Future Transport Roadmap – White Paper

Emerging directions for stakeholder feedback

August 2026

Project	**1-116 Future Transport Roadmap** This project responds to iMOVE's Commonwealth Milestone 1.3.05 by applying a research led approach to the development of a roadmap for future transport networks. This research is funded by iMOVE CRC and supported by the Cooperative Research Centres program, an Australian Government initiative.
Participants	iMOVE Australia Astrolabe Group

About iMOVE

iMOVE is a national centre for transport and mobility R&D. We work with our partners to deliver high-impact R&D collaborations that improve the transport systems for people and freight nationally. iMOVE runs the iMOVE Cooperative Research Centre which is funded by the federal government and its government, industry and research partners over 10 years to tackle transport-related challenges in Australia.

About Astrolabe Group

Astrolabe Group works with industry, government and community to create better futures through practical and people-centred solutions. Our team has combined expertise in planning, infrastructure, economics, governance and engagement with sector knowledge and practical experience.

This report was prepared for iMOVE. In preparing the report, Astrolabe has made every effort to ensure the information included is reliable and accurate. Astrolabe is unable to accept responsibility or liability for the use of this report by third parties.

Acknowledgement of Country

In the spirit of reconciliation, we acknowledge the Traditional Owners of Country throughout Australia and their continuing connections to land, waters, and community.

We show our respect to elders past and present. We acknowledge that we stand on Country which was and always will be Aboriginal Land.

Background

Future Transport Roadmap

This project will deliver a national roadmap for technology and infrastructure deployment for Australia's transport systems.

The roadmap will provide practical guidance for investment, policy and further research. While a key focus is on technological needs including digital, connectivity and automation, the roadmap will also reflect the evolving political, economic, social, environmental, and legal contexts influencing the choice and adoption of new technology.

It will articulate feasible pathways for advancing future transport outcomes across the domains of safety, productivity, accessibility and sustainability.

The roadmap aims to support public and private sector decision-makers in their planning, prioritisation and coordination of future transport technology initiatives.

This project responds to iMOVE's Commonwealth Milestone 1.3.05 by applying a research-led approach to the development of a roadmap for future transport networks. iMOVE is working with Astrolabe Group to deliver this final CRC milestone.

Purpose of White Paper

This White Paper summarises the results of our stakeholder engagements as well as elements of contextual research that have been undertaken. Throughout the engagement process we have been looking for the emergence of consensus around sectoral priorities. Areas of common thinking that have been identified are described in this paper along with emerging priorities and directions.

This paper is presented now to our stakeholders and to the sector generally to attract feedback and further input.

More information

You can find more information about this project on the dedicated project website: (https://imoveaustralia.com/project/future-transport-roadmap-tech-and-infrastructure-requirements/).

Learn more about iMOVE (https://imoveaustralia.com/) and Astrolabe Group (https://www.astrolabegroup.com.au/) by visiting their websites.

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Introduction

Rapid advances in data availability and analytics, connected and automated vehicles, and transport modelling are creating new opportunities to improve the efficiency and productivity of our transport networks and services. At the same time, pressure is growing to enhance accessibility, safety and emissions reduction.

Transport agencies must navigate this complex landscape with limited resources, while balancing policy, regulation, institutional readiness, and public acceptance to successfully deploy these technologies and drive improvement.

In response to these opportunities and challenges, and as the final milestone for the CRC, iMOVE is developing a Future Transport Roadmap. The roadmap aims to maximise improvements in safety, productivity, accessibility, and sustainability for all Australians. It is hoped that a coordinated, cross-jurisdictional roadmap will support coordinated delivery of transport innovation across the nation.

This white paper presents observations and insights we have developed from:

- Engagements with stakeholders
- Review of jurisdiction-published strategies
- Assessment of outcomes from iMOVE research projects.

We have sought to identify areas of common interest and intent across the jurisdictions. We also propose directions and actions that can lift the performance of the transport sector nationally and can hopefully be supported across the jurisdictions.

At this stage of roadmap development, we are keen to receive your feedback on the insights gained during initial engagement activities and your response to the various directions and actions that have been proposed. This feedback will inform our development of the roadmap with the guiding aim for iMOVE's final deliverable to provide useful guidance to the transport sector for their investments of time, effort and funding into new technology in the short to medium term.

To assist your feedback process 'stakeholder validation' questions have been inserted throughout the paper. These have been posed to:

- Test whether emerging conclusions resonate or conflict with your perspective
- Ensure that we have adequately captured and represented the sector's challenges and priorities
- Test the feasibility of the roadmap's emerging directions.

Your responses to these questions will be a vital input to the development of the roadmap and will help to ensure that the roadmap is aligned to the national interest.

How to respond to the stakeholder validation questions

Responses can be provided directly through our online form at Feedback Form: Future Transport Roadmap White Paper – Fill out form.

Alternatively, you can provide written comment to info@astrolabegroup.com.au

We ask that all feedback is received by Friday 21 August 2026.

Engagement

In order to develop a roadmap that is relevant to stakeholders across the sector, Astrolabe and iMOVE facilitated 20 engagement sessions with 28 representatives from federal and state agencies, industry and research institutions (see Appendix C for full Engagement Methodology). The purpose of this engagement was to understand their transport priorities, identify technologies of interest and discuss opportunities or constraints to the deployment of technology.

Sessions were initially designed to explore technology priorities across four domains: safety, productivity, accessibility, and sustainability, with each session anchored in the relevant stakeholder's domain of expertise. However, during our engagement, some additional transport priorities were revealed, particularly customer centricity and resilience. Rather than complicate the structure of our analysis, we elected to include customer centricity in our consideration of accessibility and to include resilience in our consideration of productivity. The four domains were updated as shown in the diagram below.

Other feedback we received from our engagement was that securing change to policy, regulation and governance was as important for technology deployment as the technologies themselves. This was articulated so consistently by our stakeholders that we have included a discussion of this aspect in addition to our consideration of the four domains.

Domains of focus for technology

Safety	Productivity	Accessibility	Sustainability
Towards zero road trauma – eliminate road fatalities and serious injuries across the transport network	Optimised network performance – reduce congestion and delays and improve resilience	Customer-centred service delivery – improve the quality and reliability of transport for the benefit of all users	Reduce transport emissions – support the transition to a low-carbon transport system

Domains of focus for regulation and policy reform

National coordination	Regulation and policy reform	Data	Investment and funding
Support collaboration and improved coordination between jurisdictions	Progress harmonised policy and regulation across Australia	Enable the collection, sharing and standardised use of data	Maximise returns from investment in transport technologies

Policy, regulation and governance

The following points summarise sentiments that were expressed by many stakeholders:

Regulation is constraining technology deployment. Across the engagement, stakeholders consistently identified regulation, not technological capability, as the main barrier to deployment in Australian transport. The gap between what technology can now deliver and what current regulatory frameworks permit is limiting progress.

Siloed governance frameworks limit system-level outcomes. Fragmentation within and between agencies, and across jurisdictions nationally is prevalent. Lack of collaboration at all levels of the transport system limits deployment, data sharing, and coordinated investment opportunities.

This leads to individual jurisdictions re-trialling technologies already proven in other states, and data governance frameworks blocking the distribution of critical road and transport data between public agencies and with industry.

Funding models for technology deployment are unresolved. High-priority technological solutions often have no funding for deployment at scale. This is particularly prevalent for technologies whose benefits flow broadly across the community. If the benefits cannot be monetised, it is difficult to attract funding for the supporting infrastructure.

Broadly, stakeholders expressed that the private sector would be willing to invest where there is a reasonable expectation of earning a return, however, for deployments whose returns are risky or diffuse, the requirement for investment falls to government.

Standardisation and harmonisation between jurisdictions saves time and cost in the long run. There are numerous historical examples of poor cross jurisdictional coordination of technology deployments. This now results in higher costs and dependencies that complicate deployment at scale. We cannot undo past actions, but it is important that we recognise the costs that independent actions impose, and the system-level savings that can be achieved from utilisation of standardised and open solutions.

Stakeholder validation:

1. Are there any opportunities or barriers that have not been captured across policy, regulation, and governance?

Safety domain

There is universal consensus that Safety is important and that the safety performance of the transport system, particularly the road system, needs to be improved. The following also emerged strongly:

- Safety performance will improve if rates of compliance can be lifted
- Safety performance would improve if drivers could be persuaded to change their behaviour in both the short-term and long-term scenarios
- Manufacturers are steadily improving the safety of their vehicles, so system safety would be improved if the replacement of old models with newer ones could be accelerated
- It was generally perceived that progressive revision of ANCAP (Australasian New Car Assessment Program) ratings and Australian Design Rules (ADRs) can and do contribute to improved safety on road, albeit with substantial time lags.

Our review of published government strategies and policies indicates the following safety objectives are widely supported:

- **Towards zero road trauma**: eliminate road fatalities and serious injuries
- **Automated enforcement and safety measurement**: detect and deter unsafe behaviours and use data to target road safety programs and measure outcomes
- **Intelligent monitoring**: proactively identify defects across transport infrastructure networks
- **Safe deployment of connected and automated vehicles**: develop national regulatory frameworks and build CAV-ready road infrastructure to enable safe rollout.

Other policy objectives which appear relatively consistently across the jurisdictions, but were not prominent in discussions with stakeholders, include:

- Address the disproportionate rural road toll
- Protect vulnerable users (including pedestrians, cyclists, motorcyclists, public transport users).

When considering the contribution that technology could make to improve safety, the following initiatives were proposed:

- Utilise better cameras and automated image analysis. For example, AI-enabled multi-use cameras can detect a range of infringements.
- Create higher police presence or non-compliance detection technology to persuade drivers change their behaviour.
- Make more use of variable message signs associated with speed detection technology to provide immediate feedback to drivers.
- The availability of Advanced Driver Assistance Systems (ADAS) in vehicles was considered to be important for improvement in the longer term as the new vehicles enter the national fleet. It was also considered important because it can be achieved via amendment to ADRs without requiring material levels of government expenditure.

- Vehicle-to-everything (V2X) communications was raised by several stakeholders. The general expectation is that short-range/low-latency V2X communication technology has potential to materially reduce accident rates. However, it is not clear which technology should be deployed. This indecision has stifled investment in this technology by all stakeholders. Even if direction was established immediately it is unlikely that this technology would be available at scale until 2030, or even later.
- Introduction of automated vehicles was raised by a few stakeholders as another technology that has potential to improve safety. However, stakeholders conceded that progress in this area has been slower than initially expected and few expect this technology to make a material contribution within the next decade.

Other technologies that could possibly contribute to safety are long-range V2X communication, driver monitoring and VR simulation of infrastructure modification and use of simulation for training.

Stakeholder validation:

2. Are there any ambitions, opportunities or barriers that have not been captured in the safety domain?

Productivity domain

The productivity domain attracted the most commentary. This is not surprising as public and private sectors and the community benefit strongly from productivity improvements. Furthermore, there are numerous examples in the transport sector of initiatives that have improved productivity. For example:

- Sydney Coordinated Adaptive Traffic System (SCATS)
- VicRoad Managed Motorways
- Sydney's new automated metro train
- Melbourne's automated container port
- Automated ore haulage in the Pilbara.

Our population has grown strongly in recent years and must support steadily increasing transport movements despite the generally static nature of system capacity. This requires us to continue to look for ways to increase system throughput and reduce the peakiness of demand.

Transport system optimisation and network management are priorities for most jurisdictions. Many have invested in digital modelling of their systems and use these tools to explore further optimisation initiatives. Optimising systems in real time requires a substantial uplift in digital monitoring however, which brings new complexity from the overlay of new technologies on low-performing legacy systems.

Feedback from stakeholders aligned with many of the objectives in strategies and policies articulated by our transport agencies, though most of the feedback referred to road transport rather than other modes.

