DISCUSSION PAPER

Foreword

For the last four decades I have been actively involved in transport and engineering in all its forms and have been lucky enough to work all over the world.

In all my experience, I have never seen such a chaotic environment characterised by extensive commentary using terms such as "unprecedented", "unpredictable", "uncertain", "unstable", and "AI will disrupt everything," etc.

In this world where we live, and in this lucky country in particular, we need now, more than ever, to make informed choices for the transport industry going forward. Our industry touches everyone's life and I've found, invariably, everyone has a view and is not afraid to tell you what they think of your transport strategy or operation.

As a nation, we must look towards minimising congestion, increasing opportunities and creating an environment which keeps Australia at the forefront of the digital revolution.

Whether we like it, or not, AI is already here. The increasing number of data centres becoming operational or being planned in Australia is potentially a game changer for us and is an opportunity not to be missed.

The Centre for Connected and Automated Transport has assembled an impressive group of companies, government agencies and experts, many of whom are leaders in their respective fields to craft possible pathways to better utilise the opportunities for mobility and transport in an ever-expanding digital world.

This discussion paper is a testament to the expertise of the contributors and the sheer amount of hard work put in from very experienced and committed people.

I believe the paper is truly ground-breaking, but to quote Churchill, "This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning".

So, what does this mean for us as readers of the paper and our desire to pilot possible future pathway going forward and help guide our agenda? A number of questions have been posed in the paper which deserve detailed consideration to determine the best way forward.

Firstly, the paper sets out the future potential for connected and automated vehicles. Secondly, it outlines profound and important issues we need to consider very carefully and subsequently address for the ultimate benefit of the nation. Thirdly, the issues articulated in the paper will force us to consider the massive opportunities that have been crystallised here.

I therefore, encourage you to read the discussion paper and consider how we embrace and shape the future of mobility and transport in Australia.

Happy reading!

Neil Scales, OBE

Neil Scales OBE is the former Director-General for the Department of Transport and Main Roads, Queensland, holding the role for 10 years until May 2023. He was previously the Chief Executive and Director-General of Merseytravel, the transport authority for Merseyside in the north of England. Mr Scales has held executive roles with transport and engineering companies and has consultancy experience with several agencies, including the World Bank and the European Commission.

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The Summit Consortium members include:

A.I. LAMB
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Aurecon
Australasian New Car Assessment Program
Australasian Railway Association
Australian Logistics Council
Australian Mining and Automotive Skills Alliance
Australian Rail Track Corporation
Australian Taxi Industry Association
Australian Trucking Association
Australian Urban Research Infrastructure Network
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Centre for Connected and Automated Transport
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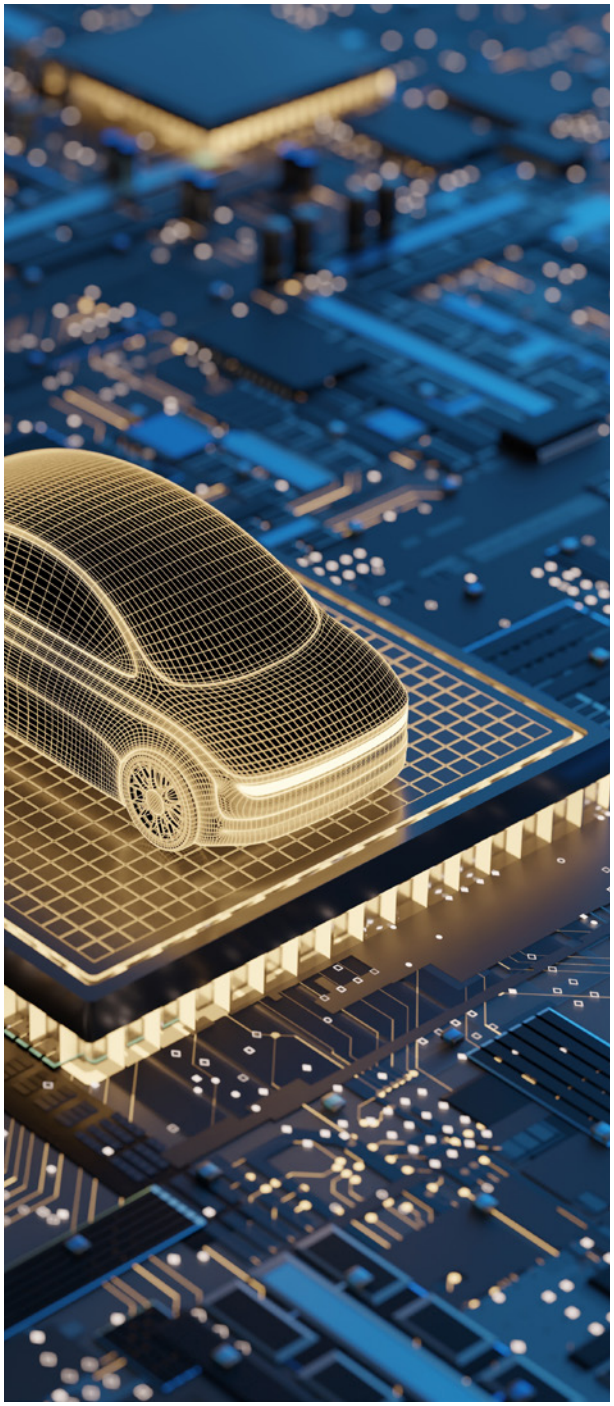

CCAT specifically acknowledges individuals who made written contributions to the paper:

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CCAT notes that the views presented in this paper represent many views from a broad range of perspectives. Individual contributors and Consortium organisations may hold differing views from those presented here.

The Editorial Committee who advised on, complied content and helped draft this paper consists of:

- **Mandi Mees,** former Executive at Roads Australia and the National Transport Commission
- **Isobel Pastor,** former Head of the UK Government's Centre for Connected Vehicles
- **PaoYi Tan,** Head of Automated & Emerging Technologies at the National Transport Commission
- **Dr Charles Karl,** Chief Technology Leader, National Transport Research Organisation
- **Ian Webb,** Board Chair, CCAT and Board Member of the NTRO
- **Brook Hall,** Executive Director, CCAT
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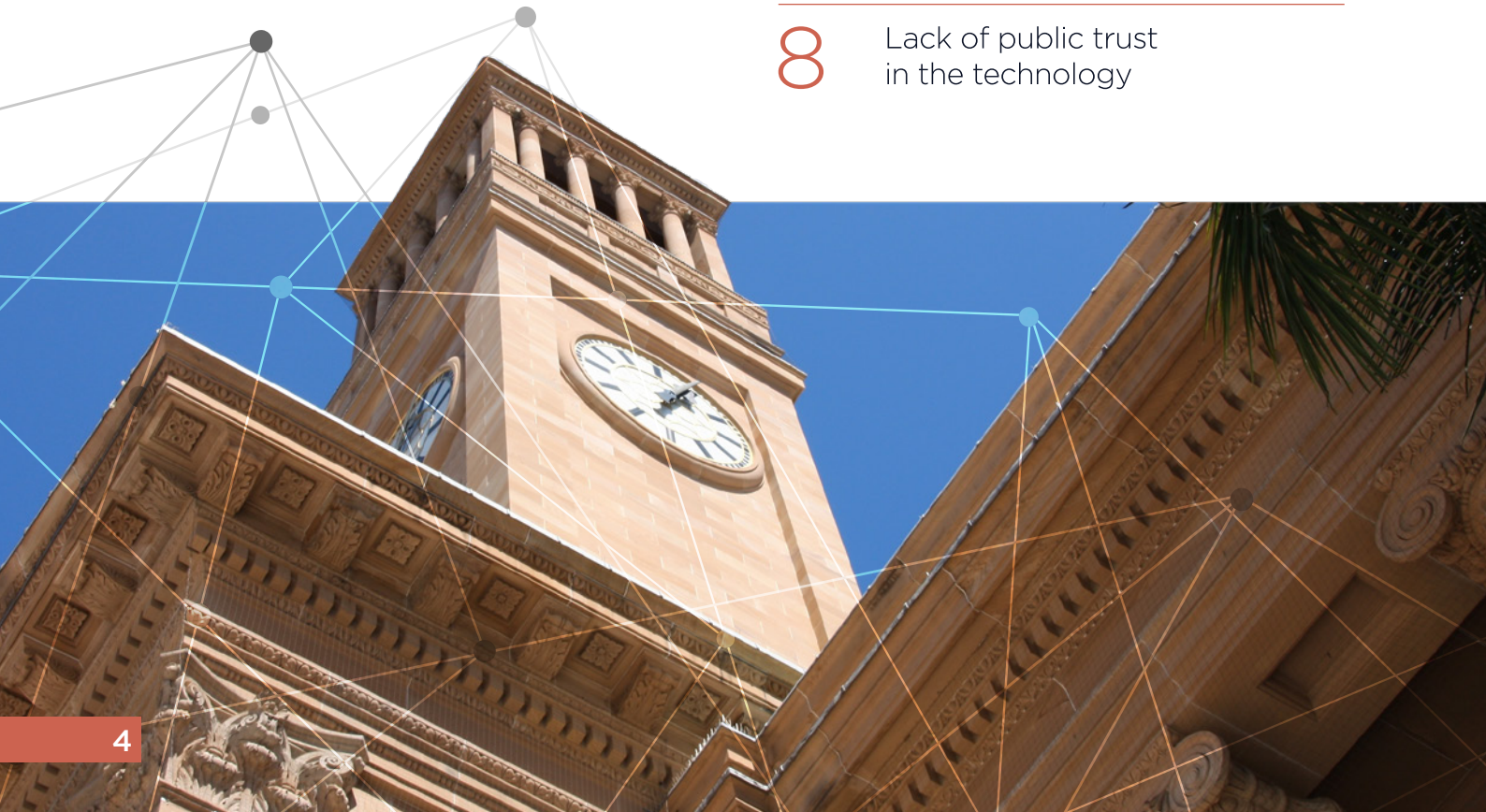
Executive summary

The purpose of the discussion paper is to call out the imperatives for action, identify the key issues and challenges to successfully deploying connected and automated transport technology in the Australian transport system and to generate stakeholder feedback to identify the key steps that would support future deployment. This feedback will support the development of recommendations at the National Future Transport Summit.

Transport is critical for our nation and its economy. There are eight key imperatives that define the case for a nationally coordinated approach on connected and automated transport:

1. Transport remains hazardous
2. Population growth is fueling runaway transport demand
3. Critical worker shortages
4. Limits to public funding
5. The climate crisis
6. Australia's unique geography
7. Falling national competitiveness
8. Lack of public trust in the technology



National imperatives for action

Now is a pivotal moment to act

This discussion paper offers many reasons for Australia's transition to connected and automated transport.

Individually, each of these imperatives warrant national attention. Collectively, the coalesce to make a strident case for immediate and collaborative action. This is the case for the National Future Transport Summit.

Transport is the backbone of the nation

Our employment, hospitals, schools, agriculture, mining, defence and access to housing all depend on moving people and goods.

1 Transport remains hazardous

People still die and are seriously injured on our roads and in dangerous workplaces. In 2024, 1301 people died on our roads and around 40,000 people were serious injured. Despite safety being a priority, road deaths and injuries are increasing. COVID lockdowns aside, the last time national road deaths fell was in 2018.

The cost of road trauma is too high. We can't afford to support a hazardous transport system. We took action with COVID to prevent deaths. Action is needed on our roads and in dangerous workplaces.

2 Runaway transport demand

Population growth, consumer preferences and enlarging cities are driving transport demand. Congestion is strangling mobility and adding costs to goods and services. We cannot build our way out of rising demand.

3 Critical worker shortages

The shortage of drivers in freight and public transport is forecast to deepen. With transport demand increasing faster than the growth of our workforces, human-driven transport is unsustainable. Until a driver solution is provided, transport costs keep going up, and everyone pays.

4 Public funds are no longer sufficient

Governments have long had responsibility for building and managing transport infrastructure and operating transport services. Demand for public funds across vital community service areas continues to grow. Without significant new taxes or charges, future major improvements to quality transport infrastructure and services will be even harder to provide.

5 The climate crisis demands action from transport

Australia has committed to reducing greenhouse gas emissions by 43% by 2030 and achieving net-zero by 2050. Emission reductions are needed across the economy. The transport sector and transport-dependent industries are big emitters but can achieve far greater emissions reductions through connectivity and automation.

6 Australia's unique geography

Our geography is vast, and transport networks are extensive. Most of our populations reside in a few major cities and along the east coast. Providing transport services in regional and remote areas is challenging. Connected and automated transport offers an opportunity to develop novel models for infrastructure and service delivery.

7 Falling national competitiveness

Other countries are embracing automation and realising the benefits. The change has already begun, but Australia is falling behind.

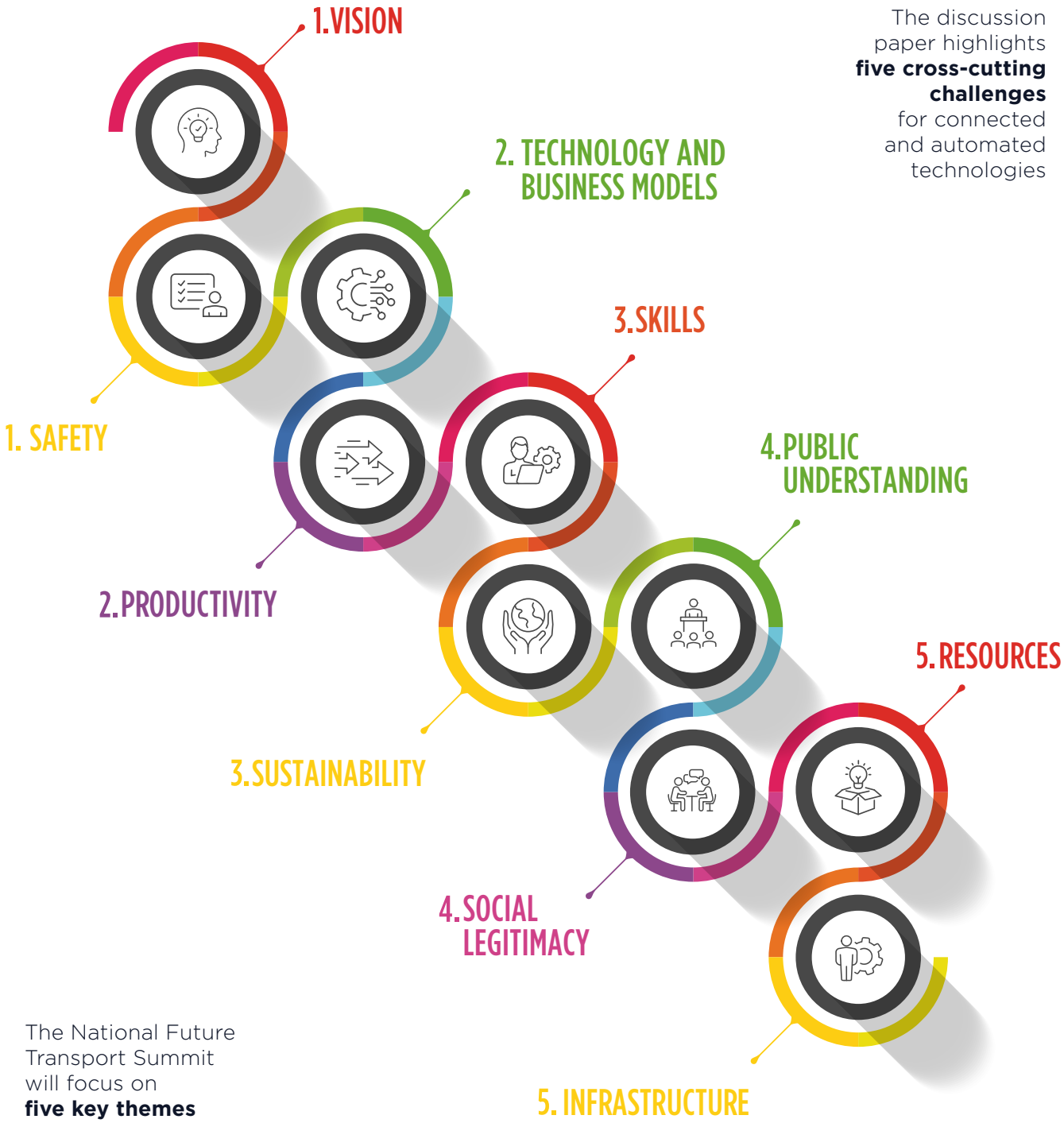
8 The public does not trust the technology

Communities must be comfortable with the technology and embrace the benefits. Without public support, progress stalls.

These imperatives will require a range of innovations and changes, from improved training to public education, to changes in policy. However, connected and automated transport solutions can play a key role in addressing all of these challenges.

The **Vision** and **Challenges**

Australia will have a world-leading safe, efficient and sustainable transport system, across all sectors and modes, driven by connected and automated technologies.



The discussion paper highlights **five cross-cutting challenges** for connected and automated technologies

The National Future Transport Summit will focus on **five key themes**

1. SAFETY

Transport and industrial safety flourishes as human error is eliminated and dangerous tasks are replaced by safe, satisfying and high value roles.

Key Challenges:

- Slow pace of technology adoption
- Need for greater collaboration to deliver consistent regulations and standards that meet Australian-specific needs
- Technology expectations exceeding what is expected from human engagement
- Ensuring robust cybersecurity
- Funding for and prioritising research and development.

2. PRODUCTIVITY

Major productivity gains from reduced costs, enhanced efficiency, strong investment attraction and innovation deliver a thriving and globally competitive domestic economy.

Key Challenges:

- Absence of a cohesive national productivity vision
- Need for national coordination and strategic support
- Industry silos and fragmented initiatives
- New public-private partnership models needed for strategic investments
- Need to leverage research and development for industry growth.

3. SUSTAINABILITY

Highly efficient vehicles and networks maximise sustainable traffic flow, minimise congestion and cut emissions.

Key Challenges:

- Potential for increased vehicle travel and energy use
- Lack of strategic integration in decarbonisation plans
- Uncertainty in the interplay of electrification and automation
- Decarbonising heavy vehicles may start with automation.

4. SOCIAL LEGITIMACY

Connected and automated transport is embraced by the public due to acknowledged safety, cost-effectiveness, comfort, and predictability, enhancing mobility for all, including those with limited options.

Key Challenges:

- Bridging the gap between innovation and public acceptance
- Enhancing mobility for people with limited transport accessibility
- Managing employment uncertainties and facilitating skill development
- Overcoming negative perceptions and building trust
- Raising awareness and ensuring public engagement
- Managing data security concerns.

5. INFRASTRUCTURE

Infrastructure planning proactively integrates the rapid evolution of connected and automated vehicles and optimises existing physical infrastructure to minimise or eliminate the need for new builds.

Key Challenges:

- Infrastructure needs are diverse and extensive
- Significant uncertainty and investment risks
- A clear national vision and a national infrastructure plan will provide greater certainty
- Responsibilities between levels of government are divided
- Infrastructure ownership and management is fragmented
- Transport user needs and technology are outpacing infrastructure upgrades
- Digital connectivity gaps and data management limitations
- Incompatible vehicle and infrastructure technologies.

CONSULTATION AND NEXT STEPS

All interested stakeholders are invited to submit responses to the following consultation questions:

1. Do you agree with the challenges described and how might these affect you or your industry?
2. What challenges are missing and how would they address the vision?
3. What are your solutions or recommendations for addressing the challenges?
4. How would you prioritise the proposed solutions, and what would be the first steps?

Submissions can be made via the Summit website:
www.ccat.org.au/summit

Submissions are due by
Friday 25th July 2025.

Submissions and other consultation feedback will help inform and provide support for the Summit's recommendations.

A Summit report, to be published in late 2025, will contain the Summit's agreed recommendations.

Contents

THE NATIONAL FUTURE TRANSPORT SUMMIT

The National Future Transport Summit (the Summit) is a strategic initiative to advance the transition to connected and automated transport in Australia.

The Summit will bring together government and industry leaders to agree to recommendations that maximise the potential of connected and automated transport and deliver an enduring point of reference to inform government and industry decision-making.

Spearheaded by the Centre for Connected and Automated Transport (CCAT), the Summit is a collaborative effort between transport agencies, statutory bodies, transport and logistics associations, infrastructure providers, technology providers, community bodies, consultancies and research organisations, collectively known as 'the Summit Consortium'.

Never before has a transport initiative assembled such a diverse and influential collective to create change.

ABOUT THIS DISCUSSION PAPER

This discussion paper calls for solutions that address the national imperatives and meet the needs of our diverse communities and industries.

To set the scene for public consultation and feedback on proposed solutions, the paper:

- states the national imperatives that demand action
- describes the evolution of the use of connected and automated transport to date and how it may evolve in years to come
- illustrates a desirable and achievable vision for the future
- outlines a series of challenges to be addressed across five key themes: safety, productivity, sustainability, social legitimacy and infrastructure
- invites feedback on the challenges and solutions.

HOW THE DISCUSSION PAPER WAS DEVELOPED

This discussion paper was developed collaboratively through.

1. Establishing up a Steering Committee which agreed on the five key themes, scope and research priorities
2. Preparing a research paper, utilising the National Transport Research Organisation's expert researchers and with assistance from the MG Lay Library, Australia's most extensive repository of national and international land transport knowledge. Over 280 reports and supporting documents were examined.
3. Setting up an Editorial Committee to advise on and draft the paper, using the research paper as reference evidence.
4. Forming the Summit Consortium to identify the community's and industry's major challenges
5. Enlisting Neil Scales OBE (former Director-General of TMR) as the independent reviewer.

WHAT IS THE PURPOSE OF THE CONSULTATION?

The Summit's public consultation seeks the views of governments, industry, academia and community groups on the impacts, challenges and opportunities presented by Australia's transition to connected and automated transport.

Submissions from these diverse groups will inform and support the development of draft recommendations that will be discussed and agreed upon at the Summit in September 2025.

WHO ARE WE SEEKING SUBMISSIONS FROM?

All Australians will be affected by the transition to connected and automated transport. Failing to embrace the technology will cost us in lost opportunities and international competitiveness.

Our collective efforts are intended to make sure these impacts are positive – by maximising benefits and mitigating undesirable impacts.

The Summit has garnered significant support from the Summit Consortium who will provide their own submissions and help draft recommendations.

We recognise that a broader representation is needed to represent the many, diverse voices and needs of Australian communities and industries.

We welcome feedback from organisations or individuals representing people with a disability, vulnerable road users, transport workers, rural and regional communities, and many more.

We acknowledge that the upcoming economy-wide changes affect more than just the transport sector. We'd like to hear from more industries and economic sectors, including, but not limited to: insurance, banking, legal, retail, building and construction.

HOW TO MAKE A SUBMISSION?

Submissions can be made via the Summit website:
www.ccat.org.au/summit

Written submissions, with optional attachments, can address overarching issues, specific Summit issues, or respond to the discussion paper questions.

Written submissions should ideally be limited to two pages (approximately 1000 words). Longer submissions will be accepted but must include a concise summary to facilitate analysis.

All submissions will be published on the Summit website to provide a public record of the consultation, unless respondents opt-out.

Submission guidelines will be shared on the Summit website, via social media and through consultation events and workshops.

HOW WILL YOUR SUBMISSION CONTRIBUTE?

Submissions and other consultation feedback will help inform and provide support for the Summit's recommendations.

An analysis of the consultation feedback will be included in the Summit report along with the Summit's agreed recommendations and acknowledgements of support via the public consultation. The Summit report will be published in late-2025.

What is connected and automated transport?

Automated vehicles can perform the entire driving task on a sustained basis without human input, either in all conditions or in specific conditions.

These vehicles are equipped with an automated driving system (ADS) – that is, a combination of hardware and software capable of performing the entire driving task without human input. Automated vehicles are already in use in rail and maritime applications; automated road vehicles are in limited use overseas and are being trialed in Australia but are not yet available commercially or in general use on public roads in Australia.[2]

Connected vehicles use mobile and wireless technologies to share data and communicate with the driver, infrastructure, other road users and other wireless services.

Collectively these technologies offer significant future benefits to Australia in safety, productivity and sustainability but will require appropriate supporting policy, investment, acceptance and infrastructure.

EVOLVING TECHNOLOGY AND USES: FROM ELEVATORS TO AUTOMATED HIGHWAYS

The concept of self-driving vehicles is not entirely novel. The humble elevator, arguably the first driverless vehicle, provides a historical precedent. Initially met with apprehension, automated elevators became ubiquitous as riders experienced greater convenience and reliable safety, while organisations could redeploy their staff to higher value tasks.

[2]See Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts, "Automated Vehicles" at https://www.infrastructure.gov.au/infrastructure-transport-vehicles/transport-strategy-policy/office-future-transport-technology/automated-vehicles

THE PRESENT: OPERATIONAL APPLICATIONS

Connected and automated transport technologies already support safety and productivity across a range of controlled settings and complex public spaces.

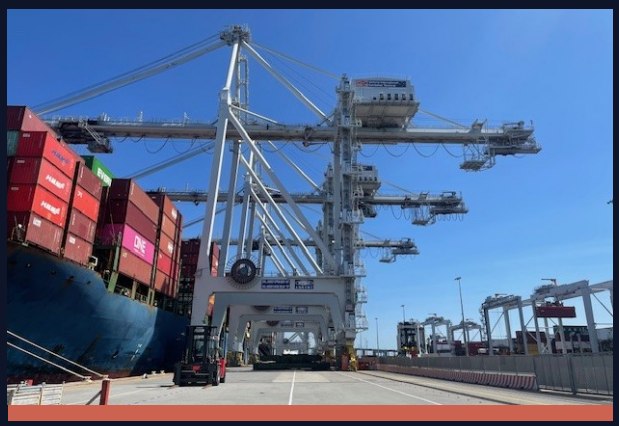
On public roads smart motorways utilise AI-driven traffic management to improve flow and reduce congestion, and advanced driver assistance system (ADAS) features are increasingly standard in consumer vehicles.

Trials have demonstrated the safety benefits of vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-everything (V2X) communication. State and territory governments are individually delivering Intelligent Transport System (ITS) plans.

"The future is already here, it's just not evenly distributed."

- William Gibson (attributed)

On the rails driverless metro systems are used in many cities around the world. In Australia, Rio Tinto runs automated iron ore trains in the Pilbara. Sydney Metro opened Australia's first driverless passenger rail line in 2019, extended it in 2024 and has a further extension to open in 2026.



Victorian International Container Terminal
Australia's first fully automated container terminal

In our ports automated technology delivers significant benefits in global supply chains. With safer, more efficient and predictable operations, ports across the world have been at the forefront of highly and fully automated technology adoption. Several Australian ports have adopted highly automated operations.

Off-road Australia is home to the world's largest concentration of automated trucks, driving operations in north-west mine sites. The mining sector also delivered the world's first automated freight railway, hauling ore from mines to ports without human drivers. These lessons are now being applied to fully automated road trains on private roads.

Connected and automated technologies—such as automated tractors, harvest robots and aerial crop monitoring—are being used in farming to address workforce shortages and improve safety and productivity.

Current status of the regulatory program

Australia's existing road transport laws are designed for traditional vehicles with human drivers. Before automated vehicles are introduced on public roads, new laws are needed to manage their safety and integration with existing road users and vehicle fleets. The National Transport Commission, the Australian Government and state and territory governments are working to develop nationally consistent laws. Similar laws have been passed in the UK, Germany, Japan, and several US states opening the possibility for automated transport on public roads.

In Australia, these laws are expected to be in place within the coming years. Similarly in airspace, the Civil Aviation Safety Authority (CASA) and Airservices Australia are working with the Australian government on new policies and regulations to support uncrewed flights and greater automation in flight management systems.

Australia is a world leader in driving a regulatory pathway for uncrewed and automated flight. In off-road land transport, workplace health and safety laws govern transport worker safety.

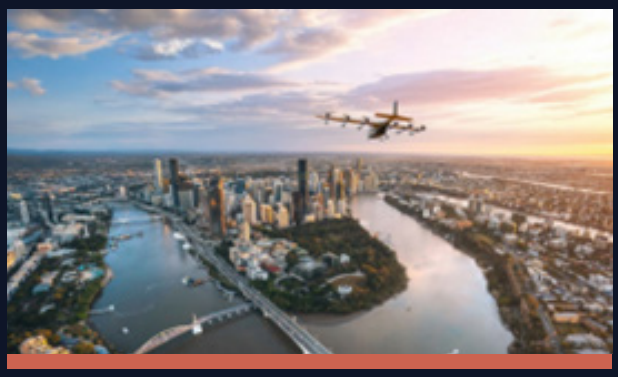
THE NEAR FUTURE: EXPANDING APPLICATIONS

The next phase of transport is becoming clear. Development is shifting towards broader applications in more complex and dynamic environments and commercial scaling of proven technologies.

Robotaxis and automated buses Self-driving ride hailing services (i.e. robotaxis) like Waymo, Zoox, WeRide, and Apollo Go are leading the way in the United States, China, Hong Kong, Japan and in the UAE. As Australian automated vehicles laws are introduced robotaxi and automated bus services will emerge here.

Private vehicles Automakers are increasingly embedding advanced driver assistance systems and capabilities that can be 'turned on' via over the air software updates when Australia's laws permit them and when consumers demand the functionality.

Aerial Mobility Australia is making significant strides in the development of Uncrewed Aircraft Systems and Advanced Air Mobility is developing rapidly. Uncrewed aircraft systems are increasingly used in sectors like mining, agriculture and emergency response, with automated flight approvals and beyond visual line of site operations supported by emerging systems like Airservices Australia's Flight Information Management System (FIMS). Automation in air traffic management and airport operations is preparing for the future of Advanced Air Mobility (AAM) and aerial cargo delivery.



Advanced Air Mobility
Wisk Aero, *a leading Advanced Air Mobility company and developer of the first all-electric, self-flying, four-passenger air taxi.*

The first commercial AAM operations are expected to begin with electric vertical take-off and landing (eVTOL) air taxis, later this decade.

Drones have many use cases and will continue to benefit from technology advancements that enable longer reach and greater loads. Drones show promise in addressing challenges of remote and isolated community through deliveries of essential goods, particularly during natural disasters such as floods and bushfires.

Freight and logistics The freight sector is well positioned to benefit from connected and automated technologies with growing freight demand, driver shortages, and increasing health and safety concerns key drivers for the industry's transition. On-road trials of automated hub-to-hub trucking have been conducted in Australia and overseas with promising results.

Automation is used in warehouses, and in last mile delivery, with retailers investing in automated vehicles, robotics and Artificial Intelligence for efficient urban deliveries. The near future will see these isolated applications scaled and integrated along entire supply chains.

Defence Drones, robots, self-driving vehicles and automated ships are becoming more common in defence applications.

2032 AND BEYOND: A FULLY INTEGRATED AUTOMATED TRANSPORT SYSTEM

Here's what we can expect from our future transport system.

Automated Network Transit delivering high-capacity urban transit at reduced cost and enhanced convenience and zero emissions.

Automated Mobility-as-a-Service (MaaS) Rideshare automated vehicles can be scaled and integrated with public transport to reduce congestion, increase predictability of journeys and minimise the need for private car ownership.

Automated public transport includes driverless shuttle buses, trains and trams providing seamless first to last-mile transit.

Driverless trains will be running on Melbourne's Suburban Rail Loop East by mid-2030.

Automated road freight will cut carbon emissions for long-haul and middle-mile freight with driver free goods movements between freight hubs.

Advanced Aerial Mobility takes off with safe, affordable, efficient, and sustainable automated flight with passenger, cargo and medical transport uses in urban and rural areas.

A vision for **connected and automated transport**

Connected and automated transport will transform Australia.

Australia will have a safe, efficient and sustainable transport system, across all sectors and modes, driven by world leadership in connected and automated technologies.

This vision provides a shared sense of direction which is crucial for navigating the complexities ahead. This is the inspiration for the National Future Transport Summit.

We invite you to engage with this vision, to critique, refine, and contribute to its evolution.

SAFE, EFFICIENT, ACCESSIBLE AND SUSTAINABLE PASSENGER MOBILITY

Future passenger transport involves a seamlessly integrated transport system where the distinction between private and public modes blurs, offering safe, efficient, accessible, and sustainable mobility for all.

In this vision we see personal vehicles evolving into highly for fully automated entities, operating in a connected environment where crashes are minimised and all transport users feel safe in shared spaces, thanks to the predictability of movement.

Connected and automated vehicles are constantly alert to other vehicles, vulnerable road users, workers and physical obstacles. This relentless focus reduces distraction and error and saves lives, particularly on rural roads where human error often leads to serious crashes.

Connected and automated vehicles facilitated by smart city technologies move in unison. They prioritise public transport and optimise traffic flow, reducing time and congestion.

Digital platforms provide on-demand access to automated vehicles tailored to individual needs, from quick and convenient solo commutes to efficient group journeys between cities and regions.

Public transport systems are integrated and responsive. Buses, trains, and air taxis connect seamlessly, with on-demand last-mile connections for comprehensive coverage.

Automated door-to-door services provide convenience and greater independence for people with disabilities or limited mobility expanding their ability to participate in society in every way.

Sustainability is a cornerstone of this future passenger transport system. New energy and zero emission vehicles replace the conventionally fuelled vehicles and the inherent efficiency of automated transport optimises energy consumption. Smart charging infrastructure facilitates efficient and sustainable energy use.

SAFE, EFFICIENT, AND PRODUCTIVE FREIGHT, GOODS DELIVERY AND SUPPLY CHAINS

The movement of goods is equally seamless, safe, and incredibly efficient. Every step of the supply chain is interconnected.

Safety is paramount. Within mines and warehouses, at ports, in our airspaces and on our roads, automated systems take over many hazardous tasks. Our workplaces eliminate dangerous or unhealthy roles.

Connected and automated transport drives significant productivity gains across the Australian economy, reducing costs, enhancing efficiency, attracting investment and fostering innovation.

A fully integrated freight network powered by connected vehicle and infrastructure technology provides real-time visibility and enables immediate adjustments, minimizing delays and significantly reducing waste. The movement of valuable goods is efficient and secure.

This interconnected system enhances productivity across diverse industrial sectors from resource extraction and agriculture through to international trade, warehousing, distribution, and ultimately reaching consumers and businesses.

Robots and AI seamlessly manage the storage and retrieval of goods with unparalleled precision and speed. Predictive analytics foresee demand fluctuations. Intelligent management cuts cost and ensures that the right products are in the right place at the right time.

Fleets of automated trucks and delivery vehicles transform freight transport. These self-driving vehicles work tirelessly, day and night, boosting efficiency, reducing emissions and significantly lowering transportation costs.

Drones and self-driving will transform last-mile delivery with faster and more convenient service.

The connected and automated transport industry will in turn create high-value jobs to manage the transition and provide the supporting technology

Actioning the **vision**

By addressing these opportunities proactively, Australia can position itself as a leader in safe, sustainable, and intelligent transport solutions. The groundwork is being laid now—how we navigate these next steps will shape the future of mobility for decades to come.

This document highlights the key challenges that provide a common thread through the five themes of the National Future Transport Summit:

1. **Vision**
   This involves working toward an agreed future for transport innovation.
2. **Technology and business models**
   This recognises the importance of integrating the necessary technologies and ensuring that the broader business ecosystem is prepared to support the vision. It highlights the need for collaboration.
3. **Skills**
   This focuses on creating mechanisms to address skill shortages and manage workforce transitions in the transport sector. This also involves adapting to the changing nature of work within the transport industry.
4. **Public understanding**
   This is about ensuring the public is well-informed about the benefits, risks and implications of connected and automated transport.
5. **Resources**
   This requires the necessary funding and investments to realise the vision.

Safety

Transport and industrial safety flourishes as dangerous jobs are replaced by safe, satisfying and high value roles and human error is eliminated.

ENHANCING SAFETY THROUGH CONNECTED AND AUTOMATED TRANSPORT

Vehicle and connected technologies are already delivering significant safety outcomes.

Advanced Driver Assistance Systems (ADAS), including sensors, cameras and driver alerts are already preventing many collisions.

The Cooperative Intelligent Transport Systems (C-ITS) enables data communications between vehicles, infrastructure and central management systems to improve roadway safety for all users and network efficiency. Australian governments are establishing a national approach to C-ITS deployment and there have been some C-ITS trials and limited rollouts, particularly in areas like heavy vehicle transport demonstrating the safety potential.

It is critical that the safety benefits (and risks) of these innovations are understood, communicated and embedded into policy and practice.

The potential for safety learnings across sectors suggest that governments and industry can work together to maximise safety benefits nationwide.

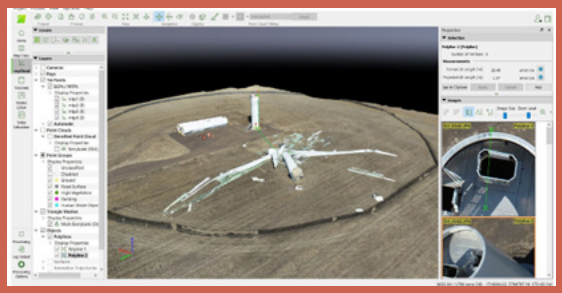
ACCELERATING TECHNOLOGY FOR ENHANCED SAFETY

The current pace of technology adoption in transport safety has not yet been enough to achieve zero trauma. Realising the potential of relevant technologies to dramatically reduce injuries and fatalities will require their inclusion in safety visions and strategies.

While ADAS features are increasingly available, the pace of mandating these systems has been hampered by complex regulatory processes. Industry development of automated technology has also been impacted by technical and operational challenges.

Case Study – demonstrating safety benefits across sectors:

The Office of the National Rail Safety Regulator (ONRSR) recently demonstrated drone capability to support Energy Safe Victoria, showcasing leading aerial intelligence capability to safely assess damage from a collapsed wind turbine – a great example of sectoral collaboration to demonstrate effective application of technology.



FOSTERING COLLABORATION FOR SAFETY STANDARDS

Diverse stakeholders are involved in connected and automated transport safety. This necessitates strong collaboration and harmonisation of standards.

National agreements, regulations and standards for transport safety are critically important in providing industry certainty, driving investments and facilitating adoption.

Learnings from international applications of connected and automated transport, including international standards relating to things like road transport, rail safety, connectivity, AI and cyber security can be applied in Australia.

Insights from initiatives and applications across all automated transport modes should be cross-pollinated to inform best practices.

ADDRESSING TECHNOLOGY CHALLENGES FOR CONNECTED AND AUTOMATED SAFETY

Successful implementation must satisfy a widespread community expectation that connected and automated transport technologies demonstrate safety exceeding human-operated capabilities. These technologies must also respond to unique Australian conditions.

Meeting these expectations requires rigorous testing, validation, and adherence to stringent safety standards.

Rigorous local testing and validation can also be expensive and commercial technology suppliers will not approach the Australian market if barriers to entry are too high. We must minimise regulatory barriers while ensuring sufficient confidence in the safety of technology. A deployment framework must provide clarity on:

Safety benchmarks
that require connected and automated transport systems to outperform human capabilities will be essential for building trust.

Australian-specific considerations
include our unique driving conditions—such as road trains, single-lane rural roads, unsealed surfaces, wildlife encounters and variable speed limits—as well as a distinctive airspace environment defined by vast distances, low population density and a mix of remote, regional and urban settings. Demonstrating safe operations in all scenarios is crucial for safe deployment.

Connectivity and redundancy
While connectivity can enhance safety of connected and automated transport, systems must be designed to operate safely in the event of connectivity failures.

National harmonisation
As far as possible, all standards and regulations should be harmonised across Australian jurisdictions.

Alignment with international standards
and approvals reduces regulatory barriers (and costs) and enhances access to world-leading technologies.

CYBERSECURITY AS A FOUNDATIONAL SAFETY PRINCIPLE

As the transition to connected and automated transport accelerates, robust cybersecurity is essential to ensure safe, secure, and sustainable deployment of new technologies. It protects critical systems from disruption and underpins public trust and confidence. Robust cybersecurity is not optional.

Managing cyber risks in connected and automated transport requires a proactive, system-wide approach that anticipates threats and integrates security measures from the outset, i.e. "cybersecurity by design."

By addressing the challenges and prioritising safety in all aspects of connected and automated transport, there exists a significant opportunity to position Australia at the forefront of safe, secure, and interoperable transport innovation.

OVERCOMING RESOURCE CHALLENGES

Funding for research and development for connected and automated transport, including testing, analysis and approvals, is a challenge that could impact all the potential benefits outlined in this paper.

Security of Critical Infrastructure Act

The Security of Critical Infrastructure Act 2018 (SOCI Act) provides a legislative framework to manage cybersecurity risks across key sectors.

Transport is one of the 11 critical infrastructure sectors defined under the Act, which directs the proactive management of security risks by granting powers and imposing risk management and reporting obligations.

Within the transport sector, the SOCI Act covers owners and operators that move goods or passengers on a commercial basis, including critical ports, freight infrastructure and services, public transport systems, and aviation assets.

SUMMARY OF KEY CHALLENGES

- **Slow pace of technology adoption**
- **Need for greater collaboration to deliver consistent regulations and standards that meet Australian-specific needs**
- **Technology expectations exceeding what is expected from human engagement**
- **Ensuring robust cybersecurity**
- **Funding for and prioritising research and development.**

Productivity

Major productivity gains from reduced costs, enhanced efficiency, strong investment attraction and innovation deliver a thriving and globally competitive domestic economy

UNLOCKING PRODUCTIVITY GAINS

Connected and automated transport can optimise critical interfaces—such as ports, roads, air and rail—streamlining freight, improving asset utilisation and supporting multimodal integration. The potential to enhance productivity across various sectors, from agriculture and mining to logistics and tourism, is substantial.

It offers solutions to workforce challenges like driver shortages, while enabling smarter use of labour and creating new opportunities in advanced manufacturing, automation, AI, cyber security and technology. Realising these benefits requires coordinated planning across modes and industries.

However, Australia's fragmented approach to future transport development, with siloed initiatives and fragmented coordination, has hampered progress. The proliferation of small-scale trials without a unified strategy has resulted in missed opportunities for collaboration, scaling and interoperability. This approach also limits investment and hinders Australia's ability to compete globally.

A national productivity vision is crucial to:

- Foster end-to-end coordination Aligning initiatives across different sectors and jurisdictions to optimise supply chains and infrastructure utilisation.
- Stimulate industry development Identifying and leveraging Australia's academic and industrial strengths to encourage a thriving domestic connected and automated transport industry.
- Drive economic growth Creating high-value jobs in areas such as advanced manufacturing, technology, cybersecurity, data science and the green economy.
- Enhance competitiveness Reducing input costs and improving efficiency to enhance the competitiveness of Australian businesses and industries.

BREAKING DOWN INDUSTRY SILOS FOR EFFICIENT SUPPLY CHAINS

In mines, ports and on farms, automated transport is already delivering major productivity gains, however these sites are only components of supply chains.

To fully realise the productivity gains, Australia must collaborate across industry silos to coordinate activities across the entire supply chain.

If coordination can be achieved between different parts of the supply chain, there is a significant opportunity to optimise productivity gains.

INCENTIVISING PRIVATE SECTOR INVESTMENT AND STRATEGIC GOVERNMENT SUPPORT

While the private sector is incentivised to invest in transport solutions that offer cost savings or revenue opportunities, collaboration and partnerships are needed to address shared benefits and support the commercial case for investment.

Private sector investment in applications such as automated mining trucks has demonstrated the productivity gains that can be achieved in controlled environments. Transitioning to open road applications and across rail, ports, freight and aerial mobility, requires coordinated effort to manage complex infrastructure challenges, