Automated Vehicle Program

National Transport Commission

July 2019

Approach

National Transport Commission

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1 Introduction

Key points

Australia has the goal of developing an end-to-end regulatory system to support the safe, commercial deployment of automated vehicles at all levels of automation.

The National Transport Commission (NTC) is working with other government agencies to deliver this framework.

1.1 Purpose

The purpose of this document is to outline the current National Transport Commission (NTC) automated vehicle reform program, including purpose, work completed to date, further planned reforms and interaction with other agencies. This document will be regularly updated as work progresses.

1.2 Why do we need reform?

Australia's laws do not currently support the deployment of automated vehicles. Our laws are designed for vehicles with human drivers. In a review in 2016, we found over 700 barriers in current legislation – state, territory and Commonwealth laws – to the deployment of more automated vehicles. Automated vehicles are expected to deliver safety, productivity and environmental benefits. Without reforms, Australians will not be able to gain these benefits.

In an automated vehicle, control of the vehicle will transfer from a human driver to a system and the entity responsible for this system. The law needs to recognise this change and have appropriate obligations to support safety and innovation.

1.3 About the NTC

The NTC leads national land transport reform in support of Australian governments to improve safety, productivity, environmental outcomes and regulatory efficiency. We are a key contributor to the national reform agenda with accountability to the Transport and Infrastructure Council and its advisory body, the Transport and Infrastructure Senior Officials' Committee. One of our focus areas is identifying and removing regulatory barriers to new, innovative transport services and products entering the Australian marketplace.

For more information, see: https://www.ntc.gov.au/about-ntc/who-we-are-what-we-do/.

1.4 Australia's goal – an end-to-end framework for automated vehicles

In November 2017, transport ministers endorsed a goal of an end-to-end regulatory system in place by 2020 to support the safe, commercial deployment of automated vehicles at all levels of automation.

The NTC continues to work towards this goal, however the timing (2020) is likely to change as we work through the regulatory issues and understand more about likely timelines for commercial deployment of these vehicles.

1.5 A coordinated approach across government

Our work complements other research and project activities undertaken by Austroads, road agencies and other organisations. These include Austroads' projects related to assessing the safety benefits of automated vehicles, any impacts of the automated vehicle regulation on registration and licencing processes and any impacts of automated vehicles on network infrastructure. Austroads is the peak organisation of Australasian road transport and traffic agencies.

More information about Austroads' projects is available on the Austroads website: https://austroads.com.au/drivers-and-vehicles/connected-and-automated-vehicles.

We also work closely with the recently formed Commonwealth Office of Future Transport Technology, which is part of the Department of Infrastructure, Transport, Cities and Regional Development.

We have a government Senior Advisory Group and Legislative Policy Working Group with representatives of the Commonwealth government, state and territory governments and other key agencies.

Automated Vehicle Decision Making and Priority Setting

Transport and Infrastructure Council
Makes decisions on national reforms to improve the efficiency and productivity of Australia's infrastructure and transport systems Sets national reforms priorities. Current priorities include removing barriers to innovation and capitalising on new and emerging technologies
Transport and Infrastructure Senior Officials' Committee
Advises and assists the Transport and Infrastructure Council on all non-infrastructure priorities

Australian Government Automated Vehicle Roles and Responsibilities

Department of Infrastructure, Transport, Cities and Regional Development	**National Transport Commission**	**State and territory transport and road agencies**	**Austroads**
Office of Future Transport Technology Coordination across portfolios Land transport technology policy framework and action plan	Develop and propose national law reform to enable the commercial deployment of automated vehicles. Current automated vehicle reforms: • In-service safety for automated vehicles • Motor accident injury insurance and automated vehicles • Government access to C-ITS and automated vehicle data	Responsibilities include: • In-service vehicle regulation • Vehicle registration • Road rules and driver licensing • Road management • Approval/ regulation of automated vehicle trials	Conducts road and transport research to inform policy development and guidance on the design, construction and management of the road network and its associated infrastructure. Current automated vehicle projects: • Infrastructure changes to support automated vehicles on rural and metropolitan highways and freeways • Pavement markings for machine vision • Integrating advanced driver assistance systems in driver education
Vehicle Safety Standards Branch Importation and first supply of automated vehicles Review of Australian Design Rules International standards harmonisation			

1.6 The challenges of automated vehicle reform

There are several challenges in developing reforms to support automated vehicles. These include the challenge of dealing with existing regulatory and government structures that are designed for human driven vehicles, not for automation. The most significant challenges are due to the unknowns about vehicle automation, which include uncertainties around:

- The timing of deployment
- Applications that will be deployed
- The mix of technologies that automated vehicles will use
- How automated vehicles will change vehicle ownership and business models

Reforms will need to provide flexibility to allow for the technology to continue to evolve.

Across our automated vehicle program, the NTC has aimed to ensure that:

- Reforms are outcomes based, with safety as the key outcome, allowing industry to determine how best to achieve those outcomes
- Reforms are neutral as to the technologies, applications and business-models that industry develop
- Reforms are nationally consistent and internationally aligned.

1.7 International alignment

The Transport and Infrastructure Council has noted the 'importance of not getting ahead of international developments' (Transport and Infrastructure Council, 2018a). Other countries are at different stages of developing regulations for automated vehicles; no jurisdiction has a complete system of regulation as yet.

The Commonwealth Department of Infrastructure, Transport, Cities and Regional Development represents Australia at the United Nations (UN) World Forum for the harmonization of vehicle regulations (WP.29). It participates in the development of United Nations vehicle standards through WP.29. Australia harmonises its national vehicle standards with UN vehicle regulations. WP.29 has prioritised development of comprehensive vehicle standards for level 3 automation.

We are also monitoring international regulatory developments by the UN Global Forum for Road Traffic Safety (WP.1) which focuses on driver regulations. The Department of Infrastructure, Transport, Cities and Regional Development represents Australia at WP.1. The NTC also contributes to WP.1 and has presented at a WP.1 meeting about automated vehicle reform in Australia.

Driver regulations developed by WP.1 are complementary to the vehicle standards developed by WP.29.

We are also monitoring legislative reform in other key automotive markets, such as the United States and Europe.

1.8 Background – what are automated vehicles?

Automated vehicles are vehicles that include an automated driving system (ADS) that is capable of monitoring the driving environment and controlling the dynamic driving task (steering, acceleration and braking) with limited or no human input.

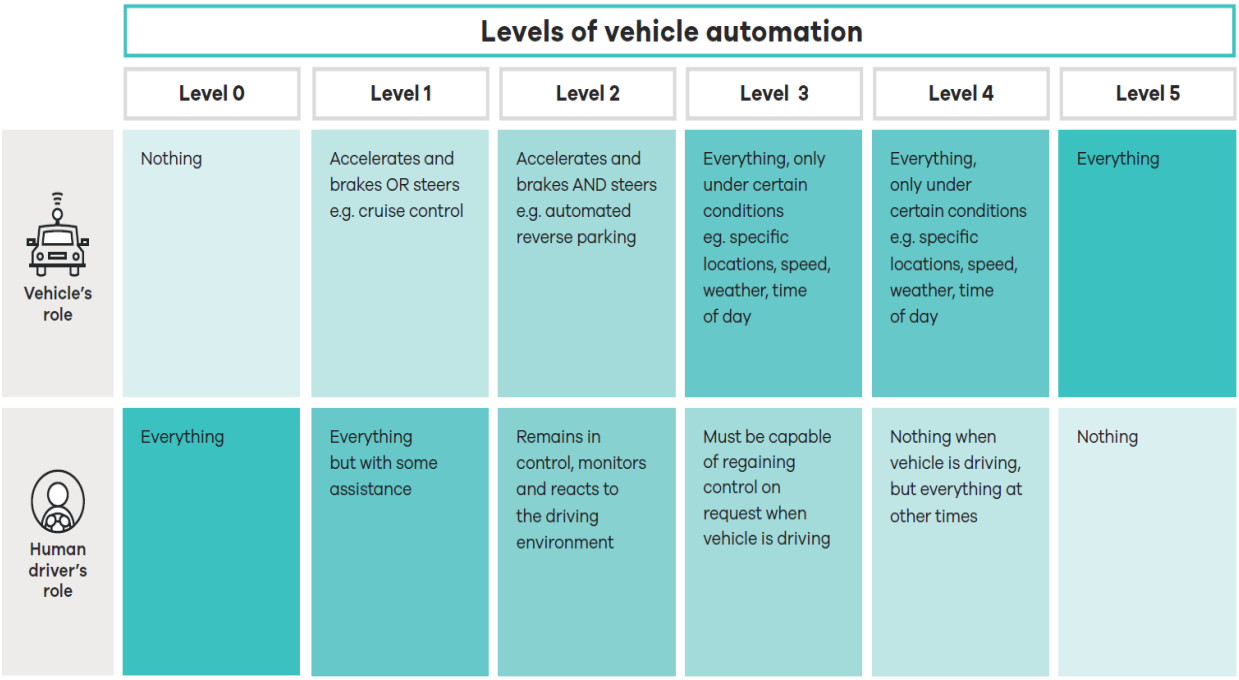
This could include:

- vehicles based on existing models, with automated functions
- new vehicle types with automated functions
- aftermarket devices or software upgrades that add automated driving functions to existing vehicles.

New vehicles with high levels of automation are expected to arrive on our roads from around 2020. These vehicles will increasingly take control of the driving task away from human drivers in certain circumstances and environments. Automated vehicles promise major safety and community benefits and offer the possibility of fundamentally changing transport and mobility. However, the supply and use of automated vehicles also raises new risks.

Levels of automation

Vehicles may operate at different levels of automation, with different expectations for a human driver. This has implications for policy, safety, regulation and infrastructure. The NTC use the levels of automation set out in Society of Automotive Engineers (SAE) International Standard J3016, *Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles*. These SAE levels are currently being used to develop regulatory responses to automated vehicles in the United States and the European Union. A simplified version of these levels of automation is set out in the below diagram.



Key terms

Automated driving system (ADS) means the hardware and software collectively capable of performing the entire dynamic driving task on a sustained basis. It is a type of driving automation system used in vehicles with SAE levels 3, 4 or 5 of automation.

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

Automated vehicle means 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 1-2) which still require a human driver to perform part of the dynamic driving task.

Conditional automation (SAE level 3) means the ADS undertakes the entire dynamic driving task for sustained periods in defined circumstances. The human driver does not have to monitor the driving environment or the ADS but must be receptive to ADS requests to intervene and any system failures. Conditional automation is also referred to as level 3 automation.

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

Full automation (SAE level 5) means all aspects of the dynamic driving task and monitoring of the driving environment are undertaken by the ADS. The ADS can operate on all roads at all times. No human driver is required. Full automation is also referred to as level 5 automation.

High automation (SAE level 4) means that the ADS undertakes the entire dynamic driving task for sustained periods in some situations, or all the time in defined places. When the system is driving the vehicle, a human driver is not required to monitor the driving environment or the driving task. Nor are they required to intervene, because the ADS can bring the vehicle to a safe stop unassisted. High automation is also referred to as level 4 automation.

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

2 NTC's automated vehicle reform program

Key points

Australia's transport ministers have already agreed to key elements of reform, including the conduct of trials, who is in control and safety for new automated vehicles.

The NTC is continuing our reforms on in-service safety, data and motor accident injury insurance.

2.1 What does an end-to-end framework look like?

An end-to-end framework needs to consider all of the areas of regulation relating to vehicles and drivers. This includes regulation of vehicle standards and the Australian Road Rules, but also heavy vehicle regulation, insurance regulation and passenger transport legislation, amongst others. The approach needs to be comprehensive and consistent across all levels of government.

The NTC is seeking national consistency in our approach wherever possible. Australia is currently one market for vehicles and we should seek to maintain a single market as we move to more automated vehicles.

The end-to-end framework will need to answer several key questions:

- Who is legally in control of a vehicle operating in automated mode?
- What is the role of governments and industry in ensuring the safety of the technology, both at first supply to market and throughout the vehicle's life?
- How will a person injured in a crash with an automated vehicle claim compensation?

2.2 What has been agreed? - Key ministerial decisions

Australia's transport ministers have already agreed several key policy decisions in relation to automated vehicles, including:

Control	That the automated driving system entity is legally in control of a vehicle when the automated driving system is operating.
Driving laws	That Australia will develop a purpose-built national law to manage the on-road operation of automated vehicles.[1]
Safety at First Supply	That Australia will incorporate a self-certification approach for automated driving systems into existing Commonwealth vehicle regulations.

Each of these are described in detail below.

2.2.1 Control of automated vehicles

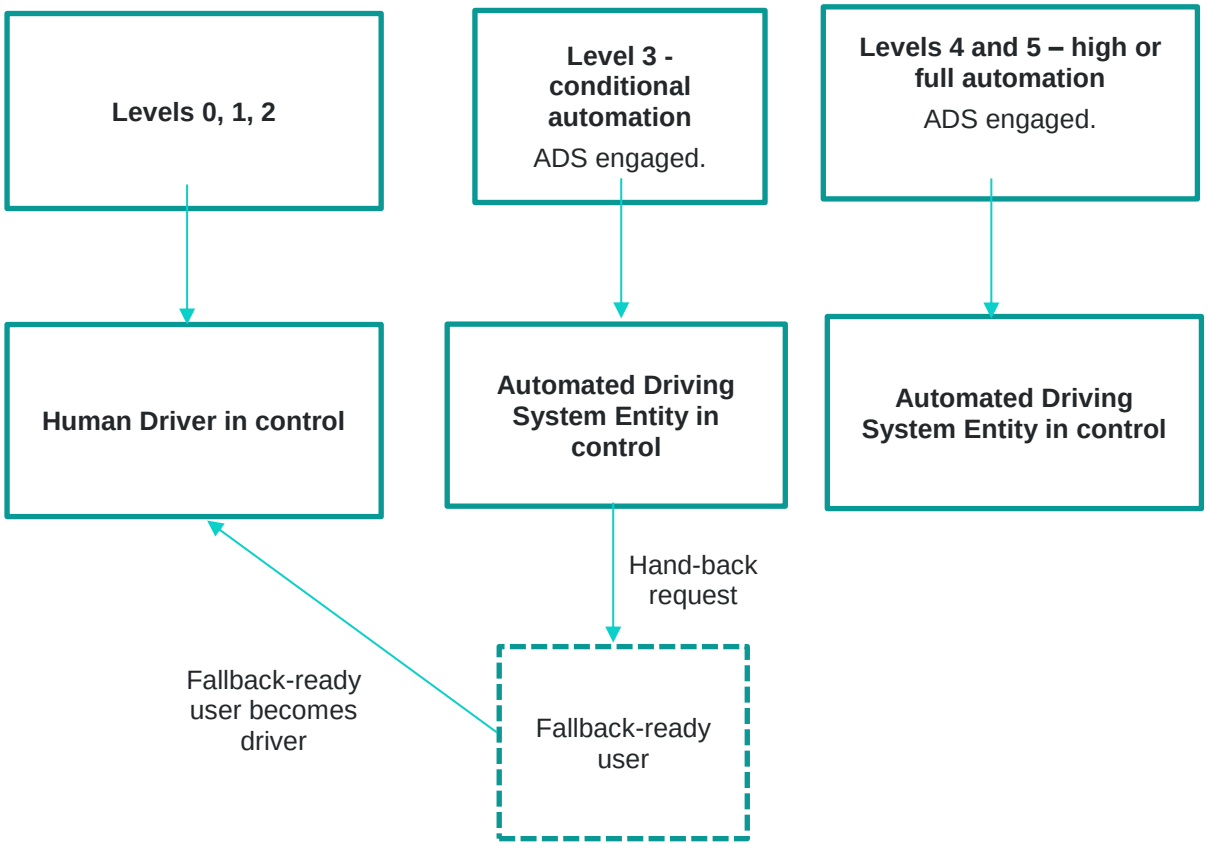
Automated vehicles involve transferring control of the driving task from a human driver to another entity. It is important that control at each level of automation is clear legally and

[1] Transport ministers agreed that a uniform approach to driving laws for automated vehicles is taken through the development of a purpose-built nationally consistent law.

operationally. A vehicle can have only one driver at a time; either a human driver or an automated driving system. Australia's transport ministers have agreed that the automated driving system entity (ADSE) is in control of a vehicle when that vehicle's automated driving system is operating in automated mode. Figure 1 below diagram illustrates how this impacts vehicles operating at different levels of automation.

Figure 1. Who is in control?

At level 3, a fallback-ready user must be prepared to assume control upon request. Once control is handed over the fallback-ready user becomes the driver.



2.2.2 Australia's Driving Laws

Transport ministers also agreed in May 2018 that Australia would develop a new purpose-built national law to regulate the on-road operation of automated vehicles. The NTC will be working through the detail of this new national law as part of our work on in-service safety of automated vehicles. For more information see: https://www.ntc.gov.au/current-projects/changing-driving-laws-to-support-automated-vehicles/?modeId=1064&topicId=1166. Laws need to allow automated vehicles into the market (through our current regulation of first supply) but also to allow these vehicles to be legally used on public roads.

2.2.3 Safety at first supply

Transport ministers agreed in November 2018 to incorporate a self-certification approach for automated driving systems into existing Commonwealth legislation for the first supply (or market entry) of road vehicles. Companies seeking to bring automated driving systems to

market in Australia will need to demonstrate evidence against a set of safety criteria. The Commonwealth Department of Infrastructure, Transport, Cities and Regional Development is currently implementing the agreed recommendations.

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

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

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

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

For more information, please see: https://www.ntc.gov.au/current-projects/safety-assurance-system-for-automated-vehicles/.

Further work on in-service safety is discussed below.

2.3 Current reforms

The NTC is currently working on three automated vehicle reforms, examining:

- In-service safety for automated vehicles
- Motor accident injury insurance and automated vehicles
- Regulating government access to Cooperative Intelligent Transport Systems (ITS) and automated vehicle data

These are outlined in detail below.

2.3.1 In-service safety

Following on from the agreement on safety at first supply, described above, the NTC is currently developing options for regulatory reforms to assure the safe operation of vehicles in service. The key question is, how do we ensure the ongoing safe operation of the automated driving system throughout the vehicle's lifetime (which could be 15-20 years)? This work will bring together the previous work on driving laws described above and examine:

- The role of different parties in in-service safety of automated vehicles, including ADSEs, manufacturers, repairers, owners and others.

- Any additional safety duties that should apply to these parties
- The institutional and regulatory arrangements to support these duties.

The NTC is currently developing a Consultation Regulation Impact Statement (RIS) which will assess a series of options. This Consultation RIS will go out for public consultation in mid- 2019.

2.3.2 Motor accident injury insurance

Each state and territory has compulsory third party insurance for motor vehicles, to compensate parties injured in a motor vehicle crash. The schemes differ significantly – some are public, some are private; some are fault-based and some are no-fault. Industry and the public require certainty as to whether a party injured in a crash with an automated vehicle could access compensation under these schemes.

The NTC has in partnership with state and territory insurance regulators reviewed how automated vehicles would be treated under existing motor accident injury insurance schemes and possible reform options. The purpose of this reform is to:

- identify barriers to accessing compensation, under current motor accident injury insurance (MAII) schemes, for personal injuries and deaths caused by an ADS
- seek feedback on whether existing MAII schemes, or alternative insurance models, should provide cover for such injuries and deaths.

We published a discussion paper in October 2018,[2] setting out proposed principles for dealing with automated vehicles and insurance, including the key principle that "No person should be worse off, financially or procedurally, if they are injured by a vehicle whose ADS was engaged, than if they were injured by a vehicle controlled by a human driver."

The discussion paper set out six options:

Option 1: Rely on existing legal framework

Option 2: Exclude injuries caused by an ADS from MAII schemes

Option 3: Expand MAII schemes to cover injuries caused by an ADS

Option 4: Purpose-built automated vehicle scheme

Option 5: Minimum benchmarks

Option 6: Single insurer

The paper also discussed data and registration requirements. We received over 20 submissions, which we are now reviewing to develop recommendations for ministers.

2.3.3 Regulating government access to Cooperative ITS and automated vehicle data

The NTC is assessing whether Australia's current information access framework applying to government collection and use of information is sufficient to protect privacy given the significant developments in transport technology. We need to consider the existing regulations in light of the types and amount of information that future transport systems could produce.

[2] The discussion paper is available at: https://www.ntc.gov.au/Media/Reports/(3D0D6112-D6C5-2D02-8858-EC8607A3F65D).pdf.

We are focusing on two areas that form a limited part of intelligent transport systems (ITS): cooperative ITS (C-ITS) and automated vehicles.

If Australia's current information access framework applying to government collection and use of information is not sufficient to protect the privacy of users of C-ITS and automated vehicle technology, reform options will be proposed to the Transport and Infrastructure Council.

We published a discussion paper in September 2018,[3] which examined:

- potential new privacy challenges of government access to information generated by C-ITS and automated vehicle technology
- whether Australia's information access framework is sufficient to address these new privacy challenges
- proposed options for reform if the current framework is not sufficient.

The discussion paper proposed reforms options:

We proposed a range of options:

- Option 1 – no change
- Option 2 – agree broad principles for limiting government access to C-ITS and automated vehicle data to inform the development of C-ITS and automated vehicle regulatory frameworks (reform option)
- Option 3 (automated vehicles) – limit government access to data from in-cabin cameras and biometric, biological or health sensors to specific purposes (reform option)
- Option 3 (C-ITS) / option 4 (automated vehicles) – limit government access to all C-ITS and automated vehicle data to specific purposes (reform option)

We received more than 35 submissions from government, the public and industry. The NTC is currently reviewing the submissions to develop recommendations to transport ministers.

2.4 Automated Vehicle Trials

Automated vehicle trials continue to play an important role in identifying safety, infrastructure and other implementation challenges along with educating and gaining feedback from the public.

Transport ministers agreed in May 2017 that Australia adopt National Guidelines for Automated Vehicle Trials. These guidelines set out the general conditions that an entity seeking to run a trial in Australia would need to meet, including:

- Management of trials
- Insurance
- Safety management plan
- Data and information

The NTC will begin reviewing the trial guidelines in 2019 to ensure they are keeping pace with technological changes.

For more information, see: https://www.ntc.gov.au/Media/Reports/(00F4B0A0-55E9-17E7-BF15-D70F4725A938).pdf.

[3] The discussion paper is available at: https://www.ntc.gov.au/Media/Reports/(614D48BA-F48B-38C8-FA90-A103E49A38CF).pdf.

State and territories have also reviewed their legislative powers to support trials. South Australia, New South Wales and Victoria have implemented changes to legislation to support trials through either exemptions (SA and NSW) or permits (Victoria).

Austroads tracks trials taking place in Australia and New Zealand at: https://austroads.com.au/drivers-and-vehicles/connected-and-automated-vehicles/trials.

2.5 Further work and future areas of reform

Further work will be required on the detail of in-service safety, including examining:

- Compliance and enforcement powers to support any new obligations. This will be informed by current reforms on in-service safety and regulating government access to data.
- Roadworthiness requirements for automated vehicles

Potential future areas of reform, either at the state and territory or at the national level, could include:

- Passenger transport legislation
- Heavy vehicle regulation
- Criminal law (eg. dangerous driving offences)
- Road management legislation

3 Reform Process

Key points

Our reforms are governed by the Transport and Infrastructure Council and the Transport and Infrastructure Senior Officials Committee, with working group and advisory groups to guide our work.

All our reforms follow a best practice approach to policy development.

3.1 Governance structure

The NTC collaborates closely with Commonwealth, state and territory road and transport agencies to research, develop and deliver our reforms. Ultimately, we make recommendations to ministers through the Transport and Infrastructure Council who agree policy changes.