- **Intelligent transport systems and network optimisation**: adopt adaptive traffic management, real-time monitoring, and predictive analytics to reduce congestion and recover from disruption.
- **Climate-resilient transport infrastructure**: redesign elements of infrastructure to better withstand the risks of natural disasters as part of the maintenance and renewal cycle.
- **Pursue automation for freight and services**: use vehicle and logistics automation to improve freight movement efficiency and reduce operating costs.

A policy objective which appears relatively consistently across the states and jurisdictions, but was not prominent in discussions with stakeholders, includes:

- **Digital transformation and data-driven operations**: apply data analytics and digital platforms to improve system responsiveness, operational decision-making, service planning, and maintenance scheduling.

Technologies that could contribute to improved productivity include:

- Digitisation: converting physical or analogue information, processes, and infrastructure into digital formats to improve efficiency and data accessibility
- Smart traffic management including intersection monitoring, LiDAR, ‘Hold the Red’ intersection management, prioritisation of targeted vehicle cohorts, extraction of network data from diverse sources (such as mobile phones and connected vehicles), Bluetooth, and Wi-Fi signatures
- Alerting travellers in real time to network disruptions to enable them to change plans or routes
- Intensifying information exchange between drivers and infrastructure
- Developing integrated network monitoring, managing monitoring data in real time and proactively providing information to motorists/travellers to assist their decision-making and to manage demand in the face of disruption.

Stakeholder validation:

3. Are there any ambitions, opportunities or barriers that have not been captured in the productivity domain?

Accessibility domain

Improvements to accessibility and general customer experience typically deliver small benefits to large numbers of people. In a few circumstances, people can be persuaded to pay for benefits, for instance for their use of a toll road. However, as this is not always possible, the implementation of technology to improve accessibility is highly reliant on public sector expenditure.

As public sector funding is always scarce, two key questions are consistently raised:

- Which limited investment/s will deliver the greatest benefits?
- Which of the underserved cohorts should be prioritised?

This demands difficult comparisons as the underserved communities are diverse, characterised by difficult geography (peri-urban, rural, and remote) and uncertain physical ability.

As the question of how to improve accessibility is a pertinent one for all transport agencies, there have been numerous iMOVE projects examining various technologies and their possible deployment. The full list of relevant projects is in Appendix D.

Stakeholders consistently proposed customer centricity as the appropriate lens for evaluating accessibility technology, positioning the user as the primary reference point, not the network.

Feedback from stakeholders focused in part on accessibility to public transport services. This aligned with general strategies and policies adopted by transport agencies across Australia, including:

- **Regional and remote connectivity**: ensure communities outside capital cities have reliable access to transport for essential services, employment, education, and healthcare.
- **Seamless multimodal integration**: connect different transport modes through integrated ticketing, wayfinding, and timetabling for end-to-end journeys.
- **Real-time information and digital inclusion**: deliver accurate and accessible travel information through both digital and non-digital options.

Other policy objectives which appear relatively consistently across all states and jurisdictions, but were not prominent in discussions with stakeholders include:

- **Eliminate barriers to public transport**: address physical and financial barriers to public transport, especially for people with disability, older people, school children, and those on low incomes.
- **Demand-responsive and on-demand services**: deploy flexible, technology-enabled services in areas where fixed-route public transport is unviable.

Technologies that could contribute to improved accessibility and journey experience include:

- Mobility as a Service
- Micro and e-mobility
- Last-mile transport services
- Connectivity on board public transport
- Relevant and timely travel disruption warnings
- Service reliability.

Stakeholder validation:

4. Are there any ambitions, opportunities or barriers that have not been captured in the accessibility domain?

Sustainability domain

The transition to low or zero-carbon emitting vehicles is progressing steadily in the light vehicle fleet, but long-distance freight and aviation do not yet have commercially viable zero-emission solutions. Additionally, the infrastructure required to support these segments to reduce their emissions has not been established.

Low-carbon liquid fuels (LCLFs) are seen as a possible interim solution for these hard-to-transition segments until robust long-term solutions become available. However, hydrocarbon LCLFs face two key limitations: they are more expensive to produce, and they are not expected to be available at the scale that the transport sector requires.

Consequently, progress towards transport sector emissions reductions is slow and is unlikely to reach net zero by 2050. The current driver of transport emissions reduction is the rate of purchase of electric passenger vehicles (EVs currently make up about 20% of new car sales). However, EVs comprise only 1.5% of passenger vehicles in Australia. Demand for EVs is influenced by vehicle and fuel prices, and the availability of charging infrastructure. Provision of additional charging infrastructure is the main option for the three levels of government to influence progress towards transport sustainability.

The growing requirement for companies to report on their carbon footprint creates challenges for the freight sector. Across all modes, carbon emissions are generally estimated rather than measured, and estimation methodologies are inconsistent across the nation. Stakeholders observed that robust measurement will be important for meaningful progress on emissions reduction.

Feedback from stakeholder engagement generally aligned with strategies and policies adopted by transport agencies across Australia, namely:

- **Electrification of public transport**: transition fleets to zero-emission vehicles.
- **Accelerate electric vehicle uptake in private and commercial settings**: provide fleet incentives and support workforce training to shift private and freight vehicles to electric.
- **EV accessibility and charging equity**: increase charging infrastructure in all settings to enable more people in the community to utilise EVs.
- **Freight decarbonisation**: transition heavy vehicles and freight operations to lower-emission technologies where economically feasible.

Other policy objectives which appear relatively consistently across the states and jurisdictions, but were not prominent in discussions with stakeholders include:

- **Reduce car dependency through mode shift**: invest in public transport, and active to reduce the proportion of trips made by private car and associated emissions.
- **Sustainable asset lifecycle management**: apply circular economy principles to infrastructure construction and end-of-life management to minimise environmental impact.

Technologies that could contribute to improved sustainability include:

- Vehicle-to-Grid integration (V2G)
- Micro and e-mobility.

