



TRANSPORT AND INFRASTRUCTURE  
COUNCIL

# NATIONAL POLICY FRAMEWORK FOR LAND TRANSPORT TECHNOLOGY

ACTION PLAN: 2020–2023





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# 1. The Transport and Infrastructure Council

The Transport and Infrastructure Council brings together Commonwealth, State, Territory and New Zealand ministers with responsibility for transport and infrastructure issues, as well as the Australian Local Government Association.

In November 2015 the Council agreed on a long-term vision for an infrastructure and transport system that will enhance Australia's productivity, competitiveness and liveability and shape the work of the Council over the coming decades. The Council will continue to place a strong focus on those policy issues that would benefit from collaboration across the three levels of government.

Capitalising on the opportunities afforded by emerging technologies is a key part of realising the Council's vision. To that end this document outlines in detail Australia's approach to emerging transport technologies (including Intelligent Transport Systems) and builds on previous work by the Council in its 2011 *Policy Framework for Intelligent Transport Systems in Australia*<sup>1</sup>.

More information on the work of the Council is available from  
<[www.transportinfrastructurecouncil.gov.au](http://www.transportinfrastructurecouncil.gov.au)>.

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<sup>1</sup> Available from <<http://transportinfrastructurecouncil.gov.au/publications/>>



## 2. Introduction

Transport technology (both internationally and in Australia) is changing rapidly, bringing with it many potential benefits for our transport networks. These benefits include improved transport productivity, more efficient use of existing infrastructure, reduced congestion and avoided deaths and injuries.

Governments, industry and research institutions are actively exploring the best ways to develop and deploy new transport technologies. For example, Australian governments are already preparing for connected vehicles, which can communicate with other vehicles, road-side infrastructure, and with other devices such as mobile phones. This will enable vehicle and transport systems to cooperatively work together to deliver optimised transport outcomes. Automated vehicles are another emerging technology with significant potential to improve the safety, efficiency and convenience of transport (especially for seniors and the disabled). These technologies are complementary to each other, and together could radically transform the ways that people travel and that our infrastructure and cities are constructed.

Transport infrastructure is also improving. Cost-effective sensors and improved communications technology are facilitating more efficient models of operating and maintaining roads and railways. Improved information flows, such as real-time public transport information, are increasingly providing travellers with access to more flexible, efficient and convenient transport services. Digital systems, including smart phones, are generating unprecedented amounts of data, which can be shared and analysed to improve infrastructure planning and operations.

Australian governments recognise that these on-going advances in transport technology have the potential to fundamentally improve the safety, efficiency, sustainability and accessibility of Australia's transport systems. Australian governments are focused on implementing the right policy settings to support and take advantage of these opportunities.

On this basis, this policy framework outlines an agreed national approach to policy, regulatory and investment decision-making for technologies in the land transport sector. This framework will be underpinned by a three year action plan, outlining governments' short to medium term priorities.

This document details:

- the national policy framework objective;
- the strategic context for new transport technologies;
- key issues for government;
- the role for governments in the deployment of new transport technologies; and
- a three year national transport technology action plan.



### 3. Framework Objective

The objective of this framework is to foster an integrated policy approach by governments to the development and adoption of emerging transport technologies, in order to achieve improved transport safety, efficiency, sustainability and accessibility outcomes.

This framework will:

- facilitate the efficient and timely uptake of transport technologies to meet consumer demands and improve service delivery;
- guide the consistent implementation, integration and uptake of transport technology across all jurisdictions and all land transport modes;
- outline the role for government on issues such as regulation, standards and investment, in order to provide certainty to industry and the community; and
- promote innovation and competition through support for compatible and interoperable transport technologies and open access to transport data.

The action plan accompanying this document will ensure that individual actions by Australian governments are appropriately prioritised, efforts are not duplicated and that key learnings from individual projects are shared appropriately.





### **Rapid Advances in Vehicle Automation**

Vehicles with a relatively high level of automation, such as self-parking or traffic jam assist, are already commercially available in Australia. Most major vehicle manufacturers, as well as several large technology companies and universities, are developing vehicles with higher levels of automation, including vehicles that are designed to require no human control. It is significant that automated test vehicles now have several million kilometres of experience in real-world conditions.

Over the next two decades many analysts predict that highly automated vehicles will become a significant part of the vehicle fleet, although it remains unclear how quickly this transition might occur and how often (if ever) human drivers will need to take over control. In the long-term, the potential benefits of automation include improved safety, reduced congestion and pollution, and enhanced mobility for the young, elderly and disabled. Passengers may also benefit from increased leisure or productive time, and reduced costs from sharing an automated taxi. Automated vehicles could also reduce the need for parking space in city areas.

However, it is also important for policy makers to consider what other effects automated vehicles might have on transport networks. For example, more convenient travel might mean longer and more frequent car trips, increased urban sprawl or reduced use of public transport. Appropriate policy and regulatory decision-making will be key to ensuring that the potential benefits of automation materialise, and that any downside risks are appropriately managed.





## The Potential of Connected Vehicles

The next generation of connected vehicles, called Cooperative Intelligent Transport Systems (C-ITS), are an emerging technology that allows a vehicle to communicate with other vehicles (V2V), road-side infrastructure (V2I) and other devices, such as mobile phones (V2P). This technology has an exciting potential to improve safety by providing drivers with warnings of imminent collisions or dangerous conditions ahead. Austroads has previously estimated that full deployment of C-ITS equipped vehicles with collision avoidance applications could prevent 25-35 per cent of serious crashes<sup>2</sup>.

Mass production vehicles with V2V capability are expected to enter the US market by 2017. Australian governments are already preparing for the introduction of C-ITS equipped vehicles in Australia (including addressing security and geo-positioning requirements). In the future, automated vehicles may use V2I to interface with traffic lights, or V2V to detect vehicles not in line of sight. Experts believe that a combination of connected and automated technology is required to realise the largest potential improvements to congestion and safety.



