vehicle'.⁹³

The Heavy Vehicle National Law also requires that a person 'must not use, or permit to be used, on a road a heavy vehicle that is unsafe'.⁹⁴ A heavy vehicle could be unsafe if any component makes the use of the vehicle unsafe.⁹⁵

For jurisdictions where the Heavy Vehicle National Law applies, it generally covers the role of the heavy vehicle industry in the in-service safety of automated vehicles.

Commercial passenger vehicle legislation

State and territory commercial passenger vehicle (or point-to-point) legislation can impose safety duties on taxi, private hire and rideshare services. The duties differ between states and territories, and each jurisdiction has its own regulator.

⁹¹ A person is an operator of a vehicle if the person is responsible for controlling or directing the use of the vehicle (see Heavy Vehicle National Law s 5).

⁹² The chain of responsibility parties are defined in the Heavy Vehicle National Law s 5 (definition of 'party in the chain of responsibility').

⁹³ Heavy Vehicle National Law s 26C.

⁹⁴ Ibid., s 89(1).

⁹⁵ Ibid., s 89(2).

Most, but not all, use a general safety duties approach. For example, New South Wales imposes safety duties on passenger and booking service providers such as taxi networks and rideshare platforms. It requires them to ensure the health and safety of drivers, passengers and others involved in providing or using their service.⁹⁶

If an automated driving system entity (ADSE) provides a fleet of automated vehicles for hire, they would probably be treated as a service provider under state and territory commercial passenger vehicle legislation. This would mean the ADSE would be subject to any general safety duties for the time it is providing the passenger service.

Work health and safety law

Commercial operators of automated vehicles will most likely be subject to general duties under WHS legislation as ‘persons conducting a business or undertaking’. It is likely that these duties would be owed to passengers or others outside the vehicle in certain situations.

WHS law in each jurisdiction creates a general duty similar to the one in the Heavy Vehicle National Law. It requires persons conducting a business or undertaking to manage safety risks related to the conduct of their business.

Informal NTC consultation suggests that the Northern Territory and Western Australia, where the Heavy Vehicle National Law does not apply, place greater reliance on duties under WHS law to manage certain risks for heavy vehicle safety.

Negligence

Commercial operators can be liable in negligence for risks within their control. This precise liability will depend on the business model and the degree of control a commercial operator has on the risk.

Potential liability in negligence law should incentivise commercial operators to take reasonable steps to ensure an automated vehicle that they make available for hire is safe and fit for purpose.

Human drivers, passengers and other road users

Human drivers, passengers and other road users are well-established parties, and the application of the law to these road users is relatively well understood. Our analysis suggests that existing regulation would generally cover the role these parties have in the in-service safety of automated vehicles. There may be some minor gaps relating to the interaction between automated vehicles and other road users. Greater regulation may be desirable to ensure these parties do not intentionally damage or interfere with the safe operation of an ADS.

Human driver licensing

To ensure vehicles are only driven by safe drivers, each Australian state and territory limits the right to drive on public roads to those who hold a driver’s licence.

⁹⁶ *Point to Point Transport (Taxis and Hire Vehicles) Act 2016* (NSW) s 12.

Driving without a licence is an offence.⁹⁷ While precise requirements vary across jurisdictions, obtaining and retaining a licence generally requires that individuals:

- complete supervised driving experience⁹⁸
- take written and practical tests to demonstrate their theoretical understanding of the road rules and ability to apply them in practice
- are of a specified minimum age and physical ability
- comply with drug, alcohol and fatigue requirements
- continue to comply with all road and traffic laws.

A driver can have their licence suspended or cancelled. This can happen if the driver fails to comply with their licence conditions, contravenes traffic laws such as driving while intoxicated, or accrues a certain number of demerit points⁹⁹ linked to offences such as speeding or failing to stop at a red light.

Road rules

The Australian Road Rules are model law maintained by the NTC¹⁰⁰ and contain rules for road users including motorists, motorcyclists, cyclists, pedestrians and passengers.

The Australian Road Rules form the basis of the road rules for each state and territory, but there are some jurisdictional differences. Despite these differences, the fundamental driving task obligations are substantially the same nationally. For example, in every state and territory, drivers are required to drive on the left side of the road, stop at stop signs and give way to the right at intersections.

In addition to drivers of motor vehicles, the Australian Road Rules provide a comprehensive framework for regulating passengers and other road users.

- Part 14 provides rules specifically for **pedestrians**, including the requirement that pedestrians obey pedestrian lights when crossing the road (ARR 232) and not cause a traffic hazard by moving into the path of a driver (ARR 236).
- Part 15 of the road rules provides for the regulation of **cyclists**, including that they ride with at least one hand on the handlebars (ARR 245) and wear bicycle helmets (ARR 256).
- Part 16 creates rules for vehicle **passengers**, including that they wear seatbelts (ARR 265), and not interfere with the driver's control of the vehicle (ARR 272).

Although the Australian Road Rules provide a comprehensive framework for regulating human drivers and other human road users, they were not developed with automated vehicles in mind. They may not sufficiently cover new undesirable behaviour for other road

⁹⁷ See, for example, *Road Safety Act 1986* (Vic) s 18.

⁹⁸ For example, in Victoria, a learner driver must complete 120 hours of supervised driving experience, including at least 20 hours of night-time driving before they are able to sit the test to drive unsupervised.

⁹⁹ State and territory driving laws provide a framework of demerit points that are linked to certain traffic offences. Once enough demerit points are accumulated (through multiple traffic infringements), the driver can lose their driving licence.

¹⁰⁰ The Australian Road Rules can be accessed at: <https://www.ntc.gov.au/roads/rules-compliance/the-australian-road-rules/>.

users such as pedestrians deliberately stepping out into the path of an automated vehicle because they rely on the ADS to come to a stop.

Negligence

It is well established that road users owe a duty to take reasonable care not to cause harm to other road users. This duty extends to vehicle passengers, drivers, pedestrians, the loved ones of those persons,¹⁰¹ good Samaritans who may seek to render assistance after a collision and thereby be exposed to the risk of injury,¹⁰² and to at least some bystanders who may sustain psychiatric injury as a result of witnessing a collision.¹⁰³

The duty is owed not only to road users who are careful and considerate but also to road users who disobey road rules and act erratically such as careless and drunk drivers.¹⁰⁴

Telecommunications service providers

Telecommunications service providers are a well-established party and there is extensive existing regulation that covers them. This regulation is likely to sufficiently cover the minor influence of telecommunications service providers on the in-service safety of automated vehicles.

Regulation of telecommunications

Telecommunications networks and providers are extensively regulated under Commonwealth legislation, including under the *Telecommunications Act 1997* (Cth), the *Telecommunications (Interception and Access) Act 1979* (Cth) and the *Telecommunications (Consumer Protection and Service Standards) Act 1999* (Cth).

The objects of the Telecommunications Act include promoting the long-term interests of end-users of telecommunications services, providing community safeguards in relation to telecommunications activities and adequately regulating the telecommunications industry.¹⁰⁵ For example, some participants (carriers) need a licence to 'operate facilities if they are used to supply telecommunications services to the public'.¹⁰⁶

If additional regulation is considered necessary to cover any new responsibilities, this would best be managed through amendments to existing telecommunications legislation, rather than new obligations in automated vehicle regulation.

Requirements on ADSEs under the agreed first supply approach

The 'minimal risk condition' safety criterion, which an ADSE must self-certify against at first supply, requires ADSEs to outline the steps they will take to bring the vehicle to a safe state if it cannot operate safely, reducing the risk of a crash.¹⁰⁷

¹⁰¹ *Jaensch v Coffey* (1984) 155 CLR 549; *Gifford v Strang Patrick Stevedoring Pty Ltd* (2003) 214 CLR 269.

¹⁰² *Chappel v Hart* (1998) 195 CLR 232.

¹⁰³ *FAI General Insurance Co Ltd v Lucre* (2000) 50 NSWLR 261.

¹⁰⁴ See *March v E & M H Stramare Pty Ltd* (1991) 171 CLR 506, 527 (McHugh J).

¹⁰⁵ *Telecommunications Act 1997* (Cth) s 3.

¹⁰⁶ *Ibid.*, ss 42-44.

¹⁰⁷ See Appendix B section B.1.6 for a full description of the 'minimal risk condition' criterion.

While not directly regulating telecommunications service providers, these requirements on ADSEs recognise the potential for telecommunications networks to fail in some cases and to provide additional safeguards if this occurs.

Vehicle inspectors

Vehicle inspectors are an existing party and are probably sufficiently covered under existing regulation. The role of vehicle inspectors ties in closely with roadworthiness and vehicle registration, which also differ between jurisdictions. There is extensive regulation covering vehicle inspectors, and inspectors have been regulated at state and territory level in the past. We consider that if further regulation is required for the inspection of automated vehicles, it would be best addressed through established state and territory legislation.

State and territory motor vehicle registration legislation allows the private sector to have a role in certifying a vehicle's roadworthiness.¹⁰⁸ This certification is required at certain points in a vehicle's life, which differ between jurisdictions. Some examples of when an inspection may be required include upon transfer of ownership, transfer of registration from one state to another, once a vehicle reaches a certain age, circumstances where a vehicle has been given a defect notice, and when registering a vehicle that has previously been written off.

Certain categories of vehicle may have further inspection requirements. For example, a personal vehicle may require a further inspection before it may be used as a rideshare vehicle. Heavy vehicles may have more regular inspection requirements than light vehicles.

When certifying a vehicle is safe for use, vehicle inspectors perform a regulatory function. There is currently extensive regulation of vehicle inspectors at the state and territory level, including:

- the ability for state and territory authorities to revoke a vehicle inspector's licence
- rules requiring an inspector's employer to exercise due diligence and to ensure the inspector complies with any conditions of their licence.¹⁰⁹

The regulation of vehicle inspectors varies between jurisdictions, allowing jurisdictional differences to be accommodated. For example, to prevent monopoly pricing in remote locations, the Northern Territory caps the amount inspectors can charge.¹¹⁰ This intervention is unlikely to be necessary in more competitive markets.

1. Dealers, second-hand dealers and distributors

Dealers, second-hand dealers and distributors are established and regulated parties. However, rather than specifically capturing safety, the existing regulation generally addresses the greater knowledge that these parties have than customers about the products they are supplying ('information asymmetries'). In chapter 4 we suggested that dealers, second-hand dealers and distributors have a minor influence on the in-service safety of automated vehicles. Existing regulation may be sufficient for these parties.

¹⁰⁸ The term used to describe these private sector parties varies between jurisdictions. For example:

- In the Northern Territory they are known as 'inspectors' appointed under the *Motor Vehicles Act 1949* (NT) s 7(2).
- In Victoria they are known as 'testers' under the *Road Safety (Vehicles) Regulations 2009* (Vic) pt 6.1.