3.2 Policy cycle

The Automated Vehicle Program will follow the policy and legislative development cycle that is used in all projects at the NTC. This is a repeatable policy cycle which includes the development of an issues paper, discussion paper (or consultation Regulation Impact Statement) and policy paper (or decision Regulation Impact Statement) and recommendations.

Figure 2. Project policy cycle

The NTC's policy processes are based on the Australian Policy Cycle (Althaus et al., 2013) and are comparable to other independent statutory agencies such as the Australian Law Reform Commission and the Productivity Commission.

However, unlike the Australian Law Reform Commission and the Productivity Commission, the NTC is also required to undertake three additional tasks:

- facilitate agreement of six state, two territory and the Commonwealth governments (as well as the Australian Local Government Association - ALGA) to the policy proposals through multi-lateral negotiations
- work with stakeholders to turn the agreed policies into proposed legislative changes, and
- facilitate agreement of six state, two territory and the Commonwealth governments (and ALGA) to the detailed proposed legislative changes that are consistent with the agreed policy, through multi-lateral negotiations.

3.3 Timing of Reforms

The below figures set out the timelines for our three current reforms; these will be updated based on feedback from and decisions of transport ministers.

Figure 3. Timeline – In-service safety for automated vehicles

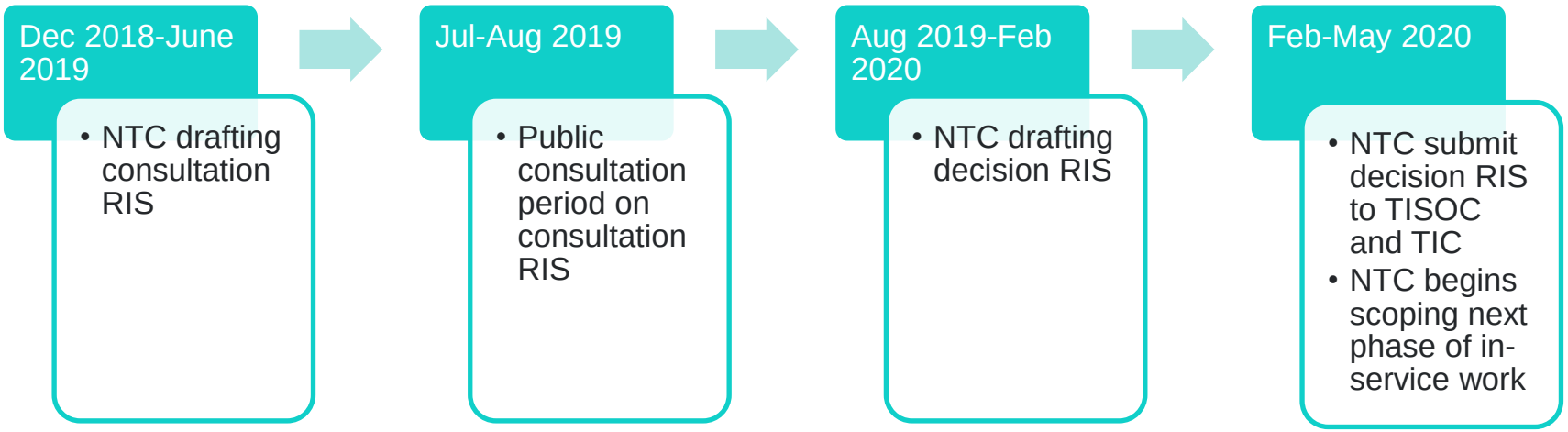


Figure 4. Timeline – Motor Accident Injury Insurance and Automated Vehicles

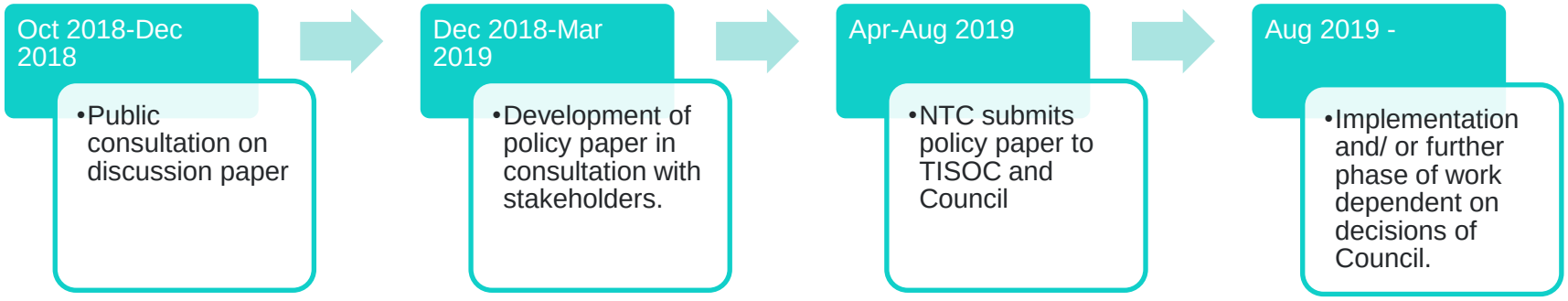
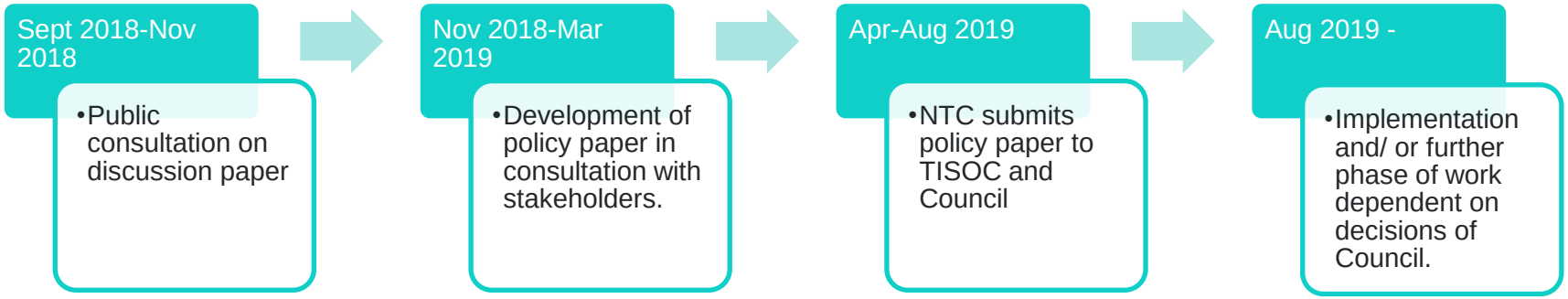


Figure 5. Timeline – Regulating Government Access to Cooperative ITS and Automated Vehicle Data



4 Consultation approach

Key points

The NTC wants to give everyone affected by our automated vehicle reforms an opportunity to have a say.

Stakeholders will have the opportunity to participate in the reform process through a variety of forums including workshops and one-on-one meetings.

4.1 Previous consultation processes

Since commencing our automated vehicle reform work in 2016, we consulted with stakeholders through nine public consultation processes and received around 350 submissions that have informed our recommendations to transport ministers.

4.2 Consultation purpose

The NTC will use a range of policy development tools and engagement options to:

- design policy options to meet regulatory goals
- test policy options
- recommend preferred policy options, and
- translate agreed policy to legislation.

4.3 Who will be consulted

The NTC wants to give everyone affected by our reforms an opportunity to have a say. The NTC will consult with relevant organisations and stakeholders, including:

- automotive industry
- insurance
- legal
- infrastructure
- privacy
- freight
- cycling, pedestrian and motorcycling groups
- enforcement agencies and police
- other government entities, and
- the Australian community.

4.4 How consultation will occur

Stakeholders will have the opportunity to contribute to reforms including through:

- regular newsletters
- workshops

- working groups
- one-on-one meetings with interested stakeholders, and
- industry associations.