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<sup>2</sup> Austroads 2011, *Evaluation of the Potential Safety Benefits of Collision Avoidance Technologies Through Vehicle to Vehicle Dedicated Short Range Communications (DSRC) in Australia* (Report AP-R375/11), available at <<https://www.onlinepublications.austroads.com.au/items/AP-R375-11>>





## 4. Strategic Context

### 4.1 How Can Current and Emerging Transport Technologies Help?

Efficient transport networks are an important enabler for a competitive, productive and growing economy, and for facilitating connections between people. Decisions about transport infrastructure can have a significant impact on other policy areas, such as the amenity and liveability of our cities. Finding innovative ways of moving goods and people can create new business opportunities, generate value for travellers and help to build a flexible and adaptable economy that will sustain Australia's well-being into the future.

Current and emerging technologies can help to achieve these important outcomes by improving transport safety, efficiency, sustainability and accessibility.

#### 4.1.1 Safety

Technologies such as seat belts, road-side breath testing, speed cameras, airbags and improved vehicle standards have been key contributors to improved road safety outcomes in Australia. Between 1970 and 2015, the annual road fatality rate declined from 30.4 to 5.1 deaths per 100,000 people, despite strong growth in vehicle ownership. Even with this progress, the economic cost of road crashes is estimated to be around \$27 billion annually<sup>3</sup>, in addition to the immeasurable social cost.

Through the National Road Safety Strategy (NRSS) 2011-2020<sup>4</sup>, the Transport and Infrastructure Council has adopted the long term vision that no person should be killed or seriously injured on Australia's roads. The NRSS is based on the Safe System approach which calls for a holistic view of the road transport system and the interactions between roads, travel speeds, vehicles and road users. Emerging transport technologies have considerable potential to reduce the number and severity of crashes by providing warnings to drivers, or by reducing the need for human decision-making potentially achieving a system with safety performance similar to or better than air, maritime and rail transport. Such technologies include:

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<sup>3</sup> Bureau of Infrastructure, Transport and Regional Economics 2010, *Cost of road crashes in Australia 2006 (Report 118)*, available from <[https://bitre.gov.au/publications/2010/files/report\\_118.pdf](https://bitre.gov.au/publications/2010/files/report_118.pdf)>

<sup>4</sup> National Road Safety Strategy (NRSS) 2011-2020, available at <<http://roadsafety.gov.au/>>



- **Driver advisory and assistance systems**, such as blind-spot warnings, speed limit advisories, lane departure warnings and electronic stability control. In the future, connected vehicle technology will improve the types of warnings that drivers are able to receive; and
- **Automated systems**, including adaptive cruise control, lane keep assist and autonomous emergency braking. Autonomous emergency braking, for example, is estimated to prevent 20–40 per cent of certain crashes<sup>5</sup>. In the future, higher levels of automation, including vehicles that require no human control, may significantly reduce the number of road deaths, potentially by as much as 80 or 90 per cent<sup>6</sup>.

Through the NRSS and the supporting Action Plan for 2015–2017, there is an agreed programme of work underway to both implement priority vehicle safety standards and accelerate the market uptake of vehicle technologies with significant safety potential. The Action Plan lists targeted technologies including autonomous emergency braking, lane departure warning and intelligent speed advisory systems.

#### 4.1.2 Efficiency

Demand on Australia's infrastructure is growing, driven by population growth, increasing economic output and long-term urbanisation trends. The social and economic costs of congestion are estimated to reach around \$30 billion a year by 2030<sup>7</sup>. Australia's freight network is also growing, with demand for road and rail freight expected to more than double between 2010 and 2040<sup>8</sup>.

Building new infrastructure is not always the solution to meeting growing demand. Major infrastructure projects are complex and expensive to deliver, particularly as all Australian governments face competing demands for public spending. In Australia's capital cities, the limited availability of land can be a significant constraint. These factors mean that there is a need to use existing infrastructure more efficiently.

The use of technology has significant potential to improve the efficiency of existing assets. For example:

- **Smart infrastructure**, such as signals on motorway on-ramps or variable speed limits, can significantly improve traffic flows at relatively low cost. Emerging systems can remotely monitor assets and predict the need for maintenance, helping to reduce costs and prevent disruptions to travellers. Better communications on railways can safely allow shorter following distances between trains;

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<sup>5</sup> Bureau of Infrastructure, Transport and Regional Economics 2014, *Impact of road trauma and measures to improve outcomes* (Report 140), available at <[http://bitre.gov.au/publications/2014/report\\_140.aspx](http://bitre.gov.au/publications/2014/report_140.aspx)>

<sup>6</sup> Ibid

<sup>7</sup> Bureau of Infrastructure, Transport and Regional Economics 2015, *Traffic and congestion cost trends for Australian capital cities*, available at <[https://bitre.gov.au/publications/2015/is\\_074.aspx](https://bitre.gov.au/publications/2015/is_074.aspx)>

<sup>8</sup> Bureau of Infrastructure, Transport and Regional Economics 2014, *Freightline I – Australian freight transport overview*, available from <[https://bitre.gov.au/publications/2014/freightline\\_01.aspx](https://bitre.gov.au/publications/2014/freightline_01.aspx)>



- **Real-time information** can help travellers plan an efficient journey, including facilitating optimal route selection, efficient connections with public transport and access to transport related services like parking. Real-time information can also enable transport system operators to better respond to incidents and manage demand. A related area is on-demand transport, where smart phones can be used to provide more convenient access to transport and mobility services, including across different transport modes;
- **New vehicle technologies**, including automated and connected vehicles, could bring a step change improvement in mobility. Automated vehicles may be able to travel closer together, or be summoned on-demand for more convenient first and last mile trips. Communications between connected vehicles and road-side infrastructure could allow traffic management to be optimised; and
- **Data** generated by these applications is an additional resource that can be analysed to improve planning, investment decision-making, and transport operations, such as by adding new public transport services during anticipated peak periods. Data can also support the design and delivery of new infrastructure. For example Building Information Modelling (BIM) can be used to create highly detailed and shared digital models of new infrastructure, improving investment and operational decision-making over the entire life of an asset.



## Smarter Infrastructure and Traffic Management

Australia has a strong record of success in implementing smart infrastructure and traffic management systems. One of the earliest smart traffic management systems – coordinated traffic signals that respond to changing traffic conditions – was pioneered in Australia and is now exported overseas. Australia was also an early adopter of electronic tolling, and importantly was able to achieve a nationally consistent system of electronic tags and receivers that communicate over the 5.8 GHz radio frequency band. This means that motorists need only use one tag, regardless of who owns and operates the particular toll road.

More recently, active traffic management measures that integrate systems such as variable speed limits, on-ramp signalling and variable message signs have been demonstrated to significantly improve traffic flow on motorways in Melbourne, Brisbane and Sydney. These types of investments tend to be low cost and high return, and can delay the need for expensive civil construction works. For example, the installation of ramp metering on the Monash Freeway in Melbourne increased throughput by 19 per cent during the morning peak – reducing the need to build an additional lane.

Smart infrastructure capabilities will continue to improve. Data61 (part of the CSIRO) is trialling a bridge monitoring system using 2,400 sensors to maximise the service life of the Sydney Harbour Bridge road deck without significantly increasing expenditure. In this example, continuous machine learning and predictive analysis of the sensor data provides early warning of problems before bridge users are affected.

In Queensland, an Emergency Vehicle Priority (EVP) system has been successfully trialled, which automatically provides green lights for emergency services vehicles responding to incidents. This system improved travel times by up to 20 per cent, with no measurable impact on congestion.



Image courtesy of VicRoads



### 4.1.3 Sustainability

Energy use and CO<sub>2</sub> emissions are closely linked to the transport sector because fossil fuels are the principal form of transport fuel in Australia. In 2014-15, domestic transport was the second largest energy user in Australia (behind electricity generation), and contributed to around 17 per cent of Australia's CO<sub>2</sub> emissions.

As Australia's population and economy grows, so will the transport sector, potentially leading to increased energy usage and emissions. Transport is projected to be Australia's main form of energy usage by 2035. Road vehicles, particularly light passenger and commercial vehicles, are forecast to continue to be the single largest source of emissions in the transport sector.

Many transport technologies that provide efficiency benefits also have flow on environmental benefits because shorter trips and free flowing traffic imply fuel savings and emission reductions. Driver assistance systems can be programmed to provide information on environmental performance, for example on optimal gear selection. Greater uptake of low and zero emission vehicles, shared mobility and active travel options would also have significant environmental benefits.

### 4.1.4 Accessibility

Australia's transport systems must serve the needs of all users, including the elderly and those with a disability. Australian governments see the ability to move around the community as underpinning all aspects of life for all people. This is an important issue as Australia's population ages and lives longer, and the number of non-drivers grows.

Technology can help address this problem by facilitating more convenient access to transport. This can include providing real-time public transport information or on-demand transport services (such as flexible bus services). In the future, fully automated vehicles may also provide greater mobility to those unable to drive themselves.





## 4.2 Key Issues for Government in Deploying New Transport Technologies

There are a number of operational and policy challenges for governments associated with the deployment of new transport technologies. It is essential that governments get the right policy and regulatory settings in place in order to eliminate unnecessary barriers to deployment, encourage innovation and support technology uptake in the transport and infrastructure sectors.

### 4.2.1 Safety, Security and Privacy

The safety, security and privacy of any new technology is of primary importance. For example, ensuring that connected and automated vehicles can be safely operated on public roads will be key to maintaining community confidence and support. This includes protecting such systems from cyber-attacks. New vehicle technologies could also create large amounts of personal data. Australian governments are already taking steps to ensure that any personal data is afforded appropriate levels of protection, in-line with community expectations. Monitoring and evaluation of security and privacy requirements is required given the complex and ubiquitous nature of the emerging digital data environment.

### 4.2.2 Digital Infrastructure

New technologies are likely to require access to new types of digital infrastructure. For example, some in-vehicle devices might require access to more accurate satellite positioning information, highly accurate 3D maps, a shared security system or fast mobile broadband. Upgrades to traffic signals may be required to enable them to communicate wirelessly with approaching vehicles. Australian governments, as part of the action plan to this document, will investigate what digital infrastructure will be required in the future, and the best way to provide it.

### 4.2.3 Data

Many new transport technologies create large amounts of data. This data can be used to provide real-time information to travellers, or to improve the way that governments operate, maintain and invest in infrastructure assets. This data doesn't necessarily have to come from vehicles or road-side infrastructure – smart phones, smart street lights and many other devices connected to the 'internet of things' can provide useful information. The increase in the number of these devices has led to an unprecedented increase in the amount of data available (a trend commonly referred to as 'big data'). A key issue for Australian governments is fully exploring the potential of big data in the transport sector and addressing challenges in data access, capture, storage and analysis.



## Automated Vehicles – What Needs to Happen Next?

While Australia is a world leader in some aspects of automation, such as the automated trains and heavy vehicles already being used in the mining industry, automated passenger vehicles are yet to undergo significant real-world testing in Australian conditions. Australian governments need to ensure that, in the near future, real-world testing (and eventually deployment) is able to occur in a safe and efficient way. A significant dimension of this is demonstrating to the public that automated vehicles are reliable and safe to use.

This preparatory work is already underway. The National Transport Commission is investigating what regulations are outdated and need to be changed. Austroads, on behalf of State and Territory road agencies, is examining what public authorities might need to do to ensure our infrastructure is ready for automated vehicles, as well as the potential implications for vehicle registration and driver licensing.

In 2015 the Australian Driverless Vehicle Initiative<sup>9</sup> demonstrated a highly automated Volvo XC-90 on a closed road in Adelaide – a first in the Southern Hemisphere. Further public demonstrations and trials in partnership with industry and government will continue.

The action plan to this document outlines the commitment of Australian governments to accelerate work to test and deploy automated vehicles.



Image courtesy of the Australian Driverless Vehicle Initiative

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<sup>9</sup> See <[www.arrb.com.au/transport/self-driving-vehicles.aspx](http://www.arrb.com.au/transport/self-driving-vehicles.aspx)> for more information



#### 4.2.4 Standards and Interoperability

Consistent standards are required to achieve interoperability between equipment and services from different vendors and different jurisdictions. Interoperability can be difficult to achieve due to significant jurisdictional differences in infrastructure conditions, patterns of use and pre-existing information technology systems.

Previous work in this area has included the development of a National Intelligent Transport Systems Architecture. This 'Architecture' is effectively a guideline for transport agencies that provides for a consistent approach to describing, developing, and integrating intelligent transportation systems and applications.

Australian governments will continue to collaborate to ensure that interoperability issues are addressed and will adopt international standards and deployment approaches unless there is a clear need for a unique Australian requirement.

#### 4.2.5 Disruption and Change

One of the biggest challenges for government is that the technological environment can evolve rapidly, creating new and sometimes unexpected policy issues and disrupting established markets and business models. For example, the increasing popularity of transport services such as Uber, Coseats and Catchalift bring potential benefits such as cheaper and more flexible transport options, but also concerns over competition with taxis, safety, insurance standards and pricing. It can often take considerable time for regulation to respond to these changes.

Governments and government agencies will also experience this disruption and change. Traditional sources of transport related revenue, such as vehicle registration, driver licensing and fuel excise will be impacted as the size and characteristics of the vehicle fleet shift. Transport agencies will need to invest in new skills such as data analysis, as the importance of using information technology and data to improve the efficiency of existing infrastructure assets grows. Some roles, such as the enforcement of road rules, may change or become obsolete, as human decision-making is increasingly removed from the driving task.

The way that physical infrastructure is designed may also change. For example, automated vehicles may require less extensive road signage and reduced parking space in city areas. Investment in infrastructure that caters for technological advancements will need to be balanced against the risk of constraining unforeseen innovations.

Given the transformative potential of emerging transport technologies, it is likely that the transport sector will experience more disruptive changes in the future. This policy framework will assist governments in preparing for those changes that are able to be anticipated, while taking a flexible approach to unexpected issues as they arise.



## 5. Australia's Approach

### 5.1 What Role for Government?

Australian governments are strongly committed to encouraging the deployment of new transport technologies. In many cases the private sector will bring new technologies to market on a commercial basis, in order to meet demand from consumers. This may require little, if any, government intervention.

In other situations there will be a strong rationale for government action. This may occur where the largest benefits require coordinated action, where there are limited incentives for consumers to take up beneficial technology, or where public investment will benefit the network as a whole. Some emerging technologies may require government (and industry) to support enablers such as security systems or communications infrastructure. Where governments do act, meeting the needs of travellers for a safe, efficient and convenient transport system should be a priority.

Governments will also ensure that an appropriate regulatory environment is maintained. Proponents of new technologies will need to demonstrate the appropriate levels of safety, security and privacy. Governments will remove or amend regulation that becomes obsolete or outdated.

On this basis, Australian governments will undertake four main roles relating to the deployment of transport technology:

#### 1. **Policy leadership:**

- provide a clear, nationally coordinated approach across different levels of government, being responsive to changes in the technological environment;
- facilitate collaboration between parties, including industry and researchers;
- raise public awareness and acceptance of beneficial new technologies; and
- efficiently manage transitions between old and new technologies (such as between human-controlled and automated vehicles). This includes considering flow-on effects to other transport modes and related policy areas such as urban planning.

#### 2. **Enabling:**

- ensure that the private sector is able to bring beneficial new technologies to market, including by supporting investment in digital infrastructure and/or data streams (such as highly accurate geo-positioning systems and real-time information on road conditions); and
- support private sector innovation in the transport sector, such as by providing open and consistent access to transport data. Where practical, data will be aggregated to the national level.



### **3. Supportive regulatory environment:**

- ensure that community expectations of safety, security and privacy are appropriately considered in new technology deployments;
- remove regulatory barriers to new technology in a proactive fashion;
- wherever possible, provide certainty about future regulatory requirements.

### **4. Investment:**

- invest in research, development and real-world trials that benefit the entire transport network customer base or provide a sound basis for government decision-making (including in collaboration with the private sector).

## **5.2 Principles for Government Action**

Australian governments have agreed on the following policy principles to inform a consistent approach to the delivery of the roles identified in section 5.1. A principles based approach has been adopted to provide flexibility and to acknowledge that important differences between jurisdictions will impact on decision-making.

### **Policy Principles**

1. Government decision-making on transport technologies will be based on capacity to improve transport safety, efficiency, sustainability and accessibility outcomes.
2. New technologies should be implemented in a way that is consumer centric (i.e. designed to meet the needs of those using the service). This includes consideration of:
  - a) options to deliver transport information and services in a way that is consistent and familiar, and
  - b) the diverse needs of travellers, in particular travellers with a disability, vulnerable road users such as cyclists and pedestrians, and users of multiple modes of transport.
3. Where government investment is required to support the deployment of new technologies, that investment will be evidence based, consistent with long-term strategic planning and will deliver value for money.
4. Where feasible, government agencies will avoid favouring particular technologies or applications, in order to encourage competition and innovation. New applications should support interoperability, backwards compatibility and data sharing, and should account for possible future transitions to other technology platforms.





5. Planning for transport technologies will build on existing infrastructure networks (including public transport) and seek to leverage existing consumer devices (such as smart phones) where appropriate.
6. When considering regulatory action, governments will consider low cost approaches such as collaborative agreements or self-regulation before pursuing formal regulation.
7. If required, best practice regulatory approaches will be adopted to ensure regulation is cost efficient, transparent, proportionate to the risk, fit for purpose and done in consultation with affected stakeholders. This includes adopting relevant international or regional standards, unless there is a compelling reason for a unique Australian requirement.



### Case Study: Connected Heavy Vehicles

The Cooperative Intelligent Transport Initiative (CITI) is one of the world's first large scale test projects of vehicle-to-vehicle and vehicle-to-infrastructure communications in heavy vehicles. The trial is taking place on 42km of accident prone road between Port Kembla and the Hume Highway, New South Wales. The Australian and New South Wales governments are funding the \$1.4 million project on a 50:50 basis.

The first stage of the project, completed in November 2015, involved 58 heavy vehicles, two light vehicles and a motorcycle being fitted with wireless communication devices, in order to share collision warnings with each other. Participating vehicles are also receiving speed and red light warnings from specially installed road-side infrastructure along the route. The University of Sydney's Australian Centre for Field Robotics is currently analysing data collected as part of the trial to determine the accuracy of the system. Stage Two of the project aims to install communication devices in an additional 60 vehicles, including buses and passenger vehicles, by the end of 2017.

In April 2016 the New South Wales Government announced a further trial of vehicle-to-infrastructure communications in heavy vehicles. During the trial the timing of traffic signals at more than 100 locations in Sydney will be adjusted to accommodate approaching heavy vehicles. The trial hopes to demonstrate that reducing the need for slow acceleration and deceleration by heavy vehicles can improve traffic conditions for all road-users.



Image courtesy of Dominic Wall

# National Land Transport Technology Action Plan

## 2020-2023

In August 2016, the Transport and Infrastructure Council (the Council) agreed to the *National Policy Framework for Land Transport Technology* (the Policy Framework). The Policy Framework outlines an agreed national approach to policy, regulatory and investment decision-making for technologies in the land transport sector. This national approach recognises that ongoing advances in transport technology have the potential to fundamentally improve the safety, productivity, sustainability and accessibility of Australia's transport systems.

Changes in the technological environment are occurring rapidly, making it challenging to plan beyond the horizon. The *National Land Transport Technology Action Plan* (the Action Plan), which underpins the Policy Framework, sets out short-to-medium term national priorities. The Action Plan ensures that individual actions by Australian governments are appropriately prioritised, avoid duplication and encourage greater collaboration and sharing of key learnings.

The [2016-19 Action Plan](#) delivered important foundational work in a range of key areas, including regulatory reform, trials and research on Intelligent Transport Systems (ITS), geo-positioning and security for connected vehicles. This has positioned Australia strongly in a global environment, as governments around the world prepare for the opportunities and challenges of new transport technologies. Australia has been internationally recognised for its proactive approach to regulatory settings, while our competitive advantage in research and advanced manufacturing puts us at the forefront of emerging industries.

The 2020-23 Action Plan is structured around the key issues identified in the Policy Framework:

- **Safety, Security and Privacy**
- **Digital and Physical Infrastructure**
- **Data**
- **Standards and Interoperability**
- **Disruption and Change**

The 2020-23 Action Plan builds on the work established and underway from the 2016-19 Action Plan. New priorities in this update explore technology in the freight sector, low and zero emissions vehicles, Mobility as a Service (MaaS), and how connected and automated vehicles (CAVs) will influence future infrastructure and land use planning. The updated Action Plan also includes areas of future focus. These areas represent upcoming priorities for national coordination, depending on the outcomes of key actions in this document and in the context of a rapidly changing technological environment.

This update continues the commitment to industry and academic progress, through organisations such as the iMove consortium of industry, government and research partners that deliver collaborative R&D projects. The National Transport Commission (NTC) and Austroads also have a critical role in delivering on the key priorities outlined in this Action Plan.

The NTC is an independent advisory body tasked by Council to provide land transport reform proposals. The NTC works with Australian governments, industry and community, to develop the end-to-end regulatory framework that will support the safe deployment of automated vehicles on Australian roads. The NTC's [automated vehicle program](#) includes work to design a safety assurance regime and the development of driving law options to provide for the safe commercial deployment of automated vehicles.

Austroads is the peak body of Australasian road transport and traffic agencies. The Austroads board is responsible for advising Council members on technical, operational and regulatory issues. Austroads' [connected automated and electric vehicle program](#) includes developing recommendations to address issues such as road and road-side infrastructure suitability and national consistency, road operator data access, driver education and licensing. [Austroads' Network program](#) develops guidance that ensures the safe, efficient and shared use of the road space for the end-to-end movement of people and goods. This supports road transport agencies in managing and regulating emerging business models (for example, micromobility, on-demand transport solutions, and Mobility as a Service) and in investigating how technology and data enables next-generation transport network management to tackle traffic congestion and improve journey time and journey time reliability.

# Safety, Security and Privacy

## Safety, Security and Privacy

Australia is taking a safety-focused approach to technology such as automated vehicles and cooperative and intelligent transport systems. This approach aims to give the community confidence in this emerging technology and support effective deployment.

### Completed and ongoing actions since 2016

■ **COMPLETE: Establishment of a regulatory framework for testing automated vehicles (2016 Action Plan – item 1)**

Australian jurisdictions have committed to removing barriers and ensuring manufacturers are able to safely test automated vehicles in real-world conditions. This project concluded in 2017 with the Council agreeing to the publication of [Guidelines for Trials of Automated Vehicles in Australia](#).

■ **COMPLETE: Evaluation of low-cost technologies to improve safety at level crossings (2016 Action plan – item 10)**

This project explored the merits of accelerated uptake of smart safety technology for level crossings and their incorporation in rail safety planning. This project concluded with the Transport and Infrastructure Senior Officials Committee endorsing the [National Railway Level Crossing Safety Strategy](#).

■ **COMPLETE: Investigate the costs, benefits, and possible deployment models for automatic crash notification (2016 Action plan – item 13)**

This project, led by the Commonwealth, analysed a range of potential deployment models for automatic crash notification systems. These systems are designed to provide emergency services with timely and accurate location data of a vehicle in a serious crash situation. This work will inform possible future deployment arrangements.

■ **ONGOING: Development of national operational guidelines to support on-road use of automated vehicles (2016 Action Plan – Item 2)**

Austrroads has completed projects in support of this action, including [key road agency actions to support automated vehicles](#), [registration and licensing issues](#) and [automated heavy vehicles in remote and regional areas](#). Further [work is underway](#) on complex issues such as road operations, pavement markings for machine vision and driver education.

■ **ONGOING: Development of a national deployment plan for security management of connected and automated vehicles (2016 Action Plan – Item 6)**

The Commonwealth and state and territory governments are conducting research on and piloting systems for managing cyber security in CAVs and connected infrastructure, using international best-practice approaches. Work on this action is continuing through key priorities 1.2 and 4.1.

### Key priorities over the next three years

■ **NEW: 1.1 End-to-end regulation for the commercial deployment of automated vehicles**

In line with Council priorities, the National Transport Commission is working with the Commonwealth, states and territories to develop a regulatory system that supports the safe deployment and operation of automated vehicles in Australia, covering first supply, in-service and decommissioning. Key actions related to this work include:

a) Implementing regulatory arrangements so automated vehicles are safe at the point of first supply in Australia.

**Timeframe:** late-2019, with further periodic changes to implement emerging international best practice approaches.  
**Lead partners:** NTC, Commonwealth, states and territories.

b) Reviewing the approach to in-service safety for automated vehicles, including consideration of institutional arrangements and road traffic and driving laws.

**Timeframe:** mid-2020, with legislative amendments following.

**Lead partners:** NTC, Commonwealth, states and territories.

c) Reviewing state and territory based motor accident injury insurance schemes to ensure appropriate insurance arrangements are in place to deal with crashes caused by automated vehicles.

**Timeframe:** mid-2021.

**Lead partners:** NTC, Commonwealth, states and territories.

■ **NEW: 1.2 Cooperative Intelligent Transport Systems (C-ITS) Security Credential Management System (SCMS) Pilot Project**

The Queensland Department of Transport and Main Roads is conducting on-road operational testing of an SCMS.

The SCMS approach secures communication between C-ITS applications. The iMOVE Cooperative Research Centre will study the use of SCMS and its future role in C-ITS applications for transport authorities, including vehicle safety and security, privacy issues and system performance and governance. This pilot will inform government decision-making on a potential national deployment plan.

**Timeframe:** end-2021.

**Lead partners:** Commonwealth; Queensland.

■ **NEW: 1.3 Guiding principles and approaches to facilitate safe and legal larger-scale trials of automated vehicles.**

Building on the establishment of the [Guidelines for Trials of Automated Vehicles in Australia](#) in 2017, this key priority will develop guidance on conducting larger-scale trials with a view to commercial deployments.

**Timeframe:** end-2021.

**Lead partners:** Commonwealth, states and territories, NTC, Austrroads.

**NEW: 1.4 Accelerate the deployment and uptake of road safety technologies and innovation.**

There is a strong commitment across all levels of government to improve safety outcomes on our roads. Governments are committed to implementing the National Road Safety Strategy 2011-2020 and the associated National Road Safety Action Plan 2018–2020, including priority actions for the deployment and uptake of vehicle safety technologies. The Commonwealth will streamline the process for legislative and regulatory changes to vehicle safety standards to improve the uptake of new safety technology in the Australian new vehicle fleet, and consider aligning Australian regulations with the proposed European regulatory package to commence within a similar timeframe.

**Timeframe:** subject to consultation.

**Lead partners:** Commonwealth, states and territories.

**Areas of future focus:**

**Ensuring safe design for in-vehicle information and communications systems**

**Consideration of C-ITS security applications at a national scale**





# Digital and Physical Infrastructure

## Digital and Physical Infrastructure

New technologies will likely need new types of digital infrastructure. They may also influence the existing infrastructure that underpins the transport system today. Australian governments are investigating what digital and physical infrastructure will be needed in the future, and how it can be provided effectively.

## Completed and ongoing actions since 2016

### ■ **COMPLETE: Exploration of the merits of new safety and traffic management technologies (2016 Action Plan – Item 14)**

Austrroads led an international scanning exercise on the costs and benefits of traffic management technologies. This work will help governments to understand which technologies are mature and have proven benefits when decisions are being made about investment. The [final report](#) was published in May 2018.

### ■ **COMPLETE: Investigation of options to provide enhanced geo-positioning information to the land transport sector (2016 Action Plan – Item 7)**

Australian and New Zealand governments developed a testbed for enhanced positioning techniques, including connected and automated vehicle projects. In 2018 the Australian Government funded the development of a [Satellite-Based Augmentation System and a national ground station network](#) to enhance Australian geo-positioning.

### ■ **ONGOING: Priority trials and research of Intelligent Transport Systems (2016 Action Plan – Item 3)**

Research and trials of emerging transport technology remains a priority for all jurisdictions. A Connected and Automated Vehicle Trials and Technology working group was established across jurisdictions to monitor future trials, avoid duplication and optimise information sharing. Austrroads continues to publish information about ongoing trials on its [website](#). This research and trialing is a key exercise to inform further analysis sought through **key priority 2.1**.

## Key priorities over the next three years

### ■ **NEW: 2.1 Develop guidance on how infrastructure can be future ready for CAV technology within an integrated transport and land use planning framework**

The Commonwealth will develop guidance to support policy and investment decisions on technology in the road transport sector. The guidance will consider strategic priorities for governments to harness the safety, productivity, sustainability and accessibility benefits of transport technology.

**Timeframe:** mid-2020.

**Lead partners:** Commonwealth, Austrroads.

### ■ **NEW: 2.2 Develop program of work to address the barriers and challenges impeding the uptake of Low and Zero Emissions Vehicles (LZEVs)**

Developed through the LZEV Working Group, this will support the Transport and Infrastructure Council's strategic work program to improve the environmental performance of infrastructure and transport systems, remove barriers to innovation and capitalise on new and emerging technologies. This work will also consider the development of a National Hydrogen Strategy and the future development of a National Strategy for Electric Vehicles.

**Timeframe:** early-2020.

**Lead partners:** LZEV Working Group (including Commonwealth, states and territories and Austrroads).

## Areas of future focus

Investigating potential interactions between multi-modal drones and infrastructure corridors



## Data

Transport systems are generating more data than ever before. This data can be used to improve services, such as real-time information for travelers, streamline government operations and guide decision-making for infrastructure investment. Investigating the potential of data and solving issues regarding access, storage and analysis is a priority for Australian governments and the transport sector.

## Completed and ongoing actions since 2016

■ **COMPLETE: Exploration of how telematics and other intelligent transport systems can be used to optimise operations and planning for port precincts and intermodal terminals (2016 Action Plan – Item 11)**

This Action has been progressed as part of the [National Freight and Supply Chain Strategy](#), which is expected to be implemented from 2019. This action explored how granular telematics and Intelligent Transport Systems data can be used to improve supply chain efficiency. Industry was consulted on options for this use of data, in order to optimise port and intermodal operations, with next steps being considered in developing the Freight and Supply Chain Strategy.

■ **ONGOING: Improve the availability of open data in the transport sector (2016 Action Plan – Item 8)**

Austroads published the [Connected and Automated Vehicles \(CAV\) Open Data Recommendations](#) report in 2018. The next stage of this project is to investigate best practices for the supply of road authority data for CAVs through **key priority 3.1**.

## Key priorities over the next three years

■ **NEW: 3.1 Explore uses of C-ITS and AV data to improve network efficiency and investment**

CAV data has the potential to support governments in improving network efficiency and safety, and be used as an input to inform investment decision making. Developing learnings, potentially drawing from trials, to inform the approach to data would help guide governments and the community in effective uses of this data. The NTC will undertake a project scoping the potential uses of C-ITS and AV data by governments. There are likely to be other CAV data projects needed to align with past and planned data projects. Austroads will undertake a project looking at the data needs for connected and automated vehicles from road agencies; for example, the location and effect of road works. This project will include national and international data consistency issues.

**Timeframe:** subject to consultation.

**Lead partners:** NTC, Austroads, Commonwealth, states and territories.

## Areas of future focus

**Improved data and data sharing for electric vehicles, including: developing data sharing and exchange standards for vehicle, charging and energy data**



# Standards and Interoperability

## Standards and Interoperability

Enabling interoperability of equipment and services, particularly in a rapidly changing technological environment, is a difficult task. Jurisdictional differences, established patterns of use and legacy systems in information technology can be barriers. Australian governments are committed to collaboration on standards and interoperability, with a focus on adopting international standards unless unique Australian requirements are needed.

## Ongoing actions since 2016

### ■ ONGOING: Development of a Cooperative ITS infrastructure road map (2016 Action Plan – Item 4)

A nationally coordinated road map will provide greater certainty to industry on potential deployment methods and timeframes, with work underway to position Australia to take advantage of opportunities in connected infrastructure. Austroads has undertaken a range of research and assessments on C-ITS through its Connected and Automated Vehicle program with **key priority 4.1** a key step to progress this work.

### ■ ONGOING: Publish a connected vehicle (Cooperative Intelligent Transport Systems) statement of intent on standards and deployment models (2016 Action Plan – Item 5)

Creating a technologically neutral statement of intent for Australia will help give guidance to industry on likely deployment models. In January 2018, the Australian Communication and Media Authority published the [Radiocommunications \(Intelligent Transport Systems\) Class Licence 2017](#), providing certainty that C-ITS applications can be used in the 5.9 MHz spectrum. C-ITS technologies and standards development continue to evolve in what is a highly complex environment, with governments and stakeholders progressing work to evaluate their adoption including through **key priority 4.1**.

## Key priorities over the next three years

### ■ NEW: 4.1 Evaluate deployment models and associated costs and benefits of C-ITS vehicle technologies

Many automotive and transport sector leaders have indicated that connectivity in vehicles will help solve complex problems in emerging technology. National and international work is underway on connectivity solutions including short-range communications and cellular technologies. A greater understanding of business and assurance models for deployment in Australia and their cost-benefit for industry and government will support effective regulatory and investment decision-making.