¹⁰⁹ See, for example, *Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015* (Qld).

¹¹⁰ *Motor Vehicles (Fees and Charges) Regulations 2008* (NT) sch 1.

Consumer protection laws specific to dealers and second-hand dealers

Some states and territories separately regulate motor vehicle dealers. Regulation includes requirements to hold a motor dealer licence and rules against odometer tampering or making false representations about a vehicle. Second-hand dealers are also generally required to hold a licence to trade.¹¹¹

The main objective of this regulation is consumer protection. Requiring minimum standards, accountability and transparency for dealers could indirectly improve automated vehicle safety. However, this regulation is not targeted towards vehicle safety. The focus of the existing regulation is generally on ensuring consumers for these industries are better informed.¹¹²

Australian Consumer Law

Consumer guarantees

Consumers can claim a remedy from suppliers if the product does not meet any one or more of the consumer guarantees, such as that the product is fit for purpose. Because dealers and second-hand dealers supply vehicles and vehicle components to consumers, they would be a supplier under the Australian Consumer Law.

The Australian Consumer Law is concerned with consumer protection rather than safety more broadly.

Misleading and deceptive conduct

The Australian Consumer Law's prohibitions against misleading or deceptive conduct and making false or misleading representations in trade or commerce apply to dealers, second-hand dealers and distributors.¹¹³ These provisions should further incentivise these parties to ensure any representations they make about a vehicle, including its safety and capability, are truthful.

In chapter 4 we explained that the role of dealers and distributors in the in-service safety of automated vehicles generally involves providing information to individuals or companies, such as information about the ADS' capabilities. Therefore, provisions requiring that the information provided is not false or misleading appear to sufficiently cover the limited role of dealers and distributors in the in-service safety of automated vehicles.

Component (not ADS) manufacturers

Component manufacturers are existing parties. Our analysis suggests that they are sufficiently covered under existing regulation.

Component manufacturers are covered by similar regulation to ADS manufacturers, as both produce components that specifically relate to the operation of automated vehicles. Regulation covering ADS manufacturers is discussed in section 4.4.3. Component manufacturers:

- have a duty under negligence law to design their product in a way that minimises the risk of the product causing injury
- are likely to have a contractual relationship with the ADSE, which the ADSE could use to minimise its liability if any in-service safety issues arise because of the design

¹¹¹ See, for example, *Second-Hand Dealers and Pawnbrokers Act 2003* (Qld) pt 3.

¹¹² See, for example, *Motor Dealers and Repairers Act 2013* (NSW) s 3.

¹¹³ Australian Consumer Law ss 18, 29.

of a component (this would place strong incentives on component manufacturers to provide for the in-service safety of automated vehicles)

- are subject to consumer guarantee and safety defect provisions in the Australian Consumer Law.

Like telecommunications service providers, the ADSE can manage the risk where a component fails. ADSEs must self-certify at first supply how the automated vehicle will come to a safe state if it cannot operate safely.

Appendix E COAG principles on directors' liability provisions

Directors' liability provisions are provisions that impose personal criminal liability on directors or other corporate officers because of the corporation having committed a particular underlying offence.

The COAG *Principles on directors' liability provisions*, set out below, were adopted in December 2009, and should be read in conjunction with the supplementary guidelines approved by COAG in July 2012.

The COAG principles are as follows:

1. Where a corporation contravenes a statutory requirement, the corporation should be held liable in the first instance.
2. Directors should not be liable for corporate fault as a matter of course or by blanket imposition of liability across an entire Act.
3. A designated officer approach to liability is not suitable for general application.
4. The imposition of personal criminal liability on a director for the misconduct of a corporation should be confined to situations where:
 - a. there are compelling public policy reasons for doing so (for example, in terms of the potential for significant public harm that might be caused by the particular corporate offending);
 - b. liability of the corporation is not likely on its own to sufficiently promote compliance; and
 - c. it is reasonable in all the circumstances for the director to be liable having regard to factors including:
 - i. the obligation on the corporation, and in turn the director, is clear;
 - ii. the director has the capacity to influence the conduct of the corporation in relation to the offending; and
 - iii. there are steps that a reasonable director might take to ensure a corporation's compliance with the legislative obligation.
5. Where principle 4 is satisfied and directors' liability is appropriate, directors could be liable where they:
 - a. have encouraged or assisted in the commission of the offence; or
 - b. have been negligent or reckless in relation to the corporation's offending.
6. In addition, in some instances, it may be appropriate to put directors to proof that they have taken reasonable steps to prevent the corporation's offending if they are not to be personally liable.

Appendix F Additional issues raised by stakeholders

Issue	NTC's response
<p>Compliance and enforcement should be considered in detail in the development of future regulatory frameworks</p> <p>Raised by: DPTI SA, a government stakeholder and Queensland Government</p>	<p>As discussed in chapter 11, we agree that compliance and enforcement is an essential part of the regulatory framework for automated vehicles. Compliance and enforcement for automated vehicles will be considered in detail in the next stage of in-service safety work.</p>
<p>Consider further:</p> <ul style="list-style-type: none"> the broader impacts on the heavy vehicle industry and road freight task ongoing interaction with emergency services while the automated vehicle is in service. <p>Raised by: Queensland Government</p>	<p>The heavy vehicle industry has much to gain from a regulatory framework that enables the lawful use of automated vehicles. We don't consider the heavy vehicle industry would be disadvantaged by anything proposed in this RIS. As the automated vehicle national law is developed, close attention will be given to its interaction with other laws, including the Heavy Vehicle National Law, with a view to ensuring there is no duplication or unwarranted regulatory burden.</p> <p>A condition of gaining entry to the Australian market is that an ADSE show how their ADS will interact with enforcement and other emergency services. Any further in-service requirements concerning interaction with enforcement and emergency services (such as ensuring an ADS can respond to a direction to pull over) will be considered in subsequent work on compliance and enforcement and may differ depending on the legislative approach Australian governments choose.</p>
<p>Consideration should be given to the types of data collected by automated vehicles and whether the Privacy Principles adequately protect consumers.</p> <p>Raised by: Kate Hunt</p>	<p>The NTC considered the privacy implications of government access to cooperative intelligent transport systems (C-ITS) and automated vehicle data in 2018–19 and is further considering government access to vehicle-generated data this year.</p> <p>Private sector access to and use of data is a broader issue than automated vehicle regulation and is outside the NTC's mandate.</p> <p>Private sector access to data and implications for privacy are being considered by other government organisations, such as the Australian Competition and</p>

Issue	NTC's response
	Consumer Commission, which published the final report of its Digital Platforms Inquiry in August 2019, and the Commonwealth Government's announced review of the Privacy Act.
<p>Australia should factor ethical considerations into law and policy-making frameworks for automated vehicles.</p> <p>Raised by: Kate Hunt</p>	<p>We looked at the issue of ethics for automated vehicles as part of our earlier work on safety assurance and concluded that concerns regarding safety dilemmas with ethical implications are already largely captured by the first safety criteria that an ADSE must self-certify against when supplying its ADS to the Australian market. We continue to monitor international regulatory developments in this area.</p>
<p>A vehicle's certification may only be valid for several years in order to protect the supplier against changed traffic conditions and traffic regulations. If patches are not available, it is possible the vehicle model will be unroadworthy.</p> <p>Raised by: Graeme Pattison</p>	<p>ADSE obligations concerning in-service software updates will be considered in detail in subsequent work on in-service modifications, discussed in more detail in chapter 11.</p>
<p>Currently drivers of level 1 and level 2 vehicles defeat interlocks that are designed to ensure drivers keep their hands on the steering wheel by placing an orange in the spokes of the steering wheel or taping a partially filled bottle of water to the steering wheel. Videos describing these techniques can be readily found on social media. Is minimising this bad behaviour the responsibility of the ADSE or the regulator?</p> <p>Raised by: Australian Motorcycle Council</p>	<p>An ADSE general safety duty would oblige ADSEs to take reasonable steps to identify and prevent foreseeable misuse such as tampering by third parties; however, the particular issues of modifications or defeat devices will be considered in detail in the next stage of work.</p>
<p>There should be as a minimum both practical and theoretical training to ensure the operator of a level 4 vehicle can operate the vehicle safely.</p>	<p>Noting there may be some changes to the road rules that affect users of automated vehicles (such as the fallback-ready user of a level 3 vehicle), the NTC is not proposing further licensing requirements for users of level 4 vehicles at this stage.</p>

Issue	NTC's response
<p>Raised by: ConnectEast</p>	<p>If new licensing requirements become necessary, the need would be identified through the Austroads Registration and Licensing Task Force.</p> <p>This task force has members from each state and territory driver licensing authority as well as the Department of Infrastructure, Transport, Cities and Regional Development. It is established to consider Australia's licensing approach with a view to developing national policies, harmonising driver licensing and ensuring transfer of licences across jurisdictional borders.</p>
<p>If the communications are in the form of V2X/V2I some components of the network may need to link to the ODD Traffic Control Room for road alerts/warning. Does the ODD have any restraints regarding EMC [electromagnetic compatibility] compliances other than normal ACMA [Australian Communications and Media Authority] compliance?</p> <p>Raised by: ConnectEast</p>	<p>The ODD generally concerns the environmental conditions in which the ADS can be safely used, not components of the vehicle itself. The limitations of the vehicle's components will inevitably determine the vehicle's limitations, including their ODD.</p> <p>The ACMA regulates EMC standards, including for vehicles. Given the role of that agency, it is not envisioned at this stage that the automated vehicle national law will regulate EMC compliance.</p>
<p>As much as possible, current recovery mechanisms should be relied on and gradually changed as experience warrants. Current recovery mechanisms give policy holders a clear pathway to compensation from an insurer for loss suffered from a negligent party.</p> <p>Raised by: ICA</p>	<p>In considering the statutory general safety duty, it was logical to assess the merits of allowing private enforcement of the duty through a cause of action; however, other areas of civil liability are generally outside the NTC's mandate.</p> <p>Policy development for liability in negligence is the responsibility of state and territory justice agencies, potentially with the Council of Attorneys-General.</p>
<p>The NTC must consider harmonising motor accident insurance schemes and road rules.</p> <p>Raised by: IAG</p>	<p>Policy development for law concerning motor accident insurance is generally the responsibility of treasuries and intergovernmental forums such as the Board of Treasurers and the Council on Federal Financial Relations.</p> <p>The NTC continues to work with states and territories to harmonise the road rules through developing and maintaining the Model Australian Road Rules.</p>

Appendix G Illustrative general safety duty

This appendix provides, for illustrative purposes only, a draft general safety duty for ADSEs and a related duty of due diligence for ADSE executive officers.

General duties for the safe operation of automated vehicles

1. Duties not transferable

A duty cannot be transferred to another person.

2. Person may have more than one duty

A person can have more than one duty by virtue of being in more than one class of duty holder.

3. Management of risks

A duty imposed on a person to ensure safe operation of automated vehicles requires the person:

- (i) to eliminate risks to safety so far as is reasonably practicable
- (ii) if it is not reasonably practicable to eliminate risks to safety, to minimise those risks as far as is reasonably practicable.

4. What is reasonably practicable

Reasonably practicable means that which is, or was at a particular time, reasonably able to be done in relation to ensuring safety, taking into account and weighing up all relevant matters including:

- the likelihood of the hazard or risk occurring
- the degree of harm that might result from the hazard or the risk
- what the person concerned knows, or ought reasonably to know, about:
 - the hazard or the risk
 - ways of eliminating or minimising the risk
- the availability and suitability of ways to eliminate or minimise the risk
- after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

5. Duties of automated driving system entities

Note: An ADSE is the type approval holder for the ADS under the Road Vehicle Standards Act 2018 (Cth)

An ADSE must ensure so far as is reasonably practicable that its ADS is safe when used for a purpose for which it was designed, manufactured, supplied or installed.

Without limiting the above, an ADSE must take reasonable steps to:

- remedy any safety defects in the operation of its ADS such as through software updates
- adapt its ADS to changes in regulation over time
- ensure it has appropriate resources and processes to eliminate or minimise incidents and risks from the operation of its ADS
- ensure compliance with all relevant regulatory requirements, including those required under the *Road Vehicle Standards Act 2018* (Cth).

6. Duties of ADSE executive officers to exercise due diligence

Note: An ADSE executive officer has the same meaning as officer has in relation to a corporation under s 9 of the Corporations Act 2001 (Cth).

An ADSE executive officer must exercise due diligence to ensure the ADSE complies with its general safety duty in (5).

Due diligence includes taking reasonable steps to:

- acquire, and keep up to date, knowledge about the safe performance of the ADS
- to gain an understanding of the hazards and risks, including the public risk, associated with the ADS's operation
- ensure the ADSE has appropriate processes for receiving and considering information regarding incidents and risks and responding in a timely way to that information.

Appendix H Legislative and policy developments in other countries

European Union

Policy developments

In April 2016 European Union (EU) Member States signed the *Declaration of Amsterdam – Cooperation in the field of connected and automated driving* (European Commission, 2016). The declaration provided actions for Member States, the European Commission and industry to support connected and automated driving, including:

- Member States identifying and removing legal barriers to the testing and deployment of connected and automated vehicles
- the European Commission developing a shared European strategy on connected and automated driving
- industry identifying areas where regulation could reduce barriers to the development and take-up of new technologies.

In a communication to the European Parliament in May 2018, the European Commission proposed an approach to ‘ensure that EU legal and policy frameworks are ready to support the deployment of safe connected and automated mobility’ (European Commission, 2018, p. 2). In the communication, the European Commission stated that it would (among other matters):

- work on guidelines to ensure a consistent approach across the EU on approving (granting exemptions) for technologies not covered by EU rules
- start work on a new vehicle safety certification approach for automated vehicles
- ‘intensify coordination with Member States on traffic rules (for example, the Geneva and Vienna Conventions) so that they can be adapted to automated mobility in a harmonised way’ (European Commission, 2018, p. 10).

As part of the May 2018 communication, the European Commission also proposed revisions to the General Safety Regulation to incorporate new safety features for automated vehicles and regulate data recorders for automated vehicles. Subject to formal approval by the European Parliament, from 2022 vehicle safety features – such as driver distraction warning, advanced emergency braking and data recorder in case of an accident – will become mandatory (European Commission, 2019).

On 15 January 2019 the European Parliament adopted a resolution on autonomous driving in European transport (European Parliament, 2019). The resolution notes the significant benefits of autonomous vehicles for society but recognises that they will present new risks and calls on action in the following areas:

- road safety
- liability
- data processing, data access and cybersecurity
- ethics
- standardisation and cross-border interoperability
- regulation to cover all transport modes (Van Den Hende & Maly, 2019).

Legislative developments

On 13 March 2019 the European Commission adopted the delegated regulation for the deployment of cooperative intelligent transport systems (C-ITS). It establishes specifications necessary to ensure compatibility and interoperability and determines how vehicle–vehicle, vehicle–infrastructure and infrastructure–infrastructure communication is to be conducted by means of C-ITS stations. The harmonised approach will ensure there is compatibility between infrastructure and vehicles across the EU and will help deploy new safety technologies including for automated vehicles.

United Kingdom

Policy developments

The Law Commission of England and Wales and the Scottish Law Commission (the Law Commissions) are reviewing the legal framework for the safe deployment of automated vehicles in the United Kingdom (UK). They will deliver final recommendations by March 2021.

In November 2018 the Law Commissions published a preliminary discussion paper that considered safety assurance at first supply and in service, criminal and civil liability and adapting the road rules for automated vehicles. The paper proposed (among other matters):

- A new safety assurance scheme to authorise ADSs at first supply should be set up. The paper queried whether the agency responsible for first supply authorisations should also have responsibilities while automated vehicles are in service.
- Each ADS should be backed by an ADSE that takes responsibility for the safety of the ADS and would be subject to sanctions and penalties in the event of failures or infringements. The paper noted that this proposal was based on the NTC's recommendations (which were agreed by Australia's transport ministers).
- A 'user-in-charge' for SAE level 4 automated vehicles should be introduced (Law Commission of England and Wales and Scottish Law Commission, 2018, p. 36–47). Their main role would be to take over driving in planned circumstances or after the vehicle has achieved a minimal risk condition and has come to a stop (Law Commission of England and Wales and Scottish Law Commission, 2018, p. 36). They would also have criminal liability for offences that do not arise from the dynamic driving task, such as reporting accidents and ensuring children wear seatbelts. The user-in-charge would need to be qualified and fit to drive but is not a driver when the ADS is engaged. During this time the user could undertake other activities. Initially, at least, the user-in-charge would be the person in the driving seat (although this might change as a wider variety of controls are developed). This concept would only apply to SAE level 4 vehicles if they have manual controls. People travelling in SAE level 4 vehicles with no manual controls would not be able to comply with user-in-charge obligations for SAE level 4 vehicles.

Australian transport ministers have made a decision to impose some obligations on users of automated vehicles with manual controls similar to those proposed in the user-in-charge concept. In May 2018 transport ministers decided that state and territory legislation should clarify if necessary that all drink- and drug-driving offences, including those concerning starting or being in charge of a vehicle, apply to a person who starts or turns off an automated vehicle with manual controls. This position could be considered further as technology develops and international approaches are refined. Transport ministers also decided that state and territory legislation should clarify that a person who starts, or is a passenger in, an automated vehicle without manual controls is not subject to drink- and drug-driving offences concerning starting a vehicle or being in charge of a vehicle.

The Law Commissions published their second consultation in October 2019, which focused on in-service safety. It introduced the idea of Highly Automated Road Passenger Services (HARPS) – services that use highly automated vehicles to supply road journeys to passengers in highly automated vehicles without a human driver or user-in-charge (level 4b and 5). The Law Commissions split HARPS from privately-owned passenger-only vehicles. Its provisional proposals included:

- A licensing scheme for HARPS operators (business that carry passengers for hire or reward in automated vehicles within a human operator).
- HARPS operators should be legally responsible for ensuring roadworthiness.
- Owners of privately-owned automated vehicles without a human operator should be legally responsible for ensuring roadworthiness, insurance, reporting accidents, installing safety-critical updates, removing the vehicle if it causes an obstruction or is left in a prohibited place. The paper asks who should hold responsibility for these matters in a leasing arrangement – the leasing company or the lessee.
- A duty on HARPS operators to collect data that can help assess passenger experiences for accessibility purposes.
- Regulatory tools to control congestion and cruising – for example, a HARPS-only road pricing scheme, phased deployment (the agency charged with licensing operators should have flexible powers to limit the number of vehicles any given operator can use within a given area for the first few years) and quantity restrictions.
- To encourage multi-modal trips, mobility should be encouraged as a service by promoting collaboration between local authorities and operators of smaller HARPS vehicles.
- The paper also sought views on whether HARPS operators should be under a legal duty to ensure vehicles are adequately supervised.

Legislative developments

The UK Parliament passed the Automated and Electric Vehicles Act in 2018. The Act makes the insurer under the compulsory motor vehicle insurance scheme liable for damages from an accident caused by an automated vehicle driving itself. Some exclusions or limitations on the insurer's no-fault liability include contributory negligence by the injured party¹¹⁴ and whether the accident results from unauthorised software alterations or a failure to install safety-critical software by the insured party.¹¹⁵

Germany

Policy developments

In June 2017 the Federal Ministry of Transport and Digital Infrastructure's Ethics Commission for Automated Driving released the *Automated and connected driving* report (Federal Ministry of Transport and Digital Infrastructure, 2017).

The report outlines 20 ethical rules on using automated and connected vehicles on public roads. Some of these rules provide:

- The guiding principle is to avoid accidents. Automated vehicles must be designed in such a way that critical situations do not arise in the first place.

¹¹⁴ *Automated and Electric Vehicles Act 2018* (UK), s 3(1).

¹¹⁵ *Ibid.*, s 4.

- The protection of individuals takes precedence over other considerations. If hazardous situations are unavoidable, protecting human life is the top priority.
- Automated technology must be designed to ensure efficient and reliable human–machine communication. In particular, the need for immediate handover of control from the ADS to the human driver should be avoided.
- In emergencies, the vehicle must enter into a ‘safe condition’ without human assistance.
- Decisions in situations where a choice must be made between one human life and another cannot be programmed. However, general programming to reduce the number of personal injuries may be justifiable. Decisions based on attributes such as age and gender are prohibited.
- Accountability that was previously only placed on individuals shifts to other parties such as manufacturers and operators of automated driving systems.

Legislative developments

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 ADSE) 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).

In addition, ‘[a]utomated vehicles must be equipped with a black box to identify whether the driver or the system had control at the time of an accident’ (Burianski & Theissen, 2017).

The automated driving provisions will be reviewed at the end of 2019 (Bird & Bird, 2019).

Canada

Policy developments

In January 2019 the Policy and Planning Support Committee Working Group on Automated and Connected Vehicles published the *Policy framework to guide the development of automated vehicle laws* (Policy and Planning Support Committee Working Group on Automated and Connected Vehicles, 2019).

The report outlines six foundational principles for governments, industry and academia to consider in preparing for the deployment of connected and automated vehicles. These principles provide as follows:

1. Safety is the number one priority.
2. Information sharing with government and law enforcement while protecting privacy is needed to ensure automated vehicles are safe and secure.
3. Policy and regulatory alignment – domestically and internationally – is vital.

4. Government and industry need to raise public awareness of the capabilities and limitations of automated vehicles.
5. Proactive preparation for the introduction of automated vehicles on public roads is needed.
6. Continuous collaboration among participants in the sector is essential.

