

# Review of 'Guidelines for trials of automated vehicles in Australia'

November 2020







# Report outline

Title	Review of 'Guidelines for trials of automated vehicles in Australia': policy paper
Type of report	Policy paper
Purpose	For approval by the Infrastructure and Transport Council, November 2020
Abstract	This paper sets out recommendations arising from a review of the 'Guidelines for trials of automated vehicles' and the resulting updates to the guidelines. It explains the amendments made to the guidelines based on stakeholder feedback and sets out considerations for government to further improve information about the trial application process, share learnings and prepare for more complex trials and commercial deployment.
Attribution	This work should be attributed as follows, Source: National Transport Commission 2020, <i>Review of 'Guidelines for trials of automated</i> <i>vehicles in Australia: policy paper</i> , NTC, Melbourne. If you have adapted, modified or transformed this work in any way,
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# Foreword

This policy paper sets out the findings and recommendations arising from a review of the *Guidelines for trials of automated vehicles in Australia.* 

Since the guidelines were first released in May 2017, 32 automated vehicle trials have taken place in Australia and trials have been run in every state and territory. We consulted with industry and government about how effective the guidelines have been in ensuring nationally consistent conditions for automated vehicle trials in Australia, and sought broader views on required changes.

We heard that, overall, the trial guidelines were working well but there were opportunities to update the guidelines to better assist industry and government. The review of the guidelines also provided lessons for government decision making about future trials and planning for automated vehicle deployment.

We have updated the guidelines so they can continue to support trials of different automated vehicle technologies and applications as they emerge. These guidelines provide a performance-based framework that supports innovation and gives certainty to governments and industry alike.

Thank you to the organisations and individuals who contributed to this policy process. We encourage government, industry, academia and the wider community to continue to work with us on our automated vehicle regulatory reforms as we develop our regulatory framework to ensure Australians can gain the full benefits of this technology.

Marcus Burke Executive Leader Future Technologies

**Dr Gillian Miles** Chief Executive Officer and Commissioner

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The National Transport Commission (NTC) and Austroads' *Guidelines for trials of automated vehicles in Australia* were released in May 2017 to support nationally consistent conditions for automated vehicle trials in Australia. They provide a level of safety assurance while being a flexible tool for organisations seeking to trial emerging technology. The guidelines are intended to:

- provide certainty and clarity to industry regarding expectations when trialling automated vehicles in Australia
- help agencies manage trials in their own jurisdictions as well as across state borders
- establish minimum standards of safety
- help assure the public that roads are being used safely
- help raise awareness and acceptance of automated vehicles in the community.

Infrastructure and transport ministers directed that the guidelines be reviewed every two years. This review of the guidelines is the first to take place since they were published.

This paper sets out the findings and recommendations arising out of the review.

# Context

The objectives of the review of the guidelines were to identify:

- whether the guidelines have assisted governments and trialling organisations
- challenges faced by governments and trialling organisations using the guidelines or in applying for, approving, operating and evaluating trials
- additional requirements governments have placed on trialling organisations
- whether the guidelines should be updated to ensure a nationally consistent and safe approach to automated vehicle trials in Australia.

# Consultation

In May 2020, we released a discussion paper seeking stakeholder views on proposed changes to the guidelines. Consultation covered the following topics:

- content and level of detail in the current guidelines
- application of the guidelines
- administrative processes and harmonisation
- other automated vehicle trial issues outside the scope of the guidelines.

Feedback from stakeholders identified updates to the guidelines that will benefit both trialling organisations and road transport agencies, in particular further detail about safety, traffic management and data and information requirements and further alignment with future safety requirements for commercial deployment. We have updated the guidelines with these changes.

Stakeholders suggested greater standardisation of approval and assessment processes and making relevant information more accessible. This would improve the efficiency of administrative processes at the point of application and smooth the way for larger or cross-border trials. Industry and government stakeholders supported standardised evaluations of trials and the sharing of learnings about trials between jurisdictions. The benefits of shared learnings identified by stakeholders included improving safety, processes and identifying priority areas for future trials.

We have recommended that Australian governments undertake further work to achieve clearer communications about the trials framework and closer collaboration between state and territory governments on more advanced trials and sharing learnings.

# Changes to the guidelines

Based on our analysis and stakeholder feedback, we have made the following changes to the guidelines:

- **Trials that do not require a permit or an exemption:** Clarify that the guidelines are intended to facilitate trialling of a range of technologies in a range of operating domains (including off road and road-related areas). Trialling organisations are still encouraged to follow the guidelines where they do not require an exemption or permit (due to the technology being trialled or the operating domain within which the trial is undertaken).
- Compliance with Australian laws: Note that there are other relevant Australian laws that trialling organisations must comply with, including passenger transport laws, disability standards and work, health and safety laws.
- Management of trials:
  - **Purpose of the trial:** Trialling organisations must provide the purpose of the trial and the outcomes sought from the trial.
  - **Trial location:** The proposed trial location can be described as specific roads, routes or regions and/or the vehicle's operational design domain.
  - **Traffic management plan:** 'Speed environment' will be added to the list of matters relating to the traffic environment that require consideration.
  - **Engagement with public and other stakeholders:** Clarification that key stakeholders include law enforcement agencies.
  - Accessibility: Trialling agencies must set out how they intend to manage specific safety and accessibility concerns, and interactions with road users or passengers with disabilities. Trialling agencies may need to demonstrate compliance with applicable disability and accessibility legislation if they are providing passenger services.
- Insurance
  - **Appropriate insurance:** Trialling organisations should consult with the relevant road transport agency about insurance in the first instance.
- Safety management plans:
  - Safety culture: Safety management plans will need to demonstrate that the trialling organisation has a safety culture that will enable it to manage emerging risks during the trial.

- Security of the automated system: Trialling organisations may need to consider how to minimise cybersecurity threats, vulnerabilities and the consequences of intrusions and breaches during the trial.
- Risks to occupants: Trialling organisations conducting trials of passenger services, or trials with a human driver or operator present in the trial vehicle, will need to demonstrate that risks to all occupants' safety have been considered and addressed.
- Other road users: A trialling organisation will need to demonstrate that it has identified the risks posed by the behaviour of other road users and has adopted risk mitigation strategies to manage those risks to the extent possible.
- Interaction with enforcement and emergency services: The applicant must demonstrate how it will ensure safe interaction with emergency services (including but not limited to police, fire and ambulance services) when the automated driving system is engaged. This includes interactions on-road and at the roadside.
- Appropriate transition processes: Clarify that practical processes for transitioning should include ensuring a human driver or operator is ready and has sufficient time to take control of the driving task when requested.
- Operation within the operational design domain: The trialling organisation must describe how the automated driving system will be:
  - able to operate safely within its defined operational design domain
  - incapable of operating in areas outside of its defined operational design domain
  - able to transition to a minimal risk condition when outside of its defined operational design domain.
- Human driver inattention: Trialling organisations will need to specify how they will mitigate, monitor and address human driver, operator or remote operator inattention.
- Pre-trial testing: Clarify that approving agencies may at their discretion accept the results of appropriate testing conducted in other jurisdictions.
- Fitness for duty: Clarify that remote operators are included within this requirement.
- Data and information:
  - Data recording and sharing capability: Data will need to be retained by the trialling organisation to the extent necessary to provide it to relevant parties (the length of time data is retained may depend on the purposes the information could be used for – for example, law enforcement and insurance).
  - Provision of data/information for other incidents: Clarify that 'other incidents' includes when a human takes back emergency control of the vehicle, or the vehicle deactivates where there is not a human driver, that did not result in any injury or death (for example, using the emergency stop function to avoid a collision).
  - End-of-trial report: Provide examples of the type of information that may be included in an end-of-trial report – for example, what worked well in the trial, challenges faced during the trial and what was learned from the trial. Clarify that the outcomes of the trials should be considered in the context of the trial's original purpose.
  - Data recording and sharing capability: The trialling organisation must outline the data that will be recorded by the automated vehicle and how it will provide the data to relevant parties.

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- Implementation:
  - Passenger trials: Passenger vehicles may need to comply with relevant state and territory passenger transport legislation, Commonwealth legislation setting out the disability standards for accessible public transport and any other applicable legislative requirements.

### **Further recommendations**

Based on the feedback we received from submissions and what we heard from stakeholders, we also put forward the following recommendations, which were agreed by the Infrastructure and Transport Council in November 2020:

- The NTC will lead further work, in conjunction with the Commonwealth Government, state and territory governments and Austroads, to:
  - facilitate sharing of best practice tools to improve trial application processes and safety learnings
  - consolidate information for industry about applying for automated vehicle trials in Australia
  - consider arrangements for approving applications for trials across borders
  - develop a standardised government evaluation framework for trials, with the NTC to report back to the Infrastructure and Transport Council by November 2021.
- The NTC, in conjunction with the Commonwealth Government, state and territory governments and Austroads, will develop a scope and the costs of reviewing Australia's overall readiness for the commercial deployment of automated vehicles, with a focus on trials, regulation, infrastructure and public attitudes, reporting to the Infrastructure and Transport Council by May 2021.

### Next steps

Ministers have agreed to the recommendations above. The NTC will work in conjunction with the Commonwealth, state and territory governments and Austroads to give effect to the decision by ministers.

The guidelines will next be reviewed in two years.

#### Key points

- This policy paper sets out the findings and recommendations of a review of the Guidelines for trials of automated vehicles in Australia.
- We reviewed the guidelines to ensure they continue to encourage a nationally consistent and safe approach to automated vehicle trials.
- We undertook public consultation to inform this policy paper and to identify updates to the guidelines.

### 1.1 **Project objectives**

The *Guidelines for trials of automated vehicles in Australia* were released in May 2017 to promote nationally consistent conditions for automated vehicle trials in Australia. The guidelines set out the criteria for automated vehicle trials relating to trial management, safety, insurance, data and information. They aim to assure safety while providing sufficient flexibility to organisations seeking to trial emerging technology. The guidelines were developed to:

- provide certainty and clarity to industry about expectations when trialling automated vehicles in Australia
- help agencies manage trials in their own jurisdictions as well as across state borders
- establish minimum standards of safety
- help assure the public that roads are being used safely
- help raise awareness and acceptance of automated vehicles in the community (National Transport Commission, 2017).

Since the guidelines were published, trials have been run in every state and territory.<sup>1</sup> The application of these guidelines by trialling organisations and state and territory governments have generated useful lessons to improve the guidelines. Differences in trial application requirements have also emerged as states and territories impose jurisdiction-specific requirements and processes for applications.

Infrastructure and transport ministers directed the National Transport Commission (NTC) to review the guidelines every two years. This review of the guidelines, which began in late 2019, is the first since the guidelines were published.

The objectives of the review are to identify:

- whether the guidelines have assisted governments and trialling organisations
- challenges faced by governments and trialling organisations using the guidelines or in applying for, approving, operating or evaluating trials
- jurisdiction-specific requirements governments have placed on trialling organisations

<sup>&</sup>lt;sup>1</sup> See <u>https://austroads.com.au/drivers-and-vehicles/future-vehicles-and-technology/trials.</u>

 whether the guidelines should be updated to further ensure a nationally consistent and safe approach to automated vehicle trials in Australia.

### 1.2 Background

Automated vehicles have the potential to provide a significant range of benefits to Australian society. These include:

- improvements to road safety (by reducing human error)
- improved access and mobility options
- more efficient traffic flow and reductions in congestion
- a reduction in the costs associated with congestion
- productivity for vehicle occupants (by allowing them to undertake tasks other than driving)
- fuel efficiency and reduced emissions (ACEA European Automobile Manufacturers Association, 2019).

On-road trials are necessary to ensure automated vehicles can operate safely and efficiently in Australian conditions. They are also important for building public understanding and confidence in the technology.

Vehicles cannot operate in automated driving mode on public roads due to existing legal barriers. Organisations seeking to run automated vehicle trials require state and territory road transport agencies to provide permits or exemptions from legislative obligations in the Australian Road Rules and other road transport legislation. States and territories can impose conditions on these permits and exemptions to ensure safety.

In November 2016 the Infrastructure and Transport Council agreed to the NTC and Austroads developing national guidelines for 'on-road field testing and trials of automated vehicles in Australia' (National Transport Commission, 2016, p. 11).

The guidelines were developed to ensure a level of national consistency in trials across the country by forming the basis for conditions a trialling organisation would need to meet to receive an exemption or permit to trial an automated vehicle on a public road. To apply for a permit or exemption, trialling organisations must address the criteria in the guidelines (including explaining why particular criteria are not relevant in their circumstances).

The guidelines aim to achieve flexibility and to support different technologies and applications as they emerge. They provide a performance-based framework that supports innovation and gives certainty to governments and industry alike.

### **1.3** Our approach to reviewing the guidelines

From late 2019 to early 2020 we undertook targeted consultation with a range of government agencies and industry organisations involved in trialling automated vehicles in Australia. The

feedback received from this engagement helped to inform the NTC's *Review of 'Guidelines for trials of automated vehicles in Australia': discussion paper.*<sup>2</sup>

In May 2020 we released this discussion paper for consultation (see Figure 1). The discussion paper sought feedback on potential updates to the guidelines, and more generally on barriers to automated vehicle trialling in Australia. As well as inviting written submissions on the discussion paper, we engaged more broadly with industry and government on lessons learned from trials in Australia. We received 18 written submissions to the discussion paper, and these, along with feedback on the guidelines from meetings with individual organisations, have been incorporated into this policy paper and the updated guidelines. A list of public submissions is at Appendix A.





# **1.4** Related work and interdependencies

#### 1.4.1 Austroads – future vehicles trials lessons learned repository

Austroads is developing a 'lessons learned' repository for Australian and New Zealand trials of automated vehicle technologies, connected vehicle technologies and zero and lowemission vehicle technologies. Once established, the repository will be populated with the outcomes and lessons from previous and future trials and made available to governments, trialling organisations and the public.

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<sup>&</sup>lt;sup>2</sup> NTC, *Review of 'Guidelines for trials of automated vehicles in Australia': discussion paper*, May 2020 available at <u>https://www.ntc.gov.au/sites/default/files/assets/files/NTC%20Discussion%20Paper%20-</u> %20Review%20of%20guidelines%20for%20trials%20of%20automated%20vehicles%20in%20Australia.pdf.

Currently, Austroads collates basic information about all current and past trials on its website.<sup>3</sup>

#### 1.4.2 Safety assurance for commercial deployment of automated vehicles

Beyond the trials framework, ministers have agreed a safety assurance approach to the first supply of automated vehicles for commercial deployment. Entities seeking to bring automated driving systems (ADSs) to market in Australia will need to self-certify that they have met a set of safety criteria and obligations to be granted a type approval under the *Road Vehicle Standards Act 2018* (Cwlth). The entity, called the automated driving system entity (ADSE), will be responsible for assuring the safety of the ADS over its operational life. Once the ADSE receives type approval, its vehicles can be deployed anywhere on the road network (subject to any type approval or registration conditions).<sup>4</sup>

The NTC is now leading development of a safety assurance approach for the safety of commercially deployed automated vehicles once they are on the road ('in-service'). In June 2020, infrastructure and transport ministers endorsed key features of a national regulatory approach to the in-service safety of automated vehicles including that a national law be implemented to establish:

- a general safety duty on the ADSE to ensure the safety of the ADS
- a national regulator for in-service safety with necessary functions, powers and duties, including the authority to regulate the ADSE, ADSE executive officers and remote drivers.<sup>5</sup>

Ministers agreed that the NTC, in conjunction with state, territory and Commonwealth governments, undertake further work on a regulatory framework for the in-service safety of automated vehicles, including developing the functions and powers of the regulator and a compliance and enforcement approach. We will provide recommendations to ministers on the next phase of the in-service work in 2021.

#### 1.4.3 Motor accident injury insurance and automated vehicles

The NTC consulted on the national approach to motor accident injury insurance as part of developing the regulatory framework for the commercial deployment of automated vehicles. Infrastructure and transport ministers have agreed that all jurisdictions' motor accident insurance schemes (compulsory third party and national injury insurance schemes) should provide access for injuries and deaths in crashes involving an automated vehicle. The Board of Treasurers (state and territory treasurers) is currently considering this approach. If endorsed, jurisdictions will review their motor accident insurance schemes with a view to changing them to cover automated driving. These changes should reflect a number of principles including that:

No person is better or worse off, financially or procedurally, in the relevant jurisdiction if they are injured by a vehicle whose ADS was engaged than if they were injured by a vehicle controlled by a human driver.

This principle is already reflected in the guidelines, which state in the 'Insurance' section:

<sup>5</sup> See the Transport and Infrastructure Communique June 2020:

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<sup>&</sup>lt;sup>3</sup> See <u>https://austroads.com.au/drivers-and-vehicles/future-vehicles-and-technology/trials.</u>

<sup>&</sup>lt;sup>4</sup> See the Transport and Infrastructure Communique May 2018:

https://www.transportinfrastructurecouncil.gov.au/sites/default/files/Communique 18 May 2018.pdf.

https://www.transportinfrastructurecouncil.gov.au/sites/default/files/documents/13th-transport-and-infrastructurecouncil-communique.pdf.

As a key principle in assessing trial applications, states and territories will aim to ensure that any road user injured by an automated vehicle trial is no worse off than if they were injured by a human-operated vehicle.

#### 1.4.4 Government access to vehicle generated data

The NTC is also considering the ongoing framework for government access to data generated by vehicles, including automated vehicles. This data has the potential to help road transport agencies create public value by enhancing network operations, investment, maintenance, planning and road safety. In 2020 we consulted on ways for government to access vehicle-generated data without raising commercial, privacy or security issues, or disincentives to deploying technology.

#### 1.4.5 Austroads – infrastructure

Austroads is undertaking a range of projects to support road transport agencies to deliver an improved road network that leverages the benefits of emerging technologies while minimising the risks that change might bring. Projects have included research and testing on the infrastructure changes required to support automated vehicles on rural and metropolitan highways and freeways.

#### Key points

- There have been several automated vehicle trials and regulatory developments in Australia and internationally since the guidelines were published.
- These developments have informed the review of the guidelines.

### 2.1 Overview

Since the guidelines were published in May 2017, there have been a number of developments in trialling and in developing regulatory frameworks for automated vehicles, both within Australia and overseas.

These developments provide useful background to the discussion and recommendations in this paper.

# 2.2 Australian context for automated vehicle trials

#### 2.2.1 Australian automated vehicle trials

Since the guidelines were published there have been a number of relevant developments in automated vehicle trialling in Australia.

- Thirty-two automated vehicle trials have taken place, and trials have occurred in every state and territory.
- Most trials have involved low-speed automated shuttle buses operating on set routes, though there have also been trials that test relevant technology or infrastructure that will feature in automated vehicles or interact with them.<sup>6</sup>
- Differences in application and approval processes and trial requirements have emerged across states and territories.
- Some applicants for small automated vehicle (SAV or 'footpath delivery robots') trials have used the guidelines as a basis for applications.
- Australia has not had any large-scale pre-deployment testing as has been seen in the United States (US), but there has been some interest from organisations in trialling larger numbers of automated vehicles.
- Some trialling organisations have noted challenges in importing their trial vehicles.
- Some government agencies have noted challenges in sharing learnings from trials across governments.

<sup>&</sup>lt;sup>6</sup> For example, the Transurban trial in Melbourne involved vehicles with advanced driver assistance technology such as lane keep assist, adaptive cruise control and traffic sign recognition interacting with motorway infrastructure including tunnels, roadworks, congestion, electronic speed signs and line markings. More information can be found on the Transurban website: <u>https://cavs.transurban.com/trials/victoria/partial-automation</u>.

# 2.2.2 Agreement to safety criteria for the first supply of automated vehicles for commercial deployment

As noted in the previous chapter, ministers have agreed a safety assurance approach to the first supply of automated vehicles for commercial deployment. Entities seeking to deploy automated vehicles will need to self-certify that they have met a set of safety criteria and obligations to be granted a type approval under the Road Vehicle Standards Act.

We consider it important to align the guidelines with the safety criteria where relevant and appropriate to allow for a more seamless transition for trialling organisations wishing to seek approval for commercial deployment in the future. This alignment must be balanced with the lower risks present in trial conditions that occur in more controlled environments compared with commercially deployed automated vehicles that may be able to access the entire road network. In the discussion paper, we noted instances where alignment with the safety criteria may be useful. As discussed throughout this paper, we will make amendments to the guidelines where appropriate to further align them with the safety criteria. We will also update the guidelines with minor language changes to further align the guidelines with the safety criteria.

The Commonwealth Department of Infrastructure, Transport, Regional Development and Communications is developing the regulatory instruments to implement the first supply approach. We will continue to monitor the development of this approach to look for opportunities to align the guidelines.

### 2.3 International context for automated vehicle trials

When the guidelines were being developed in 2017 the NTC had undertaken a comparative analysis of the rules for managing automated vehicle trials in overseas jurisdictions. The analysis provided a comparison for the proposed guidelines.<sup>7</sup>

To inform the discussion paper, the NTC conducted a desktop audit of the rules for automated vehicle testing in a sample of overseas jurisdictions (New Zealand, the United Kingdom (UK), Canada, Japan, Singapore, California, Arizona, Nevada, Sweden, the Netherlands).

Overseas trials include testing and validating automated vehicle technologies, as well as their application in different environments:

- ride-hailing and ridesharing services<sup>8</sup>
- on-road trials of commuter shuttles<sup>9</sup>
- personal delivery services/footpath delivery robots<sup>10</sup>

<sup>&</sup>lt;sup>7</sup> See the NTC's discussion paper *National guidelines for automated vehicle trials (November 2016)*, which can be accessed **at** <u>https://www.ntc.gov.au/sites/default/files/assets/files/NTC%20Discussion%20Paper-National%20guidelines%20for%20automated%20vehicle%20trials-Nov%202016.pdf.</u>

<sup>&</sup>lt;sup>8</sup> In 2017, Waymo launched an app-based commercial automated vehicle ride-hailing service in Phoenix. Japan has been testing automated commercial ridesharing services on controlled test routes in high-density environments in Yokohoma (Lyons, 2018) and Tokyo (England, 2018)

<sup>&</sup>lt;sup>9</sup> For instance, in 2019 Singapore trialled an on-demand automated shuttle that users could summon via an app (Intelligent Transport, 2019). Three areas in Singapore will use automated buses and shuttles for off-peak and on-demand commuting from 2022 (KPMG International, 2019).

<sup>&</sup>lt;sup>10</sup> Small footpath delivery robots have been tested in many countries to deliver things like parcels, groceries and meals (these have also been trialled in Australia).

- passenger pods<sup>11</sup>
- truck platooning<sup>12</sup>
- automated trucking/freight services.<sup>13</sup>

A summary of key international developments regarding trials is included in the discussion paper in section 2.3.

Review of 'Guidelines for trials of automated vehicles in Australia' November 2020

<sup>&</sup>lt;sup>11</sup> The UK has trialled automated passenger pods on pavements as a last/first mile and mobility solution (Burgess, 2018).

<sup>&</sup>lt;sup>12</sup> In the European Union, ENSEMBLE, a consortium of Europe's big six truck manufacturers has announced that multi brand platooning will be trialled on European roads by 2021 (Ensemble, 2020). Canada (Ventezou, 2019) and Japan (Garnsey, 2018) have also conducted truck platooning trials. Twenty US states have approved truck platooning (Scribner, 2019).

<sup>&</sup>lt;sup>13</sup> For example, the US Postal Service has begun testing driverless delivery vehicles between Phoenix and Dallas (Barkho, 2019).

#### Key points

- We sought feedback on the criteria in the guidelines.
- Feedback from stakeholders indicated there were areas where further prescription or detail in the guidelines would provide clarity to trialling organisations and promote greater national consistency.
- We will amend the guidelines based on stakeholder feedback.

### 3.1 Overview

The guidelines provide a flexible mechanism to encourage innovation while maintaining safety. They are pitched at a high level so they can accommodate a range of different automated vehicle technologies and applications, and the management of trials will allow for these differences.

The guidelines cover four key areas: management of trials; the safety management plan; insurance; and data and information. We sought feedback on whether any updates to these areas should be made. States and territories impose further conditions on trialling organisations to ensure safety on their roads.

Stakeholder feedback on the discussion paper identified specific areas where trialling organisations and governments would find further prescription or detail useful. Based on stakeholder feedback we will make amendments to the guidelines to:

- clarify that the trial location could either be specific roads, routes or regions and/or the vehicle's operational design domain (ODD)<sup>14</sup>
- explicitly include enforcement agencies in the list of key stakeholders that trialling organisations should show how they intend to engage with
- require trialling organisations to provide the purpose of the trial and outcomes sought from the trial
- require trialling organisations to set out how they intend to manage specific safety and accessibility concerns and interactions with road users or passengers with disabilities during the trial
- require trialling organisations to outline how they will mitigate, monitor and address human driver or operator inattention
- require trialling organisations to consider the behaviour of other drivers, riders and pedestrians
- require trialling organisations to consider interaction with enforcement and emergency services on the road and at the roadside as part of the safety management plan

<sup>&</sup>lt;sup>14</sup> The 'operational design domain' is the specific conditions an ADS or feature is designed to function in (for example, locations, weather conditions, driving modes).

- clarify that it is open for the approving agency to accept the results of appropriate pretrial tests conducted in other jurisdictions
- require trialling organisations to demonstrate a safety culture that enables them to identify and mitigate emerging safety risks as part of the safety management plan
- require trialling organisations to consider interaction with enforcement and emergency services on the road and at the roadside as part of the safety management plan
- require reporting of emergency disengagements only, including where there is no human driver present in the vehicle
- require trialling organisations to outline the data that will be recorded by the automated vehicle and how it will provide the data to relevant parties
- provide examples of the type of information that may be included in an end-of-trial report.

### 3.2 Management of trials

The guidelines require trialling organisations to provide a high-level description of the technology being trialled. This allows road agencies to understand the intent of the trial and for emergency services to understand any particular risks.

Management criteria in the guidelines are:

- trial location
- description of the technology being trialled
- traffic management plan (TMP)
- infrastructure or network requirements
- engagement with the public and other stakeholders
- managing change.

#### 3.2.1 Traffic management plans

The guidelines require trialling organisations to provide a TMP outlining anticipated traffic risks and mitigating actions. This could include consideration of matters including:

- traffic density/vehicles
- pedestrians
- signage
- irregular events construction, crash scenes, road detours, flooding
- complex intersections and merges
- regional variations in road design
- railroad interfaces.

In the discussion paper, we sought views on challenges in submitting and approving TMPs, in particular, examples and learnings about the appropriate standard of TMPs that have been approved. We noted in the discussion paper that preliminary targeted feedback had suggested that TMPs are expensive, generally requiring a qualified third party to prepare, and that the detail required in a TMP could differ depending on the particular state and local parties involved.

Queensland Department of Transport and Main Roads (TMR QLD) submitted that a TMP may not be needed for all automated vehicle trials but should be required where roadworks are required to install infrastructure for the trial or where the operation of the trial substantially affects traffic flows (for example, traffic is diverted to other lanes or routes). The Royal Automotive Club of Queensland (RACQ) and Redland City Council (who provided a joint submission) submitted that TMPs in Queensland must be signed off by a TMR QLD accredited traffic management designer, which can result in significant additional costs because a specialist skill set is required to approve every amendment and review to the entire TMP. EasyMile submitted that a TMP can be onerous and duplicate other documentation supplied and suggested that a standard template for a TMP be developed. Traffic management treatment and the standard of evidence required could be reviewed. The Royal Automobile Club of Western Australia (RAC WA) suggested including a sample template of a TMP that could better guide the ADSE on the requirements for such documents. The Australian Motorcycle Council (AMC) recommended one set of trial management guidelines be used across all jurisdictions.

#### NTC conclusions

Preparing a TMP may be an onerous requirement but it ensures the applicant has considered controlling measures to help protect the safety of all road users and minimise disruption to road users. TMPs may not be required in all cases. Developing TMPs may require specialist skills and knowledge to consider the unique traffic requirements of each automated vehicle trial and will differ for each trial. Given this, a template TMP is unlikely to be useful because the TMP will need to be tailored to the unique circumstances of each trial including the trial location, time of operation, traffic conditions and objectives of the trial. We therefore do not propose developing a standard TMP template. We note that South Australia has an additional element for consideration in a TMP that is likely to be a relevant consideration in trials – speed environment.<sup>15</sup> We have added this to the relevant matters that may need to be considered in relation to the trial traffic environment.

Austroads has published its *Guide to traffic management*,<sup>16</sup> which provides traffic management and traffic engineering guidance, and the *Guide to temporary traffic management*,<sup>17</sup> which provides guidance for the design and implementation of temporary traffic management at roadworks sites. These guides may be useful to trial applicants in preparing TMPs, in particular parts 2 and 9 of the *Guide to temporary traffic management*.

#### 3.2.2 Meaning of 'trial location'

The guidelines require trialling organisations to clearly set out the proposed trial location. This could be specific roads, routes or regions. The guidelines also state that other elements of the vehicle's ODD should be described in detail.

In the discussion paper, we sought feedback on whether the guidelines could be clarified to state that a trial location could either be specific routes or regions and/or the vehicle's ODD to provide flexibility for trialling locations.

<sup>&</sup>lt;sup>16</sup> Austroads' *Guide to traffic management* can be found on the Austroads website at <u>https://austroads.com.au/network-operations/network-management/guide-to-traffic-management.</u>

<sup>&</sup>lt;sup>17</sup> Austroads' *Guide to temporary traffic management* can be found on the Austroads website at <u>https://austroads.com.au/network-operations/network-management/temporary-traffic-management</u>.

One trialling organisation considered that jurisdictions were interpreting the trial location requirement differently. Some required set maps and routes; others used an approach focused more on the ODD. The trialling organisation noted that an approach that focuses on ODD allows more flexibility because automated vehicle technology will continue to improve and be able to deal with changing road surfaces and environments. Transurban submitted that a move to an ODD focus will overcome the practical challenges of extending tightly controlled traffic management operations to wider areas and longer timeframes. This will facilitate larger, more complex trials over time.

RACQ and Redland City Council, ACT Government and EasyMile support clarifying the guidelines to state that trial location could either be specific roads, routes or regions and/or the vehicle's ODD. RACQ and Redland City Council also noted that, depending on the trial ODD, route or roads and relevant road owners, approvals may involve further engagement and approvals from private organisations (for example, toll road operators, landowners) or local councils. TMR QLD submitted that its own framework provides for flexibility in how a trial location is constructed and provides some additional guidance regarding considerations to make when selecting a trial location. A government agency submitted that this review provides an important opportunity to expand the definition of trial location to enable steps towards commercial deployment. South Australia's Department for Infrastructure and Transport (DIT SA) submitted that the ODD is essential in recognising the ADS capability and limitations in determining a trial location.

#### NTC conclusions

We consider that state and territory governments should be able to limit trial locations and request set maps and routes if they consider this necessary to ensure safety. However, we encourage the increasing use of an ODD approach to provide flexibility for trialling organisations moving to larger scale deployments and to prepare for the approach that will be taken for approvals at first supply when automated vehicles become ready for commercial deployment. Under the safety criteria that transport ministers have agreed ADSEs must meet at first supply, ADSEs must show how their automated driving can operate safely within an ODD, rather than within a set map or route.

We will therefore update the guidelines to clarify that trial location could either be specific roads, routes or regions and/or the vehicle's ODD. This will give state and territory governments the flexibility to require set maps and routes or move to an ODD approach as they consider necessary to manage the safety of the trial. It will also give trialling organisations clarity that an ODD approach can be considered by governments. Where an ODD approach is used, for consistency with the first supply safety criteria we will amend the guidelines to require that the trialling organisation must describe how the ADS will be:

- 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 of its defined ODD.

#### 3.2.3 Trialling organisations should engage with enforcement agencies

The guidelines require trialling organisations to set out how they intend to engage with the public and other key stakeholders as part of the trial. The key stakeholders identified in the guidelines are local government authorities, road user groups, emergency services, infrastructure managers and public transport providers. It is not made clear in the guidelines that enforcement agencies are included in the definition of emergency services.

In the discussion paper, we sought feedback on whether the guidelines should explicitly state that trialling organisations should show how they intend to engage with enforcement agencies.

A government agency, EasyMile, RACQ and Redland City Council and Transurban supported the guidelines clearly stating that trialling organisations should engage with enforcement agencies as part of seeking approval for a trial. The ACT Government submitted that this engagement should be coordinated through a single point in the ACT Government rather than trialling organisations engaging with enforcement directly. We also heard during consultation that trialling organisations commonly engaged with law enforcement and that this should be formalised.

#### NTC conclusions

Stakeholder feedback supported updating the guidelines to clearly state that law enforcement agencies are in the list of key stakeholders that the trialling organisations should show how they intend to engage with. We consider it appropriate to leave the details of how that engagement should occur up to individual state and territory governments.

#### 3.2.4 Explaining the purpose of the trial

The guidelines currently do not require trialling organisations to provide the purpose of the trial or outcomes sought from the trial. In the discussion paper, we sought feedback on whether there should be a requirement in the guidelines for trialling organisations to explain the purpose of their trial.

The ACT Government, DIT SA, RACQ and Redland City Council, and TMR QLD supported trialling organisations being asked to state the objectives or purpose of their trial in their application. In individual stakeholder meetings, many stakeholders noted the importance of having clear trial objectives from the outset, particularly in order to better evaluate trials. A government agency and Brisbane City Council submitted that they required a purpose from applicants before a trial is approved. EasyMile supported the idea of a purpose but noted this had to come from the entity commissioning the trial. During targeted stakeholder sessions we heard that most applicants include a purpose for the trial in their application.

#### NTC conclusions

The purpose of a trial may be an important consideration for road transport agencies in approving a trial. For example, road transport agencies may wish to avoid duplicating similar trials and may have strategic objectives in relation to the learnings and outcomes that they want to gain from running trials in their jurisdictions. A clear purpose will also assist transport agencies in evaluating trials on completion. Given that stakeholder feedback suggests that many trialling organisations already include a purpose in their application, we will update the guidelines to reflect this practice. We will also note that trialling organisations should consider the original purpose of the trial when completing an end-of-trial report.

#### 3.2.5 Accessibility considerations

JFA Purple Orange submitted that trials of automated vehicles should be designed and rolled out so as to accommodate the needs of people living with disability. It suggested that there should be explicit consideration in the criteria for managing trials about how the needs of people living with disability have been considered. In section 6.2.2 of this paper, we discuss feedback from stakeholders in relation to accessibility considerations for passenger service trials. DIT SA, RACQ and Redland City Council, and TMR QLD submitted that the minimum accessibility requirements mandated under the Commonwealth Government's

*Disability Standards for Accessible Public Transport 2002* should be explicitly included in the guidelines.

#### NTC conclusions

Taking into consideration the needs of people with disability while we are still in the trial phase with automated vehicles will help realise the accessibility benefits of automated vehicles further down the track.

Based on feedback received, we will update the guidelines to require trialling organisations to set out how they intend to manage specific safety and accessibility concerns and interactions with road users or passengers with disabilities during the trial. The guidelines will note that there are other legislative requirements that trialling organisations may need to meet if providing passenger services, including Commonwealth disability standards.

# 3.3 Safety management plan

Trialling organisations must develop a safety management plan outlining all relevant safety risks for their trial and how these risks will be mitigated or eliminated. The guidelines set out key safety criteria and mitigations that should be addressed. However, if some criteria are not relevant, companies may explain why.

In the discussion paper, we sought feedback on the safety management plan. We are proposing several updates based on feedback that we received.

#### 3.3.1 Standard of evidence for safety management plans

Though the safety management plan provides a flexible approach to safety assurance, there may be confusion about what evidence needs to be provided for a state or territory government to approve a safety management plan. In the discussion paper, we noted that we had heard that approval of the safety management plan in particular has become an iterative and resource-intensive process between trialling organisations and state and territory road agencies.

We heard that applicants must assess and identify risks of the trial and mitigate the risks to acceptable levels (ACT Government, RACQ and Redland City Council, TMR QLD). The Federal Chamber of Automotive Industries (FCAI) stated that it supports a high-level principles-based objective to meet the needs of safety and that more prescriptive requirements can be overly burdensome and unnecessary in trial applications.

TMR QLD stated that it uses risk assessment tools to support applicants meeting a sufficient standard of evidence. It stated that completing these risk assessments requires applicants to identify and assess risks and then mitigate those risks to an acceptable level. It stated that additional evidence may be required depending on the risk mitigation strategies proposed and, while this may involve some iteration, the templates provide upfront guidance to applicants on expectations for risk assessment and management. In individual meetings we also heard feedback that the iterative nature of the application process was not necessarily a problem because it showed a willingness on the part of government to work collaboratively to achieve a successful application. DIT SA stated that its framework has been developed from lessons learned in early trial applications and that the standard of evidence, while prescriptive, provides more guidance to trialling agencies.

#### NTC conclusions

We do not propose to include further detailed requirements in the guidelines about the standard of evidence that safety management plans must meet. In section 6.3 of this paper, we consider how application processes can be streamlined more generally.

# 3.3.2 Explicitly requiring trialling organisations to specify how they will monitor human driver or operator inattention

The guidelines note that where there is a human driver, associated human factor risks will need to be considered. In the discussion paper, we sought feedback about whether the guidelines should require trialling organisations to specify how they will monitor and address human driver or operator inattention.

A government agency and the ACT Government agreed there should be an explicit requirement for trialling organisations to outline how they will monitor and address human driver and operator inattention. We heard in stakeholder sessions that trialling organisations need to assess the role of the human operator and how they are supported to do their role. The FCAI and Human Integrated Internet of Things (Hi IoT) agreed that operator and driver inattention is an issue that needs to be monitored and addressed within automated vehicle trials where appropriate. A government agency noted that 'automation complacency', as seen in the fatal Uber crash in the US, is an emerging risk that should be covered in the guidelines.<sup>18</sup> DIT SA stated that the guidelines should reference the human–machine interface criterion in the first supply safety criteria agreed by ministers. It noted that the South Australian safety assurance framework requires the trialling agency to define how the interaction is facilitated.

#### NTC conclusions

We agree that the guidelines should explicitly require trialling organisations to outline how they will mitigate, monitor and address human driver or operator inattention and will update the guidelines accordingly. We note that the guidelines already require trialling organisations to demonstrate a practical process for transitioning between automated and human driving modes. In line with the first supply safety criteria, we will add clarification about the safe transition of the driving task between an ADS and human operator.

# 3.3.3 Explicitly requiring trialling organisations to consider the behaviour of other road users

The guidelines state that trialling organisations must consider risks to other road users including drivers and riders of motor vehicles, cyclists, pedestrians and passengers.

In the discussion paper, we noted that in the 2018 Uber crash in Arizona the pedestrian crossed the street in front of the approaching vehicle at night and at a location without a pedestrian crossing. This was a violation of Arizona statutes. The US National Transportation Safety Board found that the ADS was unable to 'correctly classify and predict the path of the pedestrian crossing the road midblock' (National Transportation Safety Board, 2019a, p. 57). In individual stakeholder meetings we also heard that other road users have sometimes displayed risky behaviour around automated vehicles during trials. In the discussion paper, we asked stakeholders if it would be useful for the guidelines to explicitly

<sup>&</sup>lt;sup>18</sup> In 2018 a fatal crash occurred in Arizona involving an Uber trial automated vehicle with a safety driver. A pedestrian who had been crossing the road away from a crossing was killed. See <a href="https://ntsb.gov/investigations/AccidentReports/Reports/HAR1903.pdf">https://ntsb.gov/investigations/AccidentReports/Reports/HAR1903.pdf</a>.

require trialling organisations to consider unpredictable behaviour such as driver, rider and pedestrian noncompliance with the road rules.

The ACT Government, DIT SA, FCAI and TMR QLD supported trialling organisations being required to consider behaviour by other road users. RACQ and Redland City Council did not support this, given that it may encourage an overly risk-averse response from approving agencies if every theoretical scenario cannot be mitigated and that such evaluation may be appropriate if the trial is operating in areas of high-volume vulnerable users.

#### **NTC conclusions**

We think it is important for trialling organisations to consider the behaviour of other road users. We do not think that a general requirement for trialling organisations to consider behaviour such as driver, rider or pedestrian noncompliance with road rules would result in an overly risk-averse response from approving agencies. It would ensure that trialling organisations turn their mind to the safety risks that might arise during the trial due to the behaviour of other road users. This is supported by lessons from past trials.

We note that such a risk is already considered within the Queensland trials framework and we are not aware that this has led to an overly risk-averse response from the approving road transport agency. We will update the trial guidelines to explicitly require trialling organisations to consider the behaviour of other drivers, riders and pedestrians.

# 3.3.4 Requiring trialling organisations to consider on-road and roadside interaction with enforcement and emergency services

The guidelines do not reference interaction with enforcement and emergency services on the road and at the roadside as part of the safety management plan.

We sought feedback on whether the guidelines should be updated to reference interaction with enforcement and emergency services as part of the safety management plan. The ACT Government, Brisbane City Council, EasyMile, FCAI, RACQ and Redland City Council, TMR QLD and a government agency support updating the guidelines to reference interaction with enforcement and emergency services. EasyMile noted it conducts a vehicle presentation with local emergency services before the start of operations.

In the discussion paper, we noted two approaches to requiring safety management plans to reference interaction with enforcement and emergency services:

- The first was to include a high-level reference for example, requiring the trialling organisation 'to consider interaction with enforcement and emergency services on the road and at the roadside'. This would be consistent with the current level of detail within the guidelines.
- The second approach was to impose more prescriptive requirements for example, requiring the trialling agency to specify how the ADS will recognise enforcement and emergency officers and their vehicles, how enforcement agencies can access accurate information about whether the ADS is engaged at a given time if there is no driver or operator, how the ADS will respond to handover requests from enforcement and emergency officers if there is no driver or operator and how the ADS will facilitate access by enforcement and emergency officers to this information at the roadside.

Apart from TMR QLD (who did not specify which approach it preferred), support for updating the guidelines was for a high-level approach rather than prescriptive requirements. Stakeholders considered that specific requirements for interaction would be overly prescriptive in many trials (RACQ and Redland City Council and a government agency) and

imposing detailed requirements may remove the current flexibility and further burden the pretrial process (EasyMile). DIT SA supported an update to the guidelines to include the interaction with enforcement and emergency services to ensure early alignment with the first supply and in-service criteria.

#### NTC conclusions

Based on this feedback, we will update the guidelines to include a high-level requirement for trialling organisations to consider interaction with enforcement and emergency services on the road and at the roadside as part of the safety management plan.

#### 3.3.5 State and territory government discretion to require further pre-trial testing

The guidelines require trialling organisations to undertake pre-trial testing of the vehicle at a test facility such as a closed track. In the discussion paper, we sought views on the best way for road transport agencies to assess any pre-trial tests. We noted stakeholder views that there may be duplication for trialling organisations required to undertake pre-trial tests in one jurisdiction despite recently undertaking similar testing in another state or territory (or overseas). However, we also heard the opposing view – that states and territories should be able to require pre-trial testing even where similar tests had already been undertaken – and that this was not too onerous a task for trialling organisations.

The ACT Government, TMR QLD and a government agency agreed that the guidelines should leave the question of whether pre-trial tests undertaken should be recognised or not to the discretion of states and territories. DIT SA supported a flexible approach to pre-trial testing allowing for recognition of testing in other jurisdictions. A government agency submitted that recognition of pre-trials should be considered to reduce regulatory burden. EasyMile submitted that jurisdictions should be amenable to accepting test results from other jurisdictions or from international tests or self-assessment and self-certification as is the case in the US. Further, EasyMile noted that the pre-trial test is a burdensome process and that if the vehicle has been trialled in a similar ODD or gone through similar tests in one jurisdiction it will most likely bring similar results in another jurisdiction. In contrast TMR QLD stated that applicants are often unable to provide sufficient evidence of prior testing. TMR QLD considered that given the range of automated vehicle technologies that may be trialled in Australia it will be impossible to proactively detail the pre-trial testing requirements in all scenarios across all jurisdictions. RAC WA supports the requirement for pre-trial testing to take place at a closed facility within Australia.

#### NTC conclusions

We consider it should continue to be up to the trialling organisation to show it has undertaken appropriate pre-trial testing, in any jurisdiction. States and territories should have discretion to require further testing if necessary.

We agree that previous testing may not cover all scenarios that must be considered by an approving agency. We note that the guidelines do not prevent approving agencies from accepting testing from another jurisdiction as part of the application assessment process if trialling organisations can show that these previous tests sufficiently test the safety risks anticipated in the proposed trials. We therefore support the guidelines continuing to leave it to the discretion of states and territories to require further testing (or not), even where similar tests have been undertaken by the trialling organisation. The guidelines will, however, be updated to clarify that it is open for the approving agency to accept the results of appropriate tests conducted in other jurisdictions.

### 3.3.6 Additional criteria for the safety management plan

We sought feedback on whether there may be further elements of the first supply safety criteria that would be useful to capture within the guidelines. The ACT Government supported the guidelines being updated to include additional key safety criteria and mitigations to be addressed in the safety management plan in relation to:

- occupant safety (we also heard this in individual stakeholder meetings)
- any changes to hardware or software to be notified and approved by the trial coordinator or road transport authority before being used during the trial
- how the vehicle will integrate with the existing road transport network.

In targeted consultation with stakeholders we heard of the importance of trialling organisations having a safety culture where safety is prioritised within the organisation. We note that in its investigation of the fatal crash in Arizona involving a pedestrian and an Uber test vehicle, the US National Transportation Safety Board specifically identified an inadequate safety culture – that is, inadequate safety risk assessment procedures, ineffective oversight of the vehicle operators and a lack of adequate mechanisms for addressing operators' automation complacency – as contributing to the crash.<sup>19</sup> DIT SA considered that it is appropriate that the guidelines align with the first supply safety criteria because those criteria are the basis for first supply and in-service safety in the future national framework for automated vehicles.

#### NTC conclusions

We consider occupant safety is an important safety consideration and will update the guidelines to include occupant safety as a criterion for the safety management plan. We note the other three criteria submitted by the ACT Government are covered within the criteria already under the safety management plan and TMP.

We will also amend the guidelines to more generally refer to the need for trialling organisations to demonstrate a safety culture that enables them to identify and mitigate emerging safety risks. Throughout this paper, we discuss amendments made to the guidelines to align more closely with the first supply safety criteria.

### 3.4 Insurance

The guidelines state that trialling organisations must demonstrate they have appropriate insurance to protect against the risks associated with the trial. The guidelines also state that, as a key principle in assessing trial applications, states and territories will aim to ensure any road user injured by an automated vehicle as part of a trial is no worse off than if they were injured by a human-operated vehicle.

Submissions stated that while there were some issues with obtaining insurance, all trials were successful in obtaining the appropriate insurance policies. Submissions noted that trials required multiple types of insurance such as public liability insurance and professional indemnity insurance. We heard in individual stakeholder meetings that gaps were sometimes found in policies – for example, coverage of software and security issues. The Law Institute of Victoria, Maurice Blackburn and RACQ and Redland City Council noted concerns about whether compulsory third-party schemes would cover automated vehicle trials, with this

<sup>&</sup>lt;sup>19</sup> The NTSB's reports can be found at <u>https://ntsb.gov/investigations/AccidentReports/Reports/HAR1903.pdf</u>.

differing between jurisdictions. The Law Institute of Victoria submitted that the Transport Accident Commission should remain the insurer for personal injuries sustained as a result of an automated vehicle trial in Victoria. We sought feedback on whether a high-level requirement to hold appropriate insurance remains appropriate for trials of emerging technology.

# 3.4.1 Maintaining the high-level requirement to hold appropriate insurance with further guidance on minimum insurance requirements

The guidelines currently have a high-level rather than prescriptive approach to insurance requirements. In the discussion paper, we proposed that the guidelines maintain a high-level approach and sought feedback on this. Overall stakeholders supported maintaining the highlevel requirement to hold appropriate insurance (ACT Government, Brisbane City Council, EasyMile, RACQ and Redland City Council, and a government agency). No submissions proposed including more prescriptive requirements, but some stakeholders suggested including additional guidance. DIT SA suggested the guidelines provide industry with an indication of the minimum standards required, with a clear reference to discussing insurance requirements with the trialling location road agency. RAC WA supported the idea of providing further guidance, but not requirements, on the level of liability that should apply for insurance policies. RACQ and Redland City Council suggested including more guidance on the availability, types and amounts of insurance available. The FCAI suggested that the Insurance Council of Australia could play a coordinating role for providing information about insurers to trialling applicants. TMR QLD suggested the requirements include minimum insurance requirements that are likely to be imposed, noting that individual jurisdictions may choose to impose additional or increased insurance requirements in some circumstances.

#### NTC conclusions

The objective of the guidelines is to provide nationally consistent conditions for trials in Australia. We note that experience from trials has shown that insurance requirements have varied greatly depending on the type of trial and the parties involved. We consider that more prescriptive requirements or an indicative minimum level of insurance is likely to become out of date quickly or to be irrelevant for some trials. We recognise the need for trialling organisations to discuss insurance requirements with the trialling organisation. As such, we will maintain the high-level approach to the requirement for insurance currently in the guidelines but will include a reference to discussing insurance requirements with the relevant road transport agency in the first instance.

In section 6.3 of this paper, we discuss how application processes for automated vehicle trials can be more streamlined and how governments can provide applicants with useful and relevant information that would assist them in the trial application process.

# 3.5 Data and information

The guidelines require trialling organisations to provide certain data and information to the road transport agency:

- data and information about serious incidents (crashes or contraventions of law) (initial report within 24 hours, full report within seven days)
- information about other incidents (near-misses, human operator taking back control, public complaint) (monthly report)
- an end-of-trial report on research outcomes.

In the discussion paper, we asked whether the guidelines should be updated to improve the provision of relevant data and information. We asked stakeholders to consider consistency of reporting requirements, disengagements, the definition of 'serious incidents' and broader data recording requirements in relation to serious and other incidents. We also asked stakeholders to consider research outcomes and end-of-trial reports.

#### 3.5.1 Consistent incident reporting requirements

DIT SA submitted that updating the guidelines to promote national consistency in reporting would assist trial organisations and allow for simpler comparisons between trials and trial insight aggregation. RACQ and Redland City Council submitted that consistency in reporting may be a function of whether definitions are provided to guide incident reporting. TMR QLD submitted that under Queensland's framework for automated vehicle trials, all trialling entities must agree to a range of reporting requirements including serious and non-serious incident reporting. It stated that these reporting arrangements have proved useful and, in some cases, it has requested further investigation/information and has amended the permit for the trial. TMR QLD suggested that the guidelines could provide advice about the form and content of various core reporting obligations and that a standardised set of core reports, including templates with consistent content and format, would support the sharing of information and insights between trials and jurisdictions. DIT SA submitted that national reporting of incidents is required and could be achieved by uploading incident reports to a national website, providing transparency and sharing of information across jurisdictions. DIT SA also noted that road agencies should be able to adapt reporting requirements as necessary for specific trials.

The ACT Government submitted that the guidelines should make it clear that incidents must be reported in accordance with the laws of the jurisdiction in which the trial is occurring and any conditions placed on the trial. Further, the ACT Government submitted that there needs to be greater emphasis on reporting serious incidents to police in accordance with the law. Such reports should also be provided to the authority responsible for approving and coordinating the jurisdiction's involvement in the trial rather than just the 'road transport authority'. DIT SA would support the guidelines being updated to indicate that black box data must be provided for all reportable incidents. A government agency submitted that it is important to have some mandatory expectations around reporting of serious incidents because the information would assist in estimating additional common law claims and building expectations about expected costs associated with common law settlements.

#### NTC conclusions

We acknowledge stakeholder feedback about the need for more consistent reporting. We note that the guidelines provide guidance on the type of information that may be included/required for serious incidents. The guidelines state that the data available in the event of a crash will depend on the nature of the trial and the technology employed and could include: time, date and location; automation status (for example, automated system, human driver, transitioning); traffic conditions (for example, empty road, in heavy traffic); road and weather conditions; vehicle information (speed, brake/throttle applications); sensor information in relation to other road users and the surrounding road environment; and the identity of the vehicle operator at the time of the incident.

We note that the guidelines also currently state that trialling organisations must comply with existing crash reporting obligations within the jurisdiction (which will require reporting the

crash to the police if anyone is injured or there is damage to property),<sup>20</sup> and they are required to report any crashes or contravention of any law to the relevant road transport agency. At this stage we are not updating the guidelines to require black box data to be provided for all reportable incidents; however, this may be considered further as the framework for the commercial deployment of vehicles is developed.

What information is to be requested for serious and non-serious reporting is left to the discretion of the approving road transport agency. We acknowledge that consistent reporting requirements across states and territories would be beneficial to trialling organisations. However, this is not an automated vehicle-specific issue, and there are challenges in consistency for crash reporting across jurisdictions generally. More work would need to be undertaken to develop agreement between jurisdictions to a standard set of requirements. In chapter 6 we discuss work to be undertaken to facilitate the sharing of information (including safety learnings) and best practice tools to improve trial application processes across jurisdictions.

Specific discussion about reporting on disengagements is below. We note that in stakeholder meetings this appeared to be the type of reporting that caused the most confusion for trialling organisations.

#### 3.5.2 Clearer guidance on reporting disengagements

In the NTC/Austroads guidelines, incidents where a human operator takes back control from the ADS should be reported to the road transport agency monthly. This could be defined as a type of 'disengagement'. We note, however, that the guidelines do not use this terminology.

In the discussion paper, we discussed two issues relevant to reporting on disengagements.

First, we noted that the guidelines framed disengagements around a human operator taking back control from an ADS, despite the fact that some automated vehicles may not have a human operator. We asked stakeholders whether the guidelines should specify that disengagements should be reported as to whether or not the vehicle had a human operator, as is the case in California. A disengagement in a vehicle without a human operator would occur in cases where the ADS has deactivated itself.

Submissions supported the reporting of disengagements in vehicles without a human operator (ACT Government, Brisbane City Council, RACQ and Redland City Council, a government agency).

We also sought feedback on whether current disengagement reporting requirements should be made more comprehensive or be published. A government agency supported sharing information on disengagements, but no submissions explicitly mentioned public reporting.

Stakeholders had concerns about the type of disengagements that should be reported.

EasyMile, TMR QLD, Transurban and a government agency submitted that not all types of disengagements need to be reported. This is because reporting of a disengagement on its

<sup>&</sup>lt;sup>20</sup> For instance, in South Australia the driver of a vehicle involved in an accident must provide certain details to the police as soon as possible if: anyone is injured or killed in an accident; there is damage to property as a result of the accident of \$,3000 or more; or a vehicle is towed or carried away by another vehicle (reg 287(3) of the South Australia Australian Road Rules and regs 39–42 of Road Traffic (Road Rules – Ancillary and Miscellaneous Provisions) Regulations 2014 (SA)).

own does not provide a necessarily clearer understanding of the incident (TMR QLD, Transurban). We heard in stakeholder meetings that there is a need to separate disengagements that occurred because of an actual safety event, like a near-miss, from disengagements where a human operator took over control for a routine reason. An example of a routine disengagement given was where a human operator took over control each time the automated vehicle passed the same parked car that had not been on the trial route when the route was mapped.

EasyMile noted that disengagements may happen several times a day and are often not linked to safety. DIT SA acknowledged that the reporting of disengagements could be a burdensome requirement on trialling organisations and add an additional requirement on road agencies to analyse the data. RAC WA noted it is not practical for trialling organisations to provide monthly reports on instances when a human takes back control of the vehicle because it is a normal part of trial operations and not comparable across trial locations. Transurban also agreed that routine disengagements should not be reported because this can include situations such as a vehicle moving from its trial ODD to a different operating environment. A government agency noted any reporting of disengagements needs to be reported by the type of disengagement. Reporting of disengagements needed to balance risk while not making obligations overly burdensome for trialling entities. TMR QLD considered a disengagement to be:

... an incident resulting in the vehicle supervisor(s) undertaking emergency intervention in the operation of the vehicle that did not result in any injury or death (for example, using the emergency stop function to avoid a collision).

DIT SA submitted that emergency stops could be incorporated into the definition of disengagements.

#### NTC conclusions

Given the support for expanding the reporting requirement to include disengagements when there is no human operator in the vehicle, we will update the guidelines to also require the reporting of emergency disengagement incidents in automated vehicles with no human operator present.

We note the strong stakeholder feedback that reporting on all types of disengagements is too burdensome and does not give an indication of actual safety incidents. We will update the guidelines to clarify that monthly reporting should occur when a human driver takes back control of the vehicle in an emergency, including emergency stops, similar to the requirement in the Queensland trial requirement. Given the lack of feedback, we are not including a requirement in the guidelines to publish disengagement reports.

#### 3.5.3 Broadening the definition of 'serious incident'

We did not receive substantial feedback on broadening the scope of 'serious incident' in the trial guidelines. DIT SA supported updating the definition of a serious incident and noted that its own definition includes additional reporting requirements, including requirements to report near-misses.<sup>21</sup> Serious incidents in South Australia must be verbally reported to the road

<sup>&</sup>lt;sup>21</sup> The South Australian *Automated vehicles trials safety assurance framework* defines 'serious incident' as any crash or near-miss involving a trial vehicle or the contravention of any law including: injury to anyone inside or outside the vehicle, property damage, violation of any law including the Australian Road Rules, near-misses (of any of the previous items), data or cybersecurity breaches and other grave safety concerns. A verbal report to

transport agency within 10 minutes and in writing within six hours. The ACT Government considered serious incidents should not simply include incidents where someone is killed or seriously injured but should also include incidents involving pedestrians, cyclists and motorcyclists due to the vulnerable nature of these groups and incidents involving property damage. We note that the existing definition of serious incident in the guidelines covers such incidents. The ACT Government also submitted that the definition should be expanded to be similar to the definition of a serious incident in the Victorian guidelines, which includes tampering or unauthorised modification of the automated vehicle, and failures of the automated vehicle.<sup>22</sup> RAC WA noted that the definition of serious incident is suitable.

#### NTC conclusions

Other than the government stakeholder submissions noted above, stakeholders did not raise concerns that the definition of 'serious incidents' in the guidelines is inappropriate. The guidelines already require near-misses and other incidents to be reported to the relevant road agency – the key difference is that serious incidents must be reported within 24 hours (with a full report within seven days), whereas other incidents must be reported on a monthly basis. We consider that expanding the definition of serious incident to include incidents like near-misses may place an undue burden on trialling organisations, especially given the feedback about disengagement reporting already noted. We believe the existing definition remains appropriate at this time.

# 3.5.4 Broadening data recording requirements to align with first supply requirements

In the discussion paper, we sought feedback on whether the guidelines should include data recording requirements aligned with first supply data recording criteria.<sup>23</sup> We did not receive any submissions supporting more prescriptive data recording requirements. DIT SA noted it requires reporting of an incident, monthly reporting and an end-of-trial report. EasyMile and RACQ and Redland City Council supported the current balance between high-level guidance and prescription in relation to incident reporting. RACQ and Redland City Council submitted that aligning closer with the first supply criteria may not be practical for some trialling organisations because the ADSE may not necessarily be the trialling organisation. The ACT Government supported further aligning the guidelines with the safety criteria. TMR QLD supported clarity to industry about the types of data and reporting requirements that are likely to be imposed on trials in Australia. DIT SA submitted that the guidelines should stipulate that in-vehicle data be stored in Australia and meet Australian standards. We also heard in stakeholder sessions that the guidelines should follow the regulatory framework being developed for commercial deployment. The ACT Government submitted that it should be clear that trialling organisations must retain data relating to serious incidents for an appropriate period, with further consultation needed to ascertain the time period. EasyMile considered the data and information requirements at first supply agreed by ministers are sufficient.

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DIT SA is required within the first 10 minutes of any injury, collision, serious technical or security/cyber issue. Written notification is required within six hours of the incident.

<sup>&</sup>lt;sup>22</sup> The Victorian guidelines have a broader definition of a serious incident that also includes: theft or carjacking of an automated vehicle; tampering with or unauthorised modifications of an automated vehicle; and failure of an automated vehicle that would impair the reliability, security or operation of the ADS.

<sup>&</sup>lt;sup>23</sup> The safety criteria can be found in the discussion paper for the *Review of 'Guidelines for trials of automated vehicles in Australia'*.

#### NTC conclusions

Based on this feedback, we will update the guidelines to require trialling organisations to outline how the data will be recorded (by the automated vehicle), how it will be stored by the trialling organisation and how it will provide the data to relevant parties. This will ensure broad consistency with the safety criteria at first supply. We will not be including a specific requirement that vehicle data generated during a trial should be stored in Australia. We note that such a requirement could act as a disincentive for trialling organisations that do not have an office or a base in Australia from conducting trials here.

#### 3.5.5 Providing further guidance on reporting trial outcomes

The guidelines state that trialling organisations must provide an end-of-trial report on research outcomes. The Victorian guidelines list the trial outcomes that an end-of-trial report might include:

- what worked well
- what went wrong
- what was learned
- community concerns about the trial
- road infrastructure issues
- road environment issues
- public complaints or other community issues regarding the trial.

In the discussion paper, we sought feedback on whether it would be useful to include similar guidance in the national guidelines.

Stakeholders considered standardised end-of-trial reporting would be useful. The ACT Government, Brisbane City Council, RACQ and Redland City Council, and a government agency supported including more guidance on the content of end-of-trial reports. AMC submitted that such reports should be made public. TMR QLD considered that developing a standardised set of core reports, including templates with consistent content and format, would support the sharing of information and insights between trials and jurisdictions. DIT SA submitted that trialling organisations are provided with high-level guidance on what should be included in the end-of-trial report. A government stakeholder considered that end-of-trial reports and reports against research outcomes need to benefit jurisdictions in developing their understanding of the technology, informing infrastructure investment decisions, and other policy considerations. This would help inform the policy discussion towards achieving mass market deployment.

#### NTC conclusions

We note that trials can be based on different use cases. There could be a minimum set of agreed outcomes that trialling organisations report against in the end-of trial report (for example, safety, technical performance of the ADS). But it is likely that states and territories would also want reporting against other outcomes consistent with their own strategic policy objectives.

To encourage more consistent reporting, we will update the guidelines to provide examples of outcomes that could be addressed in an end-of-trial report: what worked well in the trial, challenges faced during the trial and what was learned from the trial. We will also ask trialling organisation to consider outcomes in the context of the original purpose of the trial.

As discussed in section 2.2.2 of this paper, we think it is important that the guidelines align with the safety criteria where appropriate to allow for a more seamless transition for trialling organisations wishing to seek approval for commercial deployment in the future. In addition to changes discussed in this chapter, for greater alignment with the safety criteria we will also update the guidelines with minor language changes.

#### Key points

- The guidelines are intended to establish minimum standards of safety for trials of a range of innovative technologies.
- A mandatory requirement to follow the guidelines would be ineffective where no permit or exemption is required to undertake a trial.
- The guidelines can be applied as a voluntary framework for a range of technologies and operating domains.

### 4.1 Overview

In the discussion paper, we asked whether additional information should be included in the guidelines to clarify the application of the guidelines to other technologies and operating domains. We also asked whether the guidelines should include additional criteria for heavy vehicles.

Stakeholder feedback to the discussion paper highlighted the importance of following the guidelines to achieve a baseline standard of safety irrespective of the type of technology being trialled or the operating domain. Stakeholders considered that because the guidelines have no legal effect on their own, a mandatory requirement to follow the guidelines would be ineffective where no permit or exemption was required to conduct the trial. Based on the feedback we received, we will make a minor change to the guidelines to make it clear that even where no exemption or permit may be required from the relevant road transport agency, the guidelines can be applied as a voluntary framework for trialling a range of technologies and operating domains. We also consider there are no additional criteria required in the guidelines to manage a heavy vehicle trial.

# 4.2 Other technology applications and operating domains

The primary objective of the guidelines is 'to establish nationally consistent criteria to assess on-road trial applications for highly and fully automated vehicles' (National Transport Commission, 2017). The guidelines do not specifically address:

- trials conducted on private land or on road-related or non-road-related areas
- trials of SAE level 1 and level 2 vehicles with innovative technologies (which do not require an exemption or permit).

However, the guidelines state that where a trialling organisation does not require an exemption or a permit, the organisation is still encouraged to follow the guidelines.

In the discussion paper, we asked if the guidelines should be explicitly extended to other technologies (other than SAE level 3 and above automated vehicle technologies) and operating domains. We discussed examples of trials of small automated vehicles (SAVs) (which run on footpaths and other road-related areas), autonomous pods and SAE level 1

and 2 vehicles that allow cooperative adaptive cruise control technology for vehicle platooning.<sup>24</sup>

#### 4.2.1 Technology applications

Some stakeholders supported expanding the scope of the guidelines to other technologies. Transurban submitted that trials that rely on technology to maintain safe operation beyond the capability of a human operator (for example, platooning with cooperative adaptive cruise control) should have the same level of safety management requirements as automated vehicle trials. Other reasons for supporting an expansion of the guidelines to other technologies were to:

- reassure the public that safety implications have been adequately addressed (AMC)
- provide a valuable starting point for emerging technologies for which no alternative reference point existed (RACQ and Redland City Council)
- have a consistent framework to deal with applications for new technologies and noncompliant vehicles rather than dealing with them on an ad hoc basis (government stakeholder).

TMR QLD considered that the trial guidelines and Queensland's exemption framework for automated vehicle trials was flexible enough to cover SAVs (that are a subcategory of automated vehicles) but there was value in clarifying this within the guidelines for consistency of application. It opposed expanding the guidelines to apply to advanced driver assistance technologies (SAE level 1 and 2 vehicles) that comply with vehicle standards and are commercially available in Australia. The ACT Government supported the application of the guidelines to emerging technologies are capable of being upgraded in higher levels of automation through software updates. Transurban considered that it would be useful to promote the application of the guidelines as a voluntary framework for organisations trialling other technologies such as autonomous pods or personal mobility options. DIT SA did not support the application of the guidelines to other emerging technologies.

#### NTC conclusions

As noted above, where the jurisdictional framework creates a requirement for a permit or an exemption, the guidelines apply to automated vehicle trials. After the release of the guidelines, the NTC became aware that some organisations wishing to trial SAVs on footpaths and other road-related areas have used the guidelines as the basis for their applications for a permit. Some road transport agencies have taken the approach of treating SAVs as a vehicle and applied conditions to address local safety risks through jurisdictional exemption or permit frameworks.

Stakeholder views on expanding the scope of the guidelines to autonomous pods reflect concerns that trials of emerging technologies meet the same standards of safety as that applied to automated vehicle trials. If autonomous pods are not captured within the jurisdictional exemption or permit schemes, we consider that a mandatory requirement for the trial guidelines to be followed is unlikely to be effective in ensuring that trialling agencies follow the guidelines. We will amend the wording of section 2.3 of the guidelines to make it clear that the trial guidelines can be voluntarily followed for trialling technologies for which an exemption or a permit may not be required or where it may not be clear if a permit or an exemption is required. Section 2.1 of the guidelines requires:

<sup>&</sup>lt;sup>24</sup> See chapter 4 of the discussion paper for the *Review of 'Guidelines for trials of automated vehicles'*.

Prior to commencing an automated vehicle trial, a trialling organisation should contact the relevant road transport agency (refer section 8) to determine if any exemptions or permits to test on Australian roads are required.

This provides the opportunity for the relevant road transport agency to engage with trialling organisations and encourage the use of the trial guidelines.

We note the divergent stakeholder views on expanding the scope of the guidelines to trials of SAE level 1 and 2 vehicles that allow cooperative adaptive cruise control technology for vehicle platooning. In the NTC's November 2016 policy paper, *Regulatory reforms for automated road vehicles*, we stated that the:

... national guidelines could support trials with any level of automated driving. However, the primary objective of the trials should be to establish nationally consistent criteria to assess on-road trial applications for highly and fully automated vehicles (National Transport Commission, 2016, p. 13)

The primary objective of the trial guidelines has not changed. We do not propose to explicitly widen the scope of the guidelines to include SAE level 1 and level 2 technologies. It is important to align the guidelines with the end-state regulation of automated vehicles (the focus of which is SAE level 3 and above technologies) for a more seamless transition for trialling organisations wishing to seek approval for commercial deployment in the future. The trial guidelines can be used as a voluntary framework by organisations trialling SAE level 1 and level 2 technologies. We note that where a technology that is being trialled is upgraded to SAE level 3 it would fall within the scope of the jurisdictional exemption or permit scheme, providing a mechanism for the guidelines to be applied.

#### 4.2.2 Operating domains

Stakeholder reactions to explicitly expanding the scope of the guidelines to other operating domains were mixed. Stakeholders noted the difficulty with requiring that the guidelines be applied where there is no requirement for a permit or an exemption (TMR QLD, Transurban) because the guidelines have no legal effect unless considered as part of an application process for an exemption or a permit (TMR QLD). Reasons for opposing the expansion of the guidelines beyond their current stated purpose were: there was no scope to trigger the guidelines if jurisdictional schemes were not triggered (TMR QLD, Transurban) and the potential for unintended consequences for academia and businesses who already undertake a risk management approach to operations (FCAI). The ACT Government supported the guidelines being expanded to cover road-related areas. The AMC submitted that while insurance and liabilities may be different in non-carriageway or non-public domains, automated vehicles need to be accountable in all situations, with the public advised of the safety implications.

#### NTC conclusions

The guidelines intend to establish minimum standards of safety. They also advise trialling organisations to set out how they intend to engage with public stakeholders including local government authorities, emergency services and law enforcement agencies before and during the trial.

The guidelines have no legal effect unless considered part of a jurisdictional application process for an exemption or a permit to conduct a trial. Exemption or permit frameworks for conducting an automated vehicle trial vary across jurisdictions – some operating domains may be covered by some jurisdictional frameworks but not by others.

Where there is no requirement for a permit or an exemption, a mandatory requirement for the guidelines to be followed in a range of road, road-related and off-road environments is unlikely to be any more effective than encouraging that the guidelines be used as a voluntary framework.

We therefore do not propose to expand the scope of the guidelines to other operating domains. We agree with stakeholder feedback that the guidelines form part of a voluntary framework that trialling organisations should be encouraged to use. Section 2.3 of the guidelines provide:

Where a trialling organisation does not require an exemption or permit, the organisation is still encouraged to follow the guidelines to help ensure their vehicles are operating safely and in compliance with Australian laws. In the event of an incident or breach involving the automated vehicle, consideration of the guidelines could be relevant in demonstrating that the trialling organisation took appropriate steps to minimise the risk of the incident or breach occurring.

We will amend section 2.3 to make it clearer that the guidelines can be followed voluntarily for trials conducted in range of operating domains.

# 4.3 Heavy vehicles

The guidelines apply to both light and heavy automated vehicle trials. The guidelines state (in section 2.5):

Trialling organisations may need to consider and include additional mitigation factors in their safety management plan to address any additional risk posed by their heavy vehicle trial. This may include consideration of network access, community consultation and engagement.

Thus, the guidelines allow jurisdictions the flexibility to require trialling organisations to consider more specific issues that may be more relevant to heavy vehicle trials (for example, infrastructure and route selection issues) without being prescriptive.

In the discussion paper, we asked if there were any additional criteria or matters relevant to the trials of automated heavy vehicles that should be included in the guidelines. Transurban suggested that the guidelines should require consideration of heavy vehicle loading in safety plans. It noted that while initial trials may be conducted with unladen or lightly loaded vehicles, there is likely to be a progression to tests at full load capacity and the dynamics of the vehicle will vary markedly over this progression. DIT SA did not see a compelling reason to revise the guidelines to be heavy vehicle specific. A government stakeholder considered that the current guidelines are appropriate for heavy vehicles and should retain flexibility around requirements for heavy vehicles trials. Its preference was that the guidelines explicitly recognise that there are regulatory requirements specific to heavy vehicles by including a high-level statement. The ACT Government and TMR QLD did not consider that there was a need to revise the guidelines to include any heavy vehicle specific matter, though TMR QLD noted that there may be heavy vehicle–related considerations that affect automated heavy vehicles and that it may assist applicants if the guidelines provided some more general advice about these considerations.

#### NTC conclusions

The guidelines already acknowledge that additional matters may need to be considered in relation to trials of automated heavy vehicles without being prescriptive about these requirements. This allows jurisdictions the flexibility to require trialling organisations to consider more specific issues that may be relevant to trials of automated heavy vehicles. The guidelines recognise that road transport agencies have a responsibility to ensure automated vehicle trials are safe, including ensuring they are only run in appropriate conditions and that safety risks are managed appropriately. These agencies can impose conditions on permits and exemptions to address these matters. We therefore do not propose to amend the guidelines to explicitly prescribe additional criteria.

#### Key points

- Standardised assessment tools and template documents could help streamline automated vehicle trial approval processes for industry and government.
- Trialling organisations would benefit from easily accessible information about trial application requirements, importation processes and other useful information about trialling automated vehicles in Australia.

### 5.1 Overview

In the discussion paper, we asked whether additional information should be included in the guidelines to:

- provide information about application processes for an exemption or permit to conduct a trial
- provide information about importation processes
- include other relevant and useful information about initiating and conducting a trial from importation to operation.

Government and industry stakeholders agreed that standardised assessment tools and easily accessible information about application processes could help streamline trial application and approval processes. Stakeholders also suggested a range of information that could be made available to trialling organisations. In chapter 6 we discuss how governments can work together to streamline and provide clearer information about application processes.

# 5.2 Application process

In the discussion paper, we asked stakeholders about the challenges they had faced with administrative processes when applying for or approving trials of automated vehicles, and how these could be addressed. We noted that trialling organisations had talked about the lack of a clear understanding of the required standard of documentation at the beginning of the process and the iterative nature of the application process.

We heard varied views, with some stakeholders finding the process smooth and others finding it long, complicated and iterative. EasyMile stated that application and approval processes are 'iterative, burdensome and vary from state to state'. It supported the creation of an easy-to-follow checklist of requirements and consistent template documents. Transurban commented positively on the Victorian Department of Transport's iterative process in which they contribute to the development of final trial and safety plan details. RACQ and Redland City Council stated that as the obligation on jurisdictions to adopt and implement the guidelines is unclear, it would be valuable for jurisdictions to publish details of how they are adopting the guidelines. They suggested that where jurisdictions deviate from the guidelines in relation to legislation, insurance and other application information, it should be made explicit and alternative requirements stated clearly.

Government stakeholders acknowledged that approval processes can be iterative and complex. This can be due to the complex arrangements in place and the various parts of government that may be involved in approving a trial (ACT Government), or because trial applicants do not understand what information is required to support their application, including the level of detail and how to provide it (TMR QLD). Governments have evolved and refined their assessment frameworks over time (a government stakeholder and TMR QLD) and they seek to continuously improve their assessment approach (a government stakeholder). Greater clarity in requirements can reduce assessment and processing times (TMR QLD). Government stakeholders supported streamlining processes and agreeing to standardised assessment tools (subject to specific jurisdictional requirements).

#### NTC conclusions

We agree with stakeholder feedback that there would be benefits to industry and governments if approval processes could be streamlined and simplified through:

- a greater use of template documents and standardised assessment tools
- making information that is useful and relevant to trialling organisations more easily available.

We do not consider that the guidelines are the best repository for this kind of information because that information will need to be kept up to date and refined over time to reflect best practice and lessons from approval processes across jurisdictions. Including the information in the guidelines would only allow for changes when the guidelines are reviewed (every two years).

We therefore do not propose any changes to the guidelines themselves to achieve greater standardisation of assessments and approvals of automated vehicle trials. However, in chapter 6, we discuss how governments can work together to streamline and provide better information about application processes.

#### 5.2.1 Importation process

Before applying for a permit or an exemption to conduct a trial, trialling organisations will generally import their vehicle or vehicles into the country. The importation process is administered by the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC). This process is not covered by the guidelines. However, importation is an important part of the overall trial application process.

DITRDC has noted there are three vehicle import approval pathways under the *Motor Vehicle Standards Act 1989*:

- type approval for supply in unlimited numbers of 'standard' vehicles that fully meet all applicable Australian Design Rules (including any for ADSs)
- type approval for supply in unlimited numbers of 'non-standard' vehicles that meet the majority of applicable Australian Design Rules
- concessional approval for vehicles that do not meet all applicable Australian Design Rules. All automated vehicles imported for trials to date have been imported under this pathway.

In the discussion paper, we asked stakeholders what works well in the automated vehicle importation process and what the challenges are. DIT SA submitted that trialling organisations have indicated that the importation process is cumbersome, inadequate and expensive. In individual stakeholder meetings, some trialling organisations reported that the process took longer than expected, resulting in delays to initial project timeframes. One road

transport agency noted that there was potentially duplication between information required for vehicle import approval and in-service trial approval. This can be confusing to trialling organisations. Some stakeholders noted that specific guidance or checklists for automated vehicle importation would be useful. Feedback to the discussion paper indicated that states and territories assist trialling organisations by providing letters of in-principle support for importation (TMR QLD, a government stakeholder, targeted consultation with industry stakeholders) and that this works well. RACQ and Redland City Council mentioned that the importation process was made easier by contracting out the process to the vehicle supplier. The challenges associated with the importation process for trial vehicles raised by stakeholders included the following:

- There is confusion about when various insurance cover and arrangements would apply (RACQ and Redland City Council).
- The restriction on use of vehicles that do not comply with Australian Design Rules to 'for trial purposes only' affect the vehicles' sale or transfer at the end of the trial and thus the value of the vehicle (TMR QLD). EasyMile submitted that the clause specifying that vehicles need to be returned or destroyed after four years is unrealistic.
- The luxury car tax (LCT) causes barriers to trialling in Australia (DIT SA, RAC WA, TMR QLD).<sup>25</sup> TMR QLD submitted that an LCT waiver is only available to importers who can establish the learnings from the research that will be provided back to the vehicle manufacturer. This requirement discourages road authorities and research institutes from importing automated vehicles for research purposes. It submitted that because Australia does not have a light vehicle manufacturing industry, any modifications to an automated vehicle must be made by the vehicle manufacturer or equipment supplier overseas and this can result in relatively minor modifications incurring considerable costs to the importer once the LCT is applied. In targeted consultation, we found that to avoid paying LCT, some trialling organisations imported their vehicles as research vehicles, which meant that no further vehicles could be imported for commercial purposes. In one instance, a trialling organisation noted they were able to resolve this issue with DITCRD, which resulted in an exemption from the tax; however, this would not be a feasible approach for companies wanting to move past a limited trial phase.
- Conditions applied to the importation approval that impose a specific location requirement may limit opportunities for trialling organisations that seek to expand on the research objectives for their trial (a government stakeholder).
- The importation process is complex and unpredictable. Easy Mile submitted that while the concessional approval pathway provides an initial entry point for automated vehicles, 'it is a tedious and non-linear process'.

Stakeholders acknowledged that an approval pathway is available for importing nonstandard vehicles (RAC WA) but queried whether the concessional approval pathway is adaptable to importing larger numbers of test vehicles (EasyMile).

In its submission to the discussion paper, DITRDC noted that it has published guidance on what information should be provided when applying for an import approval to promote consistency of decision-making during application processes.<sup>26</sup> However, circumstances surrounding trials differ. There are no limits to the number of vehicles that may be trialled in

<sup>26</sup> The guidance published by DITRDC is available at

<sup>&</sup>lt;sup>25</sup> The LCT is a tax on cars (of less than two tonnes and fewer than nine passengers) with a value above a threshold. It is imposed at the rate of 33 per cent on the amount above that threshold.

https://www.infrastructure.gov.au/vehicles/imports/import\_options/av.aspx.

Australia and DITRDC assesses each import application on its merits. DITRDC suggested that further work be undertaken with the NTC to determine whether the guidelines should include more information or link to resources about Commonwealth importation arrangements. DITRDC submitted that, as with any vehicle entering Australia, customs duties and taxes may be payable on trial vehicles and applicants should make enquiries with the Australian Taxation Office and the Department of Home Affairs.

#### NTC conclusions

We note that the focus of the guidelines is on the substance of trial conditions. We think it is preferable to maintain that clarity of focus in the guidelines. Including additional information on importation processes would increase the possibility of that information becoming out of date unless the guidelines were reviewed and updated frequently.

However, more tailored information about the importation pathway for trials, requirements and potential taxes that can apply from the outset would be useful to trialling organisations. In chapter 6, we discuss ways that governments can work together to make this information available to trialling organisations.

#### 5.2.2 Additional information in the guidelines

The guidelines provide useful additional background information for trialling organisations. For example, they contain information about vehicle and driver regulation in Australia, trials that do and do not require an exemption or permit, other relevant Australian laws, and contact details for relevant Commonwealth and state and territory government agencies.

In the discussion paper, we noted that some stakeholders have suggested the guidelines could provide further useful information to enable them to be used as a 'one-stop shop' for national information on trials. We sought stakeholder feedback on what information would be useful to include. Stakeholders suggested a range of information:

- case studies of existing trials (Brisbane City Council) or a resource pack of successful trials (RAC WA) with points of contact from Austroads or from state governments (EasyMile, RAC WA)
- specific information that would be helpful or informative in preparing an application for example, applicable legislation (RACQ and Redland City Council)
- more guidance for deploying shuttles for passenger transport services (RACQ and Redland City Council)
- information about skill sets required to prepare an application, facilitate or implement trials (for example, traffic engineers) – outlining skill sets required for application elements would help trialling organisations evaluate whether they have the skills or funds to outsource where required, and thereby evaluate the overall viability (RACQ and Redland City Council)
- examples (from other trials) of any partnerships that were required for a successful trial for greater context of the work involved in deploying an automated vehicle, particularly for non-service provider agencies like local governments (RACQ and Redland City Council)
- specific information about the importation process for vehicles to be trialled
- information about disability and accessibility legislation (RACQ and Redland City Council)
- insurance requirements, insurance availability and possible gaps in insurance cover (RACQ and Redland City Council)

- links and references to different state and territory entities and authorities (ACT Government, DIT SA) – to be maintained on a website because including the information in the guidelines would date quickly (ACT Government)
- broad passenger transport regulatory requirements (TMR QLD).

#### NTC conclusions

As noted above, the focus of the guidelines is to set out the criteria that must be addressed in any application for an automated vehicle trial. Stakeholders have drawn attention to a range of information that could be useful and relevant to trialling organisations navigating an automated vehicle trial application process. We do not consider the guidelines the best repository for this information, but we agree that it would be useful to have additional information available to trialling organisations and other stakeholders to make the trial process as efficient as possible. We discuss further work that is required to implement this in chapter 6 of this paper.

We will update the guidelines with the most recent contact information for DITRDC and state and territory road transport agencies.

#### Key points

- The review of the guidelines generated useful feedback on actions by government to encourage more complex trialling and increase readiness for commercial deployments of automated vehicles in Australia.
- There are ways in which government can make information about trialling more accessible and encourage larger, cross-border and commercial trials.
- Streamlining application processes and evaluation processes, and sharing learnings, will help governments prepare for these larger trials.

### 6.1 Overview

In the discussion paper, we asked what the barriers were to larger, cross-border and commercial trials as well as commercial deployments of automated vehicles.

The feedback we received from industry and government stakeholders indicates that the following would be beneficial to trialling agencies:

- greater standardisation of assessment and approval processes
- greater availability of relevant information regarding automated vehicle trialling.

Stakeholders highlighted the need to streamline application processes and assessment tools and maximise agency-level collaboration. Stakeholders also pointed to other considerations like alignment between the trial guidelines and the safety criteria that ministers have agreed an ADS and ADSE must self-certify against at first supply of an automated vehicle into the Australian market.

Based on stakeholder feedback, we are recommending that the NTC, in conjunction with state and territory governments, facilitate sharing of best practice tools to improve trial application processes and consider arrangements for approving applications for trials across borders. This would result in greater harmonisation of trial requirements across states and territories and facilitate larger and more complex trials that are a step towards commercial deployment.

We are also recommending the creation of an online portal to centralise information about applying for an automated vehicle trial in Australia and that the portal provide links to a range of information that trialling organisations would find useful and relevant in putting together an application for an automated vehicle trial.

We will update the guidelines wherever relevant for greater alignment with the first supply safety criteria.

# 6.2 Encouraging larger, cross-border and commercial trials

Large-scale trials, cross-border trials and commercial trials are an important step towards commercial deployments of automated vehicles. In the discussion paper, we sought

feedback on the regulatory or other barriers to running these trials and how these could be addressed.

#### 6.2.1 Large-scale trials

There have not yet been any trials of large numbers of automated vehicles in Australia. The guidelines do not restrict the number of automated vehicles allowed in a trial but state that the number of vehicles that will be approved to trial will be determined by the road transport agency. In the discussion paper, we asked whether there were any barriers to running larger trials and, if so, how they should be addressed.

Several stakeholders noted there were no regulatory barriers to large-scale trials (ACT Government, AMC, Brisbane City Council, DIT SA, TMR QLD). RACQ and Redland City Council submitted that alternative transport providers face significant barriers in operating in legislated contract areas where current public transport operators exist (RACQ and Redland City Council). They suggested that overcoming this barrier would require jurisdictions to lead or coordinate the delivery of larger public transport trials. EasyMile noted the current importation cap of trialling vehicles under the Motor Vehicles Standards Act is a barrier. It also submitted that Australia's aspirations to create a favourable environment to facilitate automated vehicle innovation has faltered after the first wave of single vehicle trials. It submitted that supporting larger projects is essential. DIT SA submitted that the guidelines should address larger AV fleet trials.

Stakeholders made suggestions for encouraging larger trials including:

- encouraging a move to an ODD focus for larger trials over time this will overcome the practical challenges of extending tightly controlled traffic management operations to wider areas and longer timeframes (Transurban)
- greater standardisation and harmonisation across states and territories to support a common approach to large-scale trials (TMR QLD, Transurban)
- while it is possible to import small number of vehicles under permits for larger scale operations, international partners would look to transfer technology to vehicles already approved under Australian Design Rules. Rather than expanding permit schemes, future Australian Design Rules should cater for automation components (Transurban).

The ACT Government submitted that managing safety and the perception of safety within the community would be the key difference with facilitating large-scale trials. Government stakeholders submitted that the risks associated with larger trials would need to be assessed on a case-by-case basis. Differences in risk appetite and political drivers across jurisdictions may result in different assessments of similar trial processes, and there should be flexibility for the jurisdiction to determine the requirements based on the nature and complexity of the trial proposed (TMR QLD, a government stakeholder).

#### NTC conclusions

As discussed in section 3.2.2 of this paper, we will update the guidelines to clarify that trial location could either be specific roads, routes or regions and/or the vehicle's ODD. In section 6.3, we discuss how governments can work towards greater standardisation of assessment and approval processes.

#### 6.2.2 Commercial and passenger trials

The guidelines allow automated vehicles to be commercial in nature – for example, offering a ridesharing service for a fee. We sought stakeholder feedback on whether the guidelines should continue to allow commercial passenger services in automated vehicle trials and, if

so, whether the guidelines should reference any additional criteria. Passenger service trials may be commercial (for a fee) or non-commercial (on a no-fee basis) and the guidelines aim to facilitate both types of trials.

Stakeholders supported the guidelines allowing for commercial services (AMC, Brisbane City Council, DIT SA, EasyMile, RAC WA, TMR QLD, a government stakeholder). Stakeholders submitted that it made sense for the guidelines to cover commercial passenger services because passenger services were likely to be the early and primary use case for automated vehicles (Brisbane City Council, DIT SA, TMR QLD).

TMR QLD pointed to the higher risk profile of passenger trials and suggested that the guidelines could provide more guidance to jurisdictions to manage this risk. DIT SA considers that the guidelines should include minimum standards for providing commercial passenger services. We also received this feedback through more targeted consultation with government stakeholders. DIT SA, RACQ and Redland City Council, and TMR QLD submitted that the minimum accessibility requirements mandated under the Commonwealth Government's Disability Standards for Accessible Public Transport 2002 should be explicitly included in the guidelines. We also heard this from disability advocates during individual stakeholder meetings. The ACT Government supported developing a set of consistent national requirements for trials of commercial passenger service vehicle trials. It noted the importance of fully informing the general public, other road users and potential passengers of the service about the nature and parameters of the trial. The trialling organisation should develop the appropriate information campaign in consultation with jurisdictions. The ACT Government also noted the need to assess other regulatory frameworks for approving a commercial passenger service trial. Additional requirements may need to be imposed - for example, regular cleaning requirements due to the COVID-19 pandemic.

TMR QLD submitted that the guidelines should be updated to provide an overview of the broad transport regulatory considerations relevant to automated vehicle trials. It acknowledged that it would be challenging to comprehensively cover all passenger transport requirements in the guidelines due to variance in passenger transport regulation at the state and territory level as well as variance in jurisdictional requirements based on the type of passenger transport service and specific trial proposal.

RACQ and Redland City Council submitted that a definition of commercial passenger services should distinguish between research trials that offer a passenger service and early-stage commercial deployments.

#### NTC conclusions

We agree that the guidelines should continue to facilitate commercial trials.

We do not propose to introduce a definition for 'commercial trials' in the guidelines or to distinguish the requirements for trials conducted for research purposes. The intent of the guidelines is to manage the safety risks of the trial. The assessment of these risks will have to be carried out on a case-by-case basis, and the relevant road agencies need the flexibility to manage these risks through specific requirements. The guidelines set out the criteria for assessing the risks posed by a trial irrespective of the use case.

Stakeholder feedback supports the guidelines providing more detail to guide jurisdictions in their assessment of risks to the passengers/occupants in a passenger service trial. We will amend the guidelines to include some high-level criteria for passenger service trials. Based on feedback, we will also update the guidelines to make it explicit that trialling organisations must comply with applicable legislation – for example, passenger transport laws, disability standards and work, health and safety laws – unless an exemption or permit is granted by the relevant road transport agency.

We acknowledge that it would be useful for trialling organisations to have more detailed information on regulatory requirements for passenger transport services before they seek approval. However, due to the variance in legislative requirements across states and territories, and the potential for changes to those requirements over time, we consider this information is best kept out of the guidelines.

#### 6.2.3 Cross-border trials

Cross-border trials will be an important step in ensuring automated vehicles can manage road rule and infrastructure changes as they cross jurisdictional boundaries in Australia. Cross-border trials may be important in freight and platooning trials in the future.

There have been no cross-border trials of automated vehicles in Australia to date. The guidelines state that trialling organisations should nominate states and territories in an application if they intend to run trials in more than one state.

In the discussion paper, we noted that potential approaches to facilitate cross-border trials, such as a mutual recognition framework or a single national scheme, would require legislative reform and coordination between states and territories. We sought feedback on barriers to cross-border trials and potential non-regulatory approaches to facilitate these trials.

EasyMile submitted that undertaking a trial application process across two states and territories is unrealistic and unappealing under the current arrangements. It would require the duplication of two similar but different approval processes across two states. It suggested that while a single national framework was the long-term end goal, a mutual recognition framework could provide an interim solution. RACQ and Redland City Council submitted that legislative differences across states and territories, in relation to insurance, disability access for public transport operations and passenger transport legislation, could pose a barrier.

A government agency submitted that cross-border trials would be complex given each jurisdiction has its own personal injury schemes and would have to recover from each other. DIT SA submitted that difficulty arises with the lack of standardisation in requirements, application and assessment tools in applying and assessing cross-border trials. RACQ and Redland City Council noted that legislated public transport operator contract areas (which are often concurrent with local government areas) are a barrier to extending services into other local government areas, even for non-automated vehicles. It also noted that local government area boundaries could require multiple stakeholder agreements.

Government stakeholders supported close coordination between the jurisdictions on any potential cross-border trials. A government agency submitted that further collaboration between jurisdictions should resolve any issues for cross-border trials. Transurban reiterated that encouraging a move to an ODD focus will overcome the practical challenges of extending tightly controlled traffic management operations to wider areas. TMR QLD reiterated that greater standardisation of requirements, application and assessment tools would support more streamlined processes relating to cross-border trials. The FCAI submitted that the proposed national regulator for automated vehicles should assume responsibility for approvals of automated vehicle trials. DITRDC suggested that as Australia moves towards hosting larger, cross-border and more complex trials, consideration should be given to whether an organisation could be tasked with maintaining the guidelines and assisting road agencies and trialling organisations to administer trial requirements as well as coordinating trial evaluations. Over the longer term, consideration should be given to whether the proposed automated vehicle national regulator could perform this role.

#### NTC conclusions

Due to differing jurisdictional legislative requirements, it may not be possible for a single application for a trial to be recognised and approved by all states and territories. A mutual recognition framework would require amendments to state and territory legislation, and implementation of the framework would require coordination between states and territories.

However, government stakeholders agree that more can be done, without legislative amendment, to streamline application processes and assessment tools. In section 6.3, we discuss further work that governments can undertake to facilitate cross-border trials and greater harmonisation of automated vehicle trial requirements.

We acknowledge the suggestion in stakeholder submissions that in the longer term the proposed national regulator for in-service safety of automated vehicles should take responsibility for the guidelines and assisting in the trial approval process. We note it may be several years before this regulator is established.

# 6.3 Streamlining application processes and greater harmonisation

As discussed in chapter 5, government and industry stakeholders agree that developing template documents and standardised assessment and approval tools would simplify application and approval processes. These tools would also reduce duplication in assessment of cross-border trials and encourage larger trials.

Governments can improve communications about the trials framework for potential trial applicants and collaborate to improve the application process. Jurisdictions have developed their own assessment tools and template documents to assist with the assessment and approval of automated vehicle trial applications. Now that all states and territories have had some trials experience, it would be useful to compare application documentation requirements and assessment tools to identify best practice and moving towards standardising and streamlining processes.

All stakeholders agree on the benefits of trialling organisations having easy access to relevant and useful information. This could include information on regulatory requirements and the availability of insurance or resource packs from other successful trials. This could improve the quality of applications and help expediate approval times.

Based on stakeholder feedback, we are proposing that the NTC, in conjunction with state and territory governments, share best practice tools to improve trial application processes and safety learnings, and consider arrangements for approving applications for trials across borders. This would result in greater harmonisation of trial requirements across states and territories and facilitate larger and more complex trials that are a step towards commercial deployment. This should reduce duplication and the compliance burden on trialling organisations wishing to undertake cross-border trials. The NTC will report on this work to the Infrastructure and Transport Council in November 2021.

We are also recommending the creation of an online portal to centralise information about applying for an automated vehicle trial in Australia. The portal would provide links to a range of information that trialling organisations would find useful and relevant in putting together an application for an automated vehicle trial.

We note that Austroads is developing a repository on connected vehicle, automated vehicle and low emission vehicle trial projects and early deployments across Australia and New Zealand. This will be a useful resource for organisations seeking to undertake automated vehicle trials.

# 6.4 Government evaluation framework and shared learnings

Evaluation is an important part of completing any government initiative or decision. Some road transport agencies have frameworks for evaluating trials, including infrastructure performance, community acceptance and approvals processes. Governments have supported a more standardised evaluation framework across states and territories. Trialling organisations will provide their own end-of-trial report on trial outcomes to the road transport agency. We sought feedback on whether there should be a more standardised government evaluation framework for automated vehicle trials. We also sought feedback on whether the results of these evaluations should be shared between states and territories and how commercially sensitive information should be treated.

We heard from stakeholders in individual meetings that there is great discrepancy in how trials are evaluated across states and territories. Governments did not have formal evaluation frameworks, and there was no evaluation of trials across jurisdictions. Some governments noted that they evaluate particular trials comprehensively. However, some governments did not evaluate trials at all. Keeping trial learnings within a jurisdiction was seen as a missed opportunity.

Several stakeholders supported a standardised evaluation framework across states and territories (ACT Government, AMC, Brisbane City Council, DIT SA, RAC WA, RACQ and Redland City Council, TMR QLD, Transurban and two government agencies). DITRDC supported governments collaborating to develop an evaluation framework. DIT SA submitted that at a high-level the evaluation should provide for things such as aim, use case, operation information and findings and recommendations.<sup>27</sup> It considered that sharing between jurisdictions should extend to incidents and key learnings from trials. It suggested that a national register be developed to report vehicle collisions and incidents. EasyMile did not consider a standardised framework is necessary because no two trials are similar and the evaluation relies heavily on the scope of the project. The FCAI did not support sharing results and submitted that many trials may include considerable commercially sensitive information. Transurban also noted the issue of sharing commercially sensitive information and suggested that any standardised framework should not include commercially sensitive information. EasyMile supported early discussions between trialling organisations and jurisdictions to determine which elements of the evaluation will be commercial-in-confidence. TMR QLD also noted that any standardised framework could consider confidential information. The ACT Government supported sharing results of trials provided any commercial-in-confidence information was kept secure.

#### NTC conclusions

Automated vehicle trials may be conducted with a range of objectives and based on different use cases. The factors or outcomes that the approving organisation may be interested in evaluating are not likely to be the same across all trials. There may, however, be a minimum set of outcomes that each trial can report against (for example, safety or technology performance) that would be useful if shared between jurisdictions. Stakeholder feedback indicates that confidentiality of information is likely to be an issue.

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<sup>&</sup>lt;sup>27</sup> A full list of what should be included can be found of page 12 of DIT SA's submission.

A standardised end-of-trial evaluation that can be shared between jurisdictions requires agreement on a minimum set of evaluation outcomes. This work will need to consider what information can be shared while maintaining commercial confidentiality. We recommend that Austroads lead work on developing a standardised government evaluation framework.

As discussed in section 6.3, we are also proposing that the NTC lead further work, in conjunction with state and territory governments, to facilitate sharing of safety learnings between jurisdictions.

# 6.5 Transition to commercial deployment

The guidelines and the associated state and territory exemption or permit processes are not intended to cover large-scale commercial deployments. The NTC and governments are continuing to develop the framework for commercial deployment of automated vehicles. We have also sought to further align the guidelines with the first supply safety criteria to ease the eventual transition from trials to commercial deployment. In the discussion paper, we asked stakeholders how to better facilitate this transition. We also sought views on any other matters we should consider as part of this review.

During targeted stakeholder sessions we heard that the guidelines need to closely follow the regulatory framework being developed for commercial deployment. Brisbane City Council noted the risk that different jurisdictions will allow commercial deployment at different times and under different circumstances. RACQ and Redland City Council noted a need for an overarching vision of how automated vehicles were to be integrated into the network to provide greater certainty and direction for businesses considering larger trials and commercial deployments. The FCAI stated there was a need for an appropriate narrative from regulators and enforcement to manage consumer expectations for the outcomes of automated vehicle trials and deployment. Government stakeholders reiterated the need for greater alignment between the guidelines, state and territory trial schemes and the end-state automated vehicle regulatory framework.

We also sought views more broadly on whether there are any other matters we should consider as part of this review. The Law Institute of Victoria submitted that all trials be required to comply with existing privacy laws and principles. A government agency submitted that the guidelines should explicitly cater for on-road trials of modified vehicles, how to identify the ADSE in such circumstances, and how safety is to be evaluated.

In targeted consultation, stakeholders across all sectors noted the apparent decline in funding for automated vehicle trials after a 'race to start'. Trialling organisations and road transport agencies noted the importance of government funding to incentivise international companies to bring their technology to Australia. One trialling organisation considered state and territory governments needed to be clear about the outcomes they were trying to achieve from trials and align funding to achieving these outcomes. If outcomes were clear at the outset, trialling organisations could put together trials for a more appropriate use case from the start.

#### NTC conclusions

We note the need for greater alignment between the end-state framework and the trial guidelines. We will update the guidelines to align them to the extent possible with the end-state regulatory framework. For example, the guidelines will now provide that the trial location can be described in terms of specific location or the ODD. We will also include the requirement that trialling organisations should consider how data will be recorded and shared with law enforcement agencies. This is consistent with the safety criteria that transport ministers have agreed to.

The development of more streamlined and harmonised trial approval and assessment processes across governments (see above) will also support eventual commercial deployment of automated vehicles.

Beyond encouraging trials, governments may also need to look holistically at Australia's overall readiness for automated vehicles across trials, regulation, infrastructure and public attitudes in order to encourage commercial deployments of automated vehicles. We are recommending that the NTC, in conjunction with the Commonwealth government, state and territory governments and Austroads, develops a scope and costs of reviewing Australia's overall readiness for the commercial deployment of automated vehicles, with a focus on trials, regulation, infrastructure and public attitudes, with a report to the Infrastructure and Transport Council by May 2021.

# 7 Summary and next steps

- Transport ministers have agreed that the updated guidelines be published by the NTC and Austroads.
- Further work is to be undertaken by DITRDC, the NTC and Austroads in collaboration with state and territory governments to achieve clearer communications about the trials framework and greater harmonisation of requirements across jurisdictions.
- The NTC should consider further work on Australia's overall readiness for the commercial deployment of automated vehicles, with a focus on trials, regulation, infrastructure and public attitudes.

# 7.1 Summary of changes to guidelines

As discussed throughout this paper, based on stakeholder feedback we have updated the guidelines as follows:

- **Trials that do not require a permit or an exemption:** Clarify that the guidelines are intended to facilitate trialling of a range of technologies in a range of operating domains (including off road and road-related areas). Trialling organisations are still encouraged to follow the guidelines where they do not require an exemption or permit (due to the technology being trialled or the operating domain within which the trial is undertaken).
- Compliance with Australian laws: Note that there are other relevant Australian laws that trialling organisations must comply with, including passenger transport laws, disability standards and work, health and safety laws.
- Management of trials:
  - **Purpose of the trial:** Trialling organisations must provide the purpose of the trial and the outcomes sought from the trial.
  - **Trial location:** The proposed trial location can be described as specific roads, routes or regions and/or the vehicle's ODD.
  - **Traffic management plan:** 'Speed environment' will be added to the list of matters relating to the traffic environment that require consideration.
  - **Engagement with public and other stakeholders:** Clarification that key stakeholders include law enforcement agencies.
  - Accessibility: Trialling agencies must set out how they intend to manage specific safety and accessibility concerns, and interactions with road users or passengers with disabilities. Trialling agencies may need to demonstrate compliance with applicable disability and accessibility legislation if they are providing passenger services.
- Insurance
  - Appropriate insurance: Trialling organisations should consult with the relevant road transport agency about insurance in the first instance.

- Safety management plans:
  - Safety culture: Safety management plans will need to demonstrate that the trialling organisation has a safety culture that will enable it to manage emerging risks during the trial.
  - Security of the automated system: Trialling organisations may need to consider how to minimise cybersecurity threats, vulnerabilities and the consequences of intrusions and breaches during the trial.
  - Risks to occupants: Trialling organisations conducting trials of passenger services, or trials with a human driver or operator present in the trial vehicle, will need to demonstrate that risks to all occupants' safety have been considered and addressed.
  - Other road users: A trialling organisation will need to demonstrate that it has identified the risks posed by the behaviour of other road users and has adopted risk mitigation strategies to manage those risks to the extent possible.
  - Interaction with enforcement and emergency services: The applicant must demonstrate how it will ensure safe interaction with emergency services (including but not limited to police, fire and ambulance services) when the ADS is engaged. This includes interactions on-road and at the roadside.
  - Appropriate transition processes: Clarify that practical processes for transitioning should include ensuring a human driver or operator is ready and has sufficient time to take control of the driving task when requested.
  - Operation within the ODD: The trialling organisation must describe how the ADS will be:
    - 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 of its defined ODD.
  - Human driver inattention: Trialling organisations will need to specify how they will mitigate, monitor and address human driver, operator or remote operator inattention.
  - Pre-trial testing: Clarify that approving agencies may at their discretion accept the results of appropriate testing conducted in other jurisdictions.
  - Fitness for duty: Clarify that remote operators are included within this requirement.
- Data and information:
  - Data recording and sharing capability: Data will need to be retained by the trialling organisation to the extent necessary to provide it to relevant parties (the length of time data is retained may depend on the purpose(s) the information could be used for – for example, law enforcement and insurance).
  - Provision of data/information for other incidents: Clarify that 'other incidents' includes when a human takes back emergency control of the vehicle, or the vehicle deactivates where there is not a human driver, that did not result in any injury or death (for example, using the emergency stop function to avoid a collision).
  - End-of-trial report: Provide examples of the type of information that may be included in an end-of-trial report – for example, what worked well in the trial, challenges faced during the trial and what was learned from the trial. Clarify that the outcomes of the trials should be considered in the context of the trial's original purpose.

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- Data recording and sharing capability: The trialling organisation must outline the data that will be recorded by the automated vehicle and how it will provide the data to relevant parties.
- Implementation:
  - Passenger trials: Passenger vehicles may need to comply with relevant state and territory passenger transport legislation, Commonwealth legislation setting out the disability standards for accessible public transport and any other applicable legislative requirements.

# 7.2 Recommendations

The review of the guidelines provided insights that could inform government decision making about future trials and planning for automated vehicle deployment.

We made recommendations to ministers for additional work to be undertaken to establish clearer communication about the trials framework and closer collaboration between state and territory governments on more advanced trials and sharing lessons learned. We also recommended that Australia further consider its readiness for commercial deployments of automated vehicles more generally.

Ministers have agreed to the following:

- The NTC will lead further work, in conjunction with the Commonwealth Government, state and territory governments and Austroads, to:
  - facilitate sharing of best practice tools to improve trial application processes and safety learnings
  - consolidate information for industry about applying for automated vehicle trials in Australia
  - consider arrangements for approving applications for trials across borders
  - develop a standardised government evaluation framework for trials, with the NTC to report back to the Infrastructure and Transport Council by November 2021.
- The NTC, in conjunction with the Commonwealth Government, state and territory governments and Austroads, will develop a scope and the costs of reviewing Australia's overall readiness for the commercial deployment of automated vehicles, with a focus on trials, regulation, infrastructure and public attitudes, and report our findings to the Infrastructure and Transport Council by May 2021.

As well as these actions, Austroads is developing a lessons learned repository for Australian and New Zealand trials of automated vehicle technologies, connected vehicle technologies and zero and low-emission vehicle technologies (noted in chapter 1). Once established, the repository will be populated with the outcomes and lessons from previous and future trials and made available to governments, trialling organisations and the public. In summary, the following agencies will be responsible for maintaining and improving the trials framework:

Action	Lead
Communication of the trials framework to industry	DITRDC
Reviewing the trial guidelines	NTC and Austroads, with further consideration of appropriate agency once the framework for the commercial deployment of automated vehicles is implemented
Sharing of best practice tools among state and territory governments	NTC and state and territory road transport agencies
Standardised government trial evaluation framework	Austroads
Repository of future technology trials (including automated vehicle trials)	Austroads

# 7.3 Review of the guidelines

Infrastructure and transport ministers directed that the guidelines be reviewed every two years. The next review of the guidelines will be undertaken in two years.

# Appendix A List of public submissions

Name of organisation	Description
ACT Government	Government of the Australian Capital Territory
Australian Motorcycle Council (AMC)	Peak body representing motorcycle users
Brisbane City Council	Local council
Commonwealth Department of Infrastructure, Transport, Regional Development and Communications (DITRDC)	Commonwealth government department
South Australian Department for Infrastructure and Transport (DIT SA)	State government department
Department of Transport and Main Roads Queensland (TMR QLD)	State government department
EasyMile	Trialling organisation
Federal Chamber of Automotive Industries (FCAI)	National peak body representing manufacturers and importers of passenger vehicles, light commercial vehicles and motorcycles in Australia
Human Integrated Internet of Things (Hi IoT)	Internet of Things company
JFA Purple Orange	Social profit organisation
Law Institute of Victoria	Peak body for Victorian legal professionals
Maurice Blackburn Lawyers	Law firm
Royal Automobile Club of Western Australia (RAC WA)	Automobile club and insurance company
Royal Automobile Club of Queensland (RACQ) and Redland City Council	Motoring club for and local council (joint submission) based in Queensland
Transurban	Manager and developer of urban toll road networks in Australia and the United States

# Glossary

Term	Definition
Australian Design Rules	National standards for safety, antitheft 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 ADS can safely perform the driving task in place of a human driver in the framework for the commercial deployment of automated vehicles. The ADSE will self-nominate by seeking type approval for the ADS under the <i>Road Vehicle Standards Act 2018</i> (Cwlth).
Automated vehicles	A vehicle with conditional to full automation (SAE levels 3–5). 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 12), which still require a human driver to perform part of the dynamic driving task.
Department of Infrastructure, Transport, Regional Development and Communications	Department of the Commonwealth Government responsible for administering the <i>Road Vehicle Standards Act 2018</i> (Cwlth).
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

Term	Definition
	driving task excludes strategic functions such as trip planning – where and when to travel and route selections.
First supply	The market entry of motor vehicles to Australia.
In-service	Vehicles supplied to the Australian market and are now in use.
<i>Motor Vehicle Standards Act 1989</i> (Cwlth)	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 <i>Road Vehicle Standards Act 2018</i> (Cwlth) replaces this Act.
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).
Road Vehicle Standards Act 2018 (Cwlth)	Commonwealth legislation to control the safety, environmental and antitheft 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</i> (Cwlth) once fully commenced.
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.
Infrastructure and Transport Council	Group comprising Commonwealth, state, territory and New Zealand ministers with responsibility for infrastructure and transport issues, as well as the Australian Local Government Association.

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[Accessed 11 August 2020].

Barkho, G., 2019. *US postal Service begins testing driverless delivery vehicles*. [Online] Available at: <u>https://observer.com/2019/05/usps-driverless-delivery-vehicles/</u> [Accessed 18 November 2020].

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