**Timeframe:** early-2021, subject to implementation consultation.

**Lead partners:** Commonwealth.

## Areas of future focus

**Identify any gaps in standards in-line with international developments**



# Disruption and Change

## Disruption and Change

Government and transport agencies are experiencing a changing environment, with potential shifts in traditional sources of revenue, infrastructure needs, insurance standards, enforcement of road rules and skills training in the sector. The policy framework will continue to support agencies' decision-making as these changes unfold. This action plan outlines Australian governments' commitment to research, partnering with industry and academia and proactively positioning the Australian transport system for the future.

## Ongoing and revised actions since 2016

### ■ ONGOING: Explore options to increase the uptake of telematics and other technologies for regulatory and revenue collection purposes (2016 Action Plan – Item 9)

This work examined strategies for government and the private sector to accelerate deployment of telematics, and was incorporated into a review of the regulatory telematics regime. The National Transport Commission released the [Review of Regulatory Telematics](#) report in March 2018, and continues to work with key stakeholders on implementing the report's recommendations.

### ■ REVISED: Investigate options for interoperable public transport ticketing (2016 Action Plan – Item 12)

Transport ticketing technology is evolving and existing systems require renewal to take advantage of developments.

**Key priority 5.2** will continue the intent of this action through a wider analysis of Mobility as a Service.

## Key priorities over the next three years

### ■ NEW: 5.1 Identify and facilitate emerging technologies that improve freight outcomes

International and Australian trials and research have shown that new technologies can increase freight network efficiency, decrease risk to transport users, reduce fuel usage and emissions, and enhance traceability of supply chains. Through the National Action Plan of the National Freight and Supply Chain Strategy, jurisdictions will:

- facilitate research and trials of transport technology in the Australian freight sector;
- develop an evidence base to inform next steps on improving freight outcomes, skills, workforce and industry impacts, and future infrastructure needs; and
- promote national consistency to support interoperability.

**Timeframe:** end-2019 onwards.

**Lead partners:** Commonwealth, states and territories.

### ■ NEW: 5.2 investigate the role of governments in MaaS and identify priorities and enablers to support its effective development and deployment

MaaS combines public and private transport options in a single app, providing an integrated origin to destination journey, handling payment and bookings through the same platform and providing dynamic route-planning information to users. This provides a model to improve mobility and accessibility in cities, towns and regions. The specific business models of MaaS are being explored and tested around the world, including Australia. This action will define the opportunities and challenges in an Australian context of integrating various forms of transport into a single, optimised on-demand mobility service. This includes describing the enabling roles of governments in guiding the deployment of MaaS.

**Timeframe:** end-2020, subject to consultation.

**Lead partners:** Commonwealth, states and territories.

### ■ NEW: 5.3 Research into the competition impacts of automated vehicles

Potential deployment scenarios for automated vehicles may influence commercial issues such as repairer access, e-commerce platforms and access to data. Research into this aspect of the technology will guide future regulatory decisions making and identify future analysis needed.

**Timeframe:** subject to consultation.

**Lead partners:** NTC, Commonwealth.

## **Areas of future focus**

### **Workforce and skills considerations**

**Revenue implications for all levels of government of emerging transport technology**

**Organisational impacts of connected and automated vehicles for road transport agencies**

**Ethics in the use of artificial intelligence and robotics in vehicle automation**

**Investigate the need for a national approach to rail technology and other technologies that support mass transit (for example, faster rail, high capacity rail signaling, trackless trams)**





# Related Initiatives

There is a wide range of related work to prepare Australia for the future of the transport system. This section is a snapshot of many of the initiatives undertaken or underway across governments and transport organisations.

## Northern Territory

[Darwin Driverless Bus Trial](#)



## New South Wales

[Cooperative Intelligent Transport Initiative \(CITI\)](#)

[Connected and Automated Vehicle Trial Program](#)

[Connected and Automated Vehicles Plan](#)

[Electric and Hybrid Vehicle Plan](#)

[MaaS Innovation Challenge](#)

[Future Transport Technology Roadmap](#)

[Research hub](#)



## Australian Capital Territory

[CANdrive Automated Vehicle Trial](#)

[Wing Drone Delivery Trial](#)



## Queensland

[Connected and Automated Vehicle Initiative \(CAVI\)](#)

[Managed Motorways Initiative](#)

[Queensland Electric Super Highway](#)

[Queensland Electric Vehicle Strategy](#)

[Mobility Disruptions Strategic Options Assessment](#)

[Draft Queensland Transport Strategy](#)



## South Australia

[Future Mobility Lab Fund](#)

[Autonomous Vehicle Trial Exemption and Authorisation Scheme](#)

[Cohda Wireless Connected and Automated Vehicle Trials](#)

[Telstra Connected V2X trial](#)

[Flinders University FLEX AV Trial](#)

[Olli AV and Matilda Smart Bus Stop Trial](#)

[EasyMile Renmark Trial](#)



## Victoria

[Smarter Journeys Program](#)

[Intelligent Transport Systems Grants Program](#)

[Automated Driving System Permit Scheme](#)

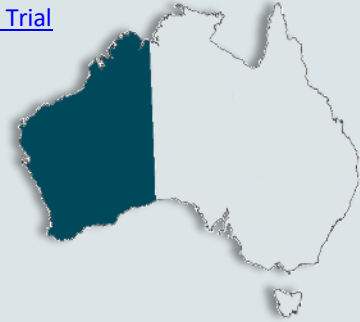


## Western Australia

[Royal Automobile Club of Western Australia \(RAC WA\) Intellibus Trial](#)

[RAC WA Intellicar Trial](#)

[Curtin University Driverless Bus Trial](#)



## Tasmania

[Smarter Fleets](#)



## National Transport Commission

[Barriers to the safe use of innovative vehicles and mobility devices](#)

[Developing technology-neutral road rules for driver distraction](#)



# Austrorads

[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](#)

[Assessment of key road operator action to support electric vehicles](#)