The report also delineated the roles and responsibilities that each jurisdiction should take in governing automated vehicles. It proposed that the federal government should lead the harmonisation of regulation across the country and hold vehicle manufacturers accountable to safety standards, while the provincial governments should implement the federal vehicle safety requirements and manage vehicle registration, insurance, rules of the road and changes to highway infrastructure.

Legislative developments

From 1 January 2019 the Pilot Project – Automated Vehicles (Ontario Regulation 306/15) allows level 3 automated vehicles available for public purchase in Canada to operate on Ontario's roads (Ontario Ministry of Transport, 2019). This effectively allows for public registration and use of level 3 automated vehicles in Ontario (Love, et al., 2019).

A human driver must always be ready to take back control of the vehicle. Further, drivers are responsible for the safe operation of the vehicle and must continue to obey all existing road laws (such as those relating to distracted and impaired driving).

United States

Like Australia, the United States is a federation where much of the legislative authority for vehicles in service occurs at the state level. Despite efforts, the US has experienced difficulties in achieving national consistency in the policy development for automated vehicles.

Federal policy developments

In September 2017 the House of Representatives passed the Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution (SELF DRIVE) bill. The purpose of the bill was to define 'the Federal role in ensuring the safety of highly automated vehicles as it relates to design, construction, and performance, by encouraging the testing and deployment of such vehicles'.¹¹⁶ The SELF DRIVE bill did not, however, successfully pass the Senate. On 13 March 2019, following the bill's failure to pass the Senate, three Republican Leaders wrote to the Committee on Energy and Commerce outlining the benefits of automated vehicles and the proposed SELF DRIVE Act, and urging the Committee 'to continue its bipartisan work on self-driving vehicle legislation' (Walden, et al., 2019).

In January 2020 the United States Department of Transportation (US DoT) released *Ensuring American leadership in automated vehicle technologies: automated vehicles 4.0*. The document outlines 10 US Government principles in the three core interests of protecting users and communities, promoting efficient markets and facilitating coordinated efforts (US Department of Transportation, 2020).

In October 2018 the US DoT released *Automated vehicles 3.0: Preparing for the future of transportation*. The document 'outlines how automation will be safely integrated across passenger vehicles, commercial vehicles, on-road transit, and the roadways on which they

¹¹⁶ SELF DRIVE Bill s 2.

operate' (US Department of Transportation, 2018, p. viii). Among other matters, the document:

- supports development of voluntary technical standards
- provides state and local governments with considerations to support safe operation of automated vehicles
- focuses states on removing barriers to automated vehicle technologies.

The US DoT states it will modernise or eliminate regulations that could hinder automated vehicle development. The US DoT supports approaches that are flexible and adaptable over time, including focusing on performance-based rather than prescriptive rules.

The US DoT also notes that the approach outlined in *Automated driving systems 2.0: A vision for safety* (AV 2.0) continues to apply, and that the current document builds on this approach. AV 2.0 provides a set of 12 safety elements as guidance for ADSEs when developing ADSs. These include operational design domain, minimal risk condition, cybersecurity and data recording. While ADSEs are encouraged to demonstrate how they have addressed the safety elements by publishing a safety self-assessment, the guidance is voluntary and is not backed by compliance and enforcement mechanisms (NHTSA and US Department of Transportation, 2017).

State policy and legislative developments

Some automated vehicle policy and legislative developments in the US states are outlined below.

Alabama

A bill currently before the Alabama Legislature relates to the authorisation of autonomous vehicles operated by an automated driving system.¹¹⁷

The bill provides for an autonomous vehicle to operate without a conventional human driver if it is equipped with a teleoperation system and meets several criteria. A teleoperation system is hardware and software that allows a remote human operator to supervise or perform the dynamic driving task.

The criteria the autonomous vehicle must meet include that it is:

- capable of operating in compliance with road and traffic laws
- capable of achieving a minimal risk condition
- equipped with a recording device.

Arizona

State of Arizona Executive Order 2018-04 provides that vehicles can only be operated on public roads without a person present if they are fully autonomous. The person wanting to operate a fully autonomous vehicle must submit a written statement to the Arizona Department of Transportation acknowledging that:

- the ADS complies with federal motor vehicle safety standards
- the fully autonomous vehicle can achieve a minimal risk condition and comply with all applicable traffic and vehicle safety laws.
-

¹¹⁷ Alabama Senate Bill 47 (2019).

California

In April 2018 the California Department of Motor Vehicles adopted regulations relating to the deployment of autonomous vehicles for public operation.¹¹⁸

For autonomous vehicles to be deployed on public roads, manufacturers are required (among other matters) to:

- conduct testing and validation, and be satisfied that the vehicles are safe for deployment on public roads in California
- certify that the technology is designed to detect and respond to roadway situations in compliance with relevant laws (including changes to those laws)
- notify the registered owner that updates are available and explain how to access the updates
- certify that autonomous vehicles meet current industry standards to help defend against, detect and respond to cyber attacks.

Florida

In June 2019 Florida's legislature passed House Bill 311, which among other things: authorised automated vehicles to operate on public roads regardless of whether a human operator is present in the vehicle; deemed an ADS the driver of a vehicle when it is engaged; and allowed teleoperation by remote drivers within the US.

Nevada

In June 2017 the Nevada Legislature passed Assembly Bill 69, which allows manufacturers and developers to register their autonomous vehicles for operations (public use) by self-certifying that it meets the requirements in Nevada Revised Statutes Chapter 482A – Autonomous Vehicles (State of Nevada Department of Motor Vehicles, 2019).

Some of the requirements in Chapter 428A include:¹¹⁹

- The autonomous vehicle must be capable of operating in compliance with applicable vehicle and traffic laws.
- If the vehicle is not fully autonomous, it must be equipped with: means for a human operator to engage and disengage the ADS; an indicator to indicate when the ADS is operating; and means to alert the human operator to take back control of the vehicle. The human operator must be seated in a position that allows them to immediately take back control and must be capable of immediately taking over.
- If the vehicle is fully autonomous, it must be capable of achieving a minimal risk condition. A human operator does not need to be present.

Utah

In March 2019 Utah's Legislature passed House Bill 101. The bill has now been signed into law and allows autonomous vehicles to operate on public roads in Utah (Ropek, 2019).

The bill amends the state's driving and road rules to allow automated vehicles equipped with an ADS to operate within the state under certain conditions (State of Utah, 2019). These conditions include that a minimal risk condition can be achieved in the case of a system failure rendering a level 5 ADS unable to perform the entire dynamic driving task relevant to the operational design domain of the ADS (State of Utah, 2019).

¹¹⁸ Modified Express Terms, Article 3.8 – Deployment of Autonomous Vehicles.

¹¹⁹ Nevada Revised Statutes 482A.070 and 482A.080.

Further, the amendments allow a vehicle to operate without a driver (including a remote driver) and provide that when an ADS is in operation, the ADS is responsible for the compliant operation of the vehicle (State of Utah, 2019).

Under the amendments, the 'registration and privilege' of a vehicle equipped with an ADS to operate on a highway of the state can be revoked if (State of Utah, 2019):

- a) the ADS is operating in an unsafe manner, or
- b) the vehicle's ADS is being engaged in an unsafe manner.

Singapore

Policy developments

In February 2017 the Second Minister for Transport (Ng Chee Mengh) stated that Singapore plans to adopt a 'light-touch' regulatory stance that caters to various innovations in the land transport sector while continuing to ensure the safety of the public (Mengh, 2017).

In January 2019 Singapore released guidelines for deploying autonomous vehicles covering vehicle behaviour, safety, cybersecurity and data formats (TR 68). The purpose of TR 68 is to 'promote the safe deployment of fully autonomous vehicles in Singapore' (Land Transport Authority, 2019).

Legislative developments

In February 2017 the Singapore Government passed amendments to the Road Traffic Act (RTA) to accommodate automated vehicles. The law empowers the Minister for Transport to make rules concerning the use of automated vehicles.¹²⁰

The Road Traffic (Autonomous Motor Vehicles) Rules 2017, which are made under the RTA, provide a mechanism for a person to apply to use an autonomous motor vehicle on a public road, outside of a trial. The application to use an autonomous vehicle on public roads must outline:¹²¹

- (i) how any autonomous motor vehicle is intended to be used;*
- (ii) the type or types of autonomous motor vehicles to be used and details concerning the autonomous system to be employed in each vehicle;*
- (iii) if an autonomous motor vehicle is to be modified, the nature of the modifications; and*
- (iv) any supporting documents concerning any autonomous motor vehicle to be used and the autonomous system to be employed, stating that the vehicle and autonomous system are safe for use in the intended manner.*

If authorisation is granted to use an autonomous motor vehicle on a road,¹²² conditions can be imposed.¹²³ Such conditions may include limiting the geographical area in which the autonomous vehicle may be used, prohibiting it from carrying passengers, and requiring a qualified driver to monitor and take over operation of the vehicle if necessary.¹²⁴

¹²⁰ Road Traffic Act (Singapore), s 6C.

¹²¹ Road Traffic (Autonomous Motor Vehicles) Rules 2017 (Singapore), r 6.

¹²² Ibid., r 7.

¹²³ Ibid., r 9(1).

¹²⁴ Ibid., r 9(2).

The rules also impose duties on certain persons around autonomous vehicle maintenance, data collection, record keeping, vehicle testing and notification of incidents.¹²⁵

Japan

Policy developments

In December 2018 Japan's National Police Agency released a draft bill to allow level 3 automated vehicles to operate on public roads. The Japanese Government sought public comment on the bill and will submit it to its national parliament in 2020 (The Japan Times, 2018).

The bill proposes to amend Japan's Road Traffic Act to recognise an 'autonomous driving device' and provides that the autonomous driving device would be the driver when it is performing the driving task (Allsop & Baldwin, 2019).

Provided they can take back control of the vehicle, the draft bill allows drivers of level 3 vehicles to watch TV or talk on their mobile phones when the automated driving system is engaged. Initially, 'the government may only allow the use of level 3 self-driving technology during highway traffic jams' (The Japan Times, 2018). The bill also requires level 3 vehicles to be fitted with a data recorder and for drivers 'to save and store all driving data captured by the recorder' (Allsop & Baldwin, 2019).

In December 2019 the Ministry of Land, Infrastructure, Transport and Tourism began public consultation on a safety standard for automated vehicles. It requires driver monitoring, warning systems for handover to human drivers, the ability to achieve minimal risk conditions, things an 'operating status recording device' must record, the amount of time that recordings should be kept, and an external display that denotes a vehicle as automated. These requirements do not prescribe the technology to be used.

¹²⁵ Ibid., pt 3.

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National Transport Commission
Level 3/600 Bourke Street
Melbourne VIC 3000
Ph: (03) 9236 5000
Email: enquiries@ntc.gov.au
www.ntc.gov.au