Stakeholder validation:

5. Are there any ambitions, opportunities or barriers that have not been captured in the sustainability domain?

Implementation of the roadmap

The Roadmap will identify national preferences and priorities in relation to these domains and provide support to future transport deployment by identifying actions that will enable the nation to make progress in each domain.

The Roadmap is intended to support Australia's transport agencies and private sector operators in their decision-making for investment and deployment of technology. It will be a guide for policy development, investment in transport technologies and further research to address knowledge gaps over the next decade. It will not prescribe specific investments or delivery actions.

The Roadmap will also encourage cross-jurisdictional conversations and seek to identify where jurisdictions can work together to realise shared benefits from new transport technologies.

Emerging directions

The following section presents the emerging direction of the Roadmap, developed through a synthesis of findings from research, policy review, and stakeholder engagement. The emerging direction identifies key objectives and focus areas that will be further developed for the Roadmap.

Objectives and focus areas are divided into two:

- **Policy, regulation and governance**: national coordination, regulation and policy reform, data, investment, and funding
- **Domains of endeavour**: safety, productivity, accessibility and sustainability.

The roadmap will identify the following for each focus area:

- Current state: the key issues and challenges and work that is already underway
- Actions to progress the focus areas and deliver the ultimate objective
- Collaborators: stakeholders that should be involved, and what they will play
- Risks of inaction
- Case studies: lessons learnt from across the world.

Policy, regulation and governance

Objective	Focus areas
National coordination	• Develop and endorse a vision and principles for transport in Australia • Support collaboration and improved coordination between jurisdictions on priorities, trials, investment opportunities, and data sharing
Regulation and policy reform Progress harmonised policy and regulation across Australia	• Prioritise standardised and open technology solutions • Set a standard for Connected and Automated Vehicle communications system for the country • Encourage policy development to be outcome-based and technology-agnostic
Data Enable the collection, sharing, and standardised use of data	• Establish a national framework for measuring and monitoring progress against objectives. The framework should define metrics for each objective, and methods for collecting, storing and sharing data • Develop protocols for collection, sharing, and usage of transport data • Develop robust data privacy protections to enable greater data collection, particularly to unlock multi-modal data collection e.g. through AI video analytics
Investment and funding Maximise returns from investment in transport technologies, ensuring all jurisdictions reap the benefits	• Align and coordinate budget commitments across jurisdictions to progress nationally agreed objectives. Communicate these investment priorities to the transport sector to signal opportune areas for additional investment • Invest in and approve trials that include cross-jurisdictional collaboration. Require trials to be designed for national adoption from the outset, for example, with endorsement from multiple jurisdictions to avoid re-trialling of the same technology • Resolve how to support technology deployment across the nation in the face of widely differing jurisdictions' financial strengths

Stakeholder validation:

6. Are there other objectives and focus areas that need to be considered in the roadmap for policy, regulation and governance?
7. What work is already underway related to the objectives and focus areas for policy, regulation and governance?
8. Which stakeholders should be involved in changes to policy, regulation and governance?

Safety

The ultimate objective of this domain is: **towards zero road trauma – eliminate road fatalities and serious injuries across the transport network.**

The following table identifies emerging focus areas for the roadmap to explore further, alongside existing enabling technologies.

Focus areas	Potential technologies

Protect vulnerable users: Improve safety outcomes for at-risk groups, such as pedestrians, cyclists, motorcyclists, and targeted public transport users (including the elderly, youth, and people with disabilities).	• Advanced Driver-Assistance Systems
	  – Driver monitoring systems
	  – Artificial Intelligence detection
	  – Electronic Stability Control
	  – Intelligent Speed Assist
	• Vehicle-to-Everything communication
	• Dedicated Short-Range Communications
	• Collective perception
	• High Definition Maps
	• Digital twin sandpit
	• VR simulations
	• Telematics
	• Remote sensing and satellite monitoring
	• CCTV and AI monitoring of public transport passengers
	• Deployment of ‘smart cameras’ on roadsides to detect noncompliant behaviour
	• Systematic monitoring of road condition to identify dangerous defects

Resilient and well-maintained infrastructure: Proactively identify and address infrastructure defects (in a time and cost-efficient manner). This also includes the use of technology to prepare for and respond to natural disasters.	
Reduce the disproportionate road toll: Improve safety outcomes on regional, rural, and remote roads, where incidents are disproportionately high.	

Productivity

The ultimate objective of this domain is: **optimised network performance – reduce congestion and delays.**

The following table identifies emerging focus areas for the roadmap to explore further, alongside existing enabling technologies.

Focus areas	Potential technologies
Data-driven transport operations: Improve incident detection and resolution, operational decision-making and maintenance scheduling.	• Adaptive traffic management systems • Predictive analytics platforms • Real-time network monitoring • Connected and Automated Vehicles • Digital twin • Internet of Things sensors • AI-driven asset management • High Definition Maps • Vehicle-to-Everything communication • Introduction of ETCS and/or ATMS to railway operations • Frictionless ticketing • Automated permitting processes for heavy vehicles and associated remediation of infrastructure vulnerabilities
Efficient freight and logistics movement: Improve freight efficiency and reduce operating costs across the supply chain by optimising route planning, reducing dwell times and enabling better coordination.	
Manage demand patterns: Influence and respond to travel demand across the network through real-time information, incentives, and predictive modelling, to reduce peak-period pressure and localised congestion.	

Accessibility

The ultimate objective of this domain is: **customer-centred service delivery – improve the quality and reliability of transport for the benefit all users.**

The following table identifies emerging focus areas for the roadmap to explore further, alongside existing enabling technologies.

Focus areas	Potential technologies
Equitable access to transport services: Reduce transport disadvantage in communities by improving the availability, affordability, and reliability of transport options, particularly for underserved populations.	• On-demand transport platforms • Automated scheduling and dispatch • Micro and e-mobility • Ride-matching and pooling systems • Real-time journey planning • Smart/frictionless ticketing • Audio broadcast technologies • Automated and connected vehicles
Inclusive design and deployment: Reduce transport disadvantage experienced by people with disabilities by embedding accessibility principles into the design, deployment, and operation of transport infrastructure, vehicles, and information systems.	
Reliable and transparent journey information: Improve trust and satisfaction in the transport network by giving users accurate, real-time, and easy-to-access information.	

Sustainability

The ultimate objective of this domain is: **reduce transport emissions – support the transition to a low-carbon transport system**

The following table identifies emerging focus areas for the roadmap to explore further, alongside existing enabling technologies.

Focus areas	Potential technologies
Accelerate low and zero-emission vehicle uptake: Increase adoption of electric, hydrogen, and other low-emission vehicles through incentives and supportive infrastructure (such as charging networks).	• Battery electric vehicles • Commercial fleet charging infrastructure • Sustainability measurement platforms • Low carbon liquid fuels • EV charging infrastructure • Renewable energy integration • Vehicle-to-Grid integration • Carbon footprint tracking and reporting platforms • Green freight rating and optimisation • Low-emission zone management systems • Modal shift incentives • Life cycle assessment tools
Focus on hard-to-transition segments: Prioritise research and trials in long-distance heavy haulage and remote operations, where zero-emission solutions are not yet commercially viable at scale.	
Shift travel to lower-emission modes: Increase the share of trips made by public transport, active transport, and shared mobility options.	

Stakeholder validation:

9. Are there other objectives and focus areas that need to be considered in the roadmap for safety, productivity, accessibility or sustainability?
10. Are some focus areas more urgent than others – if so, which ones?
11. Are there technologies missing that should be considered?

Case studies

The Roadmap will present a series of case studies drawn from Australian and international experience, spanning technology deployment, policy and regulatory reform, and examples of cross-jurisdictional collaboration. The following table is a list of initial case studies under consideration for inclusion in the Roadmap. Further research and engagement will inform the final selection.

Project details	Description
Technology	
Sydney Mobility as a Service (MaaS) Trial | Sydney, Australia | IAG / University of Sydney	A six-month trial exploring user uptake, willingness to pay, assessed readiness to adopt, and how MaaS can influence travel behaviour across Greater Sydney. • Convenience was found to be the primary driver of adoption over cost or sustainability. • Achieving sustainability goals was not found to be enough to justify the private sector investing in MaaS, unless accompanied by financial support. *Relevant domains: Accessibility, Sustainability*
Leading the Charge in Bidirectional Charging | NSW and SA, Australia | University of Technology Sydney (ISF) / NRMA	Research into early adopter experience of Vehicle-to-Grid (V2G) technology in Australia, considering barriers to uptake around information, skills, cost, and user experience, and time to set up as well as standards, retailers, and public awareness. • Regulatory and installation complexity (inclusing inconsistent DNSP approval processes and absence of charger standards) were the primary barriers to deployment. High upfront cost was secondary to process friction. • Without concerted effort to address identified barriers, the issues were expected to persist for mainstream consumers regardless of improvements to underlying technology. *Relevant domains: Sustainability*
Rouse Hill Electric Bus Depot | NSW, Australia | ComfortDelGro / TfNSW	Electrification of a metropolitan bus depot in Western Sydney, requiring grid infrastructure upgrades equivalent to doubling the suburb's existing grid connection. • Fleet electrification is a critical concern – the grid upgrade cost is a material barrier that is not reflected in vehicle-cost only comparisons. • The scale of investment required illustrates system-level commitment needed to transition large fleets to electrified solutions. Smaller operators may not be able to access the same capital or infrastructure support. *Relevant domains: Sustainability*
Waymo Commercial Robotaxi Service | Phoenix / San Francisco / Los Angeles / Austin, USA | Waymo LLC	Commercial robotaxi service operating at scale without human drivers. Across four US cities, Waymo has accumulated over 220m fully autonomous miles (March 2026). • 94% fewer crashes resulting in serious injury. 82% fewer airbag deployments in any vehicle crashes. 82% fewer injury-causing crashes.

	• 93% fewer pedestrian crashes with injuries. 84% fewer cyclist crashes with fewer injuries. 84% fewer motorcycle crashes with injuries. • Deployment remains geographically constrained by the operational design domain. Safety performance applies to specific urban environments, with highway and mixed-condition performance creating significantly more complexity. *Relevant domains: Safety, Productivity, Accessibility*
Flexible Bus Service | ACT, Australia | Transport Canberra	The ACT's Flexible Bus Service is a bookable accessible transport service for residents over 70, those with mobility difficulty, or those unable to access regular bus services. • Previously required days of advance booking; the service now enables day-prior booking. • Service is currently restricted to eligible users and is free, creating ongoing cost pressure. The pathway to broader on-demand offering requires a resolved funding and contracting model – technology is not the constraint. *Relevant domains: Accessibility*
Melbourne Tram Signal Priority | Melbourne, Australia | Yarra Trams	Smart sensors deployed on 25 Melbourne trams to communicate with traffic signals, replacing legacy analogue sensors. Sensors detect door status and stop button presses, enabling signals to hold green phases when trams are still boarding. • Incremental sensor upgrades to existing infrastructure delivered measurable journey-time improvements at low cost. No network-wide infrastructure replacement was required. • The productivity gain came from improving the quality of information exchanged between vehicles and signals - not from building new infrastructure. Same approach is replicable across other tram and bus networks. *Relevant domains: Productivity*
AI Optimisation for Corridor Performance | Melbourne, Australia | University of Melbourne / Cubic Transportation Systems	Project built a high-fidelity digital twin of a Melbourne road network covering 28 signalised intersections, calibrated against real SCATS loop detector data and live speed data. 'LSTM' and 'Informer AI' models were trained to forecast traffic conditions and test management interventions without disrupting the live network. • LSTM models consistently outperformed other approaches for short-term forecasting (15 minutes or less), making them suited to immediate tactical traffic management. The Informer model performed better for longer-horizon forecasting (30 minutes or more). The two models serve complementary rather than competing functions. • The AI model generates traffic state predictions in 70 microseconds, making it suitable for real-time decision support rather than only offline planning. *Relevant domains: Productivity, Safety*

Policy, regulation and governance	
UK Automated Vehicles Act 2024 | United Kingdom | Centre for Connected and Autonomous Vehicles	Enabling legislative framework for AV deployment on public roads in Great Britain. • Technology-agnostic framing avoids the risk of regulation becoming obsolete as technology evolves. Outcome-based safety principles replace prescriptive standards. • New liability concept 'Authorised Self Driving Entity' resolves who is responsible when an AV causes and accident.

New Mobility Playbook v1.0 | Seattle, USA | Seattle Department of Transportation, 2017	Seattle's framework for managing the rapid emergence of new mobility services (rideshare, bikeshare, carshare, and automated vehicles) across the city's transport network.
	
	• Playbook explicitly acknowledges that transport technology could take the city in one of two directions:
	  ○ Toward safer, more equitable transport, or;
	  ○ Toward congestion, insecure data, and exclusive services that benefit only a few.
	  ○ Playbook designed to shape technology towards city values.
	• Equity and justice are grounded as organisational principles. The Playbook acknowledges previous transport decisions affected disadvantaged communities more acutely, with new mobility decisions assessed against whether or not they repeat or reverse those patterns.

Stakeholder validation:

12. Are there other case studies that should be considered in the roadmap?

Appendices

Appendix A – Technology descriptions
Appendix B – Policy review
Appendix C – Engagement methodology
Appendix D – iMOVE projects

Appendix A – Technology descriptions

The following table presents a description of relevant transport technologies.

Technology	Description
360 imagery	Panoramic visual capture covering a full 360-degree field of view, used for mapping, surveying, and situational awareness
Application Programming Interface (API)	A set of protocols that allows different software systems to communicate and share data with one another
Advanced driver-assistance system (ADAS)	Advanced driver-assistance systems are a collection of technologies where automated systems perform tasks usually performed by drivers, either by taking control of vehicle functions or warning the driver of hazards. Technologies that fall under ADAS include lane keeping assistance, cruise control, blind spot warnings, parking assistance, traction control and emergency steering. ADAS sensors are the physical hardware components (e.g. cameras, radar, LiDAR, ultrasonic sensors) that feed data into ADAS systems to detect the vehicle's surroundings.
Artificial Intelligence (AI) data processing	The use of AI to analyse, interpret, and extract insights from large volumes of raw data
AI detection	The use of AI to identify and classify objects, events, or anomalies in real time
Closed-loop card data capture	Use of data from travel cards such as Myki or Opal to gain insights on when and where passengers travel
Collective perception	A connected vehicle technique where multiple vehicles and infrastructure share sensor data with each other to build a broader, shared picture of the environment
Dedicated Short-Range Communications (DSRC)	A wireless communication protocol designed for vehicle-to-vehicle or infrastructure communication over short distances, enabling fast and reliable data exchange
Digital twin sandpit	A virtual replica of a real-world system or environment used as a safe, simulated space to test and evaluate technologies or scenarios without real-world risk
Digitisation	The process of converting physical or analogue information, processes, and infrastructure into digital formats to improve efficiency and data accessibility
Driver monitoring systems	In-vehicle systems that use cameras and sensors to track driver behaviour, alertness, and attention
Electric Vehicle (EV) charging	The infrastructure and technology used to recharge the batteries of electric vehicles, ranging from home chargers to public rapid-charging networks

High compute intersections	Integration of high-coverage sensors to detect vehicles, cyclists and pedestrians at an intersection to allow smart decision making such as right-of-way optimalisation, detecting mobility-impaired users or prioritising active transport
High Definition (HD) Maps	Highly detailed, precise digital maps used by connected and autonomous vehicles, containing centimetre-level accuracy of road geometry, lane markings, and infrastructure
Hold the Red	The Hold the Red (HTR) system extends the all-red phase at the intersection when it predicts a vehicle running through a red light. The HTR is an intelligent crash-avoidance system that tracks the speed and location of all vehicles approaching the intersection
Light Detection and Ranging (LiDAR)	A remote sensing technology that uses laser pulses to measure distances and generate precise 3D maps of the surrounding environment
Machine learning	A subset of AI where systems learn from data to improve their performance over time without being explicitly programmed for each task
Micro and e-mobility	E-mobility is the use of mostly light-weight battery-powered devices such as e-bikes or e-scooters for transport (though non-electric devices are also used)
Mobility as a Service	An integrated approach to transport that combines multiple modes of travel (bus, rail, ride-share, cycling) into a single, on-demand digital platform accessible to users
Pressure mats	Sensor pads embedded in road surfaces or pavements that detect the presence and weight of vehicles or pedestrians
Vehicle-to-Everything (V2X) communication	A broad communication framework that enables vehicles to exchange data with other vehicles, infrastructure and networks
Vehicle-to-Grid (V2G) integration	Electric vehicles feed stored energy back into the grid, enabling EV batteries to act as distributed energy storage and supporting grid stability
Virtual Fencing	GPS or sensor-defined invisible boundaries to control or monitor movement without the need for physical barriers
Virtual Reality (VR) simulations	Immersive, computer-generated environments used to replicate real-world scenarios for testing, training, or stakeholder engagement purposes without physical risk

Appendix B – Policy review

The following table lists the government strategies and policies that were reviewed as part of this project.

Strategies and policies	
Federal	
National Road Transport Technology Strategy	Infrastructure and Transport Ministers Meeting
2024–27 National Connected and Automated Vehicle (CAV) Action Plan	Infrastructure and Transport Ministers Meeting
National Electric Vehicle Strategy	Department of Climate Change, Energy, Environment and Water
ACT	
ACT Transport Strategy	Transport Canberra, 2020
ACT Road Safety Action Plan 2020-2023	Transport Canberra
Zero-Emission Transition Plan for Transport Canberra	Transport Canberra, 2024
NSW	
Transport Technology Roadmap	Transport for NSW, 2024
NSW Connected and Automated Vehicle Readiness Strategy	Transport for NSW, 2022
NSW Electric Vehicle Strategy	Department of Climate Change, Energy, the Environment and Water, 2026
Future Transport Strategy 2056	Transport for NSW, 2018
Connecting NSW	Transport for NSW, 2025
NT	
National Remote and Regional Transport Strategy	Transport and Infrastructure Council
NT Infrastructure Strategy	Infrastructure NT, 2022
Territory-wide Logistics Plan	Department of Infrastructure, Planning and Logistics, 2020
Electric Vehicle Strategy and Implementation Plan	Department of Infrastructure, Planning and Logistics, 2021
QLD	
Department of Transport and Main Roads Strategic Plan 2023-2027	Department of Transport and Main Roads

SA	
South Australia's Transport Strategy	Department for Infrastructure and Transport, 2025
Automated Vehicle Trials Safety Assurance Framework	Department for Infrastructure and Transport, 2019
Public Transport Strategy and Regional Review	Department for Infrastructure and Transport
TAS	
Towards Zero Tasmanian Road Safety Strategy 2017-2026	Department of State Growth
Tasmanian Urban Passenger Transport Framework	Department of Infrastructure, Energy and Resources
Tasmanian Walk, Wheel, Ride Strategy (in development, 2024–25)	Department of State Growth
Regional Integrated Transport Plans (Southern, Northern, Cradle Coast)	Department of State Growth
VIC	
Plan for Victoria	Department of Transport and Planning
Victorian Road Safety Strategy 2021-2030	Department of Transport
Road Safety Action Plan 2	Department of Transport, 2021
WA	
Our Roadmap to enabling C-ITS in Western Australia 2024 – 2028	Main Roads WA
Keeping WA Moving	Main Roads WA
Road Safety Strategy for Western Australia 2020-2030	Road Safety Commission
EV Strategy & Implementation Plan	Department of Water and Environmental Regulation
Intelligent Transport Systems (ITS) Master Plan 2022 – 2030	Main Roads WA

Appendix C – Engagement methodology

Astrolabe and iMOVE facilitated 24 engagement sessions with stakeholders across the transport sector. The purpose of engagement was to:

- Understand their priorities to ensure the Roadmap aligns with real needs, challenges, and opportunities across the transport ecosystem
- Identify which technologies are of interest to stakeholders across a range of time frames (currently in use, being investigated, and on the horizon)
- Identify and share case studies of transport technologies being successfully applied in each domain.

As the primary audience for the final Roadmap is intended to be government transport agencies, representatives from these agencies were the main targets, however stakeholders from industry and academia were also included in engagement.

Engagement sessions were conducted as semi-structured interviews over 30-60 minutes. Questions that were asked included:

1. What are your organisation's key priorities in relation to [specific domain/s]? What are the timeframes in which you want to achieve these objectives?
2. What do you see the greatest unmet need or opportunity in [specific domain/s]?
3. Are there any technologies you are currently deploying or looking to invest in or trial?
4. What are the top 2-3 priority technologies? What needs to be done to progress these technologies, and what are the timelines?
5. Are there emerging technologies (or applications) that you think aren't receiving sufficient attention, or that you think should be further researched?
6. Do you know any examples where transport technology has delivered significantly improved outcomes in [specific domain/s]?
7. What do you see as the most significant barriers to adopting or scaling new transport technologies?
8. What would you like to see in the final Future Transport Roadmap?

The following table presents a summary of the organisations and roles that were engaged.

Organisation	Department (if relevant)
Road Safety Commission	Road Safety Commissioner
StraDigi	
TfNSW	Technology and Products
TMR	Traffic Engineering
TfNSW	Autonomous Vehicles Policy
Transport WA	Sustainability and Strategic Projects

Transport WA	Automated Vehicle Reform Freight
DITRDCA	Transport Market Reform and Technology
Main Roads WA	Real Time and Intelligent Transport System Operations
TfNSW	Universities and Research Research and Insights Research Partnerships Freight & Rail Policy Policy Strategic Transport Projects
DTP	Strategy
ComfortDelGro	
La Trobe University	Centre for Technology Infusion
TMR	Engineering
DTP	Strategy
Yarra Trams	Passenger Experience & Innovation
Transport Canberra	Transport, Territory and Municipal Services
Dept. of Infrastructure Tasmania	Traffic Operations
Booth Transport	
Institute for Sensible Transport	
Department of Logistics and Infrastructure (NT)	Transport and Civil Services Civil Construction
Department for Infrastructure and Transport (SA)	Transport Planning and Program Development Electrical Engineer Integrated Modal Planning

Appendix D – iMOVE projects

To ensure the Roadmap considers the breadth of iMOVE research over the last several years, Astrolabe reviewed 54 research projects completed between 2020-26. These projects were reviewed to understand their priorities, recommendations, and technologies as relevant to the four domains.

Most projects (26) focussed on productivity, followed by safety (24 projects), accessibility (12 projects), and sustainability (13 projects) (some projects touched on multiple domains). A series of 'responses' also emerged from this review, with each response having relevance to one or more domains, as well as enabling technologies. The tables below present a summary of these. Descriptions of technologies can be found in Appendix A.

Mobility	How people move between places
Smart traffic management	The use of systems to reduce congestion, improve safety and inform infrastructure and service decisions
Data capture	Large-scale methods of collecting and processing data
Assistance Technologies	Technologies that assist drivers by informing them of hazards or controlling parts of vehicle operations (such as speed, braking, or steering)
CAVs	Motor vehicles that can communicate information with infrastructure and other vehicles and have some level of autonomous control of the vehicle operation
Governance	Policies, legislation and decision-making systems
Design	Design of the street environment to increase safety, prioritise certain modes of travel and encourage traffic flow
Alternative Fuels	Non-fossil fuels to power vehicles, including Electric Vehicles and Hydrogen, including their supporting infrastructure (e.g. charging infrastructure)
Freight	Movement of goods, generally in heavy road vehicles

Domain	Response	Enabling technology and systems
Safety	Assistance technology	Advanced driver-assistance system (ADAS) and sensors, driver monitoring systems, Artificial Intelligence (AI) detection, Vehicle-to-Everything communication (V2X)
	CAVs	V2X, collective perception, dedicated short-range communications (DSRC), High Definition (HD) Maps
	Design	Digital twin sandpit, VR simulations
Productivity	Freight	Digitisation
	CAVs	As above

Accessibility	Design	As above
	Alternative fuels	Electric vehicles (EV) and charging, Vehicle-to-Grid integration (V2G)
	CAVs	As above
Sustainability	Alternative fuels	As above
Across all domains	Smart traffic management	Digital twin sandpit, AI data processing and detection, machine Learning, perimeter control, LiDAR, Hold the Red
	Data capture	ADAS sensors, machine learning, LiDAR, 360° imagery, closed-loop card data capture, AI data processing, API, pressure mats
	Governance	N/A
	Mobility	Mobility as a Service, micro and e-mobility

The following table lists iMOVE projects related to accessibility.

1-009	Bus Passenger Counting – Sydney Trial: Process and Outcomes
1-012	Safely introducing Connected and Automated Vehicles into integrated transport networks
1-014	Exploring balance between movement and place in designing safe and successful places (iMOVE project for TfNSW)
1-023	Enhancing land-use inputs to strategic transport models through advanced econometrics: CUBE Land Best Practice Review—Literature and User Survey
1-029	Replacement Bus Patronage Counting and Wait Time Measurement
1-033	A Smart Transport Technology Roadmap for Perth
1-036	Working from Home: The Perth Experience (Changes in Transport Demand – The Case of Greater Perth)
1-052	A method to monitor the share of high-speed road travel on safer roads
1-057	The Future of Australian Cities and Regions in a Post-Pandemic World
1-062	Framework and Conceptual Solution for Integrating Road Network Operations Planning into Real-time Traffic Management
1-071	Optimise Replacement Bussing Services During Network Disruptions – A Data-Driven Approach
1-081	Estimating Simplified Main Tour Mode Using Revealed Preference and Stated Preference Data
1-085	Using real-time train data to predict level crossing boom gate closure
2-010	Enhanced Decision Support Tool for on-site loading docks (White Paper)

2-011	Integrating Autonomous Aircraft into the Healthcare Supply Chain for Remote Communities in the Northern Territory
2-031	Planning for a Sustainable Last Kilometre Freight Delivery System for the Food and Beverage Sector in Greater Perth
3-001	Mobility as a Service in Australia: Customer insights and opportunities
3-003	Mobility as a Service Trial – User behaviour analytics / The Sydney Mobility as a Service Trial: Design, Implementation, Lessons and the Future
3-004	Unlocking Shared Mobility – Investigating Free-Flow Parking for Car-Sharing in Australia
3-007	Managing Transport System Investment Risk: Enhancing patronage predictions and adapting strategic asset management and appraisal processes to account for emerging trends and uncertainty
3-008	Future Transport and Mobility Environment (FTME)
3-009	FLEX Automated Vehicle – Phase 2 Trial
3-010	Liverpool Sustainable Urban Mobility Study (SUMS)
3-014	Australia's Disability Standards for Accessible Public Transport and Connected and Automated Vehicles (composite report)
3-016	Light Insight Trial (LiT)
3-017	FACTS: A Framework for an Australian Clean Transport Strategy
3-019	Outcomes and community benefits of a regional active travel network: Wagga Wagga Active Travel Plan (WWATP) – Evaluation Final Report
3-020	Design of a Regional Town and Rural Hinterland (RTRH) MaaS Blueprint
3-021	Interactively Visualising Street Design Scenarios for Communicating Bike Infrastructure Options to Communities and Policymakers
3-022	Promoting Sustainable University Travel Choices – Final
3-023	Frictionless Ticketing for Public Transport
3-026	Identifying Opportunities to Address Transport Disadvantage in Perth
3-027	Desire Lines User Behaviour Research: Initial Scoping and Feasibility
3-028	Older drivers: Advanced Driving Assistance Systems (ADAS) and Automated Vehicles (AVs) — Phase 2: Streams B & C; Phase 3: Guidelines Development
3-031	Validating the Benefits of Increased Drone Uptake for Australia
3-035	IEP – See Me: Transforming User Experience on Public Transport for Everyone
3-037	Impacts of e-rideables on the transport task in WA
3-038	Active Transport and Travel Demand in Brisbane: Insights from Survey and Smart Travel Diary Data
3-039	Behaviour Change for Sustainable Transport

3-044	Closing the Loop on First/Last Mile Transportation: Assessing the Connection between Micromobility and Public Transport in Brisbane
3-048	Sensory Sensitivity Wayfinding
6-001	The barriers to women entering and progressing in transport roles – Final report (Milestone 2)
6-006	Automated Mobility for Elderly and People with Disability: How 5G Can Help
6-007	Your Street Your Say
6-012	Shared Spaces – Final Report
6-017	Easy and novel ways to engage communities around road safety: Toolkit
6-018	Enabling Accessible Electric Vehicle Charging
6-022	Improving the Accessibility and Inclusivity of Public Transport through New and Emerging Transport Technologies
6-027	Aboriginal Cultural Landscape Management Research Project
6-028	Gippsland Community e-Bus Pilot: A case study of community-led transport in Venus Bay and Sandy Point
6-029	IEP1 – OneDock: Supercharging e-micromobility
6-036	Accessibility Guidelines for Connected and Automated Vehicles in Public Transport
6-041	Care in Transit: Designing for Passengers, Transport Operations and Homelessness Support

Feedback Form: Future Transport Roadmap White Paper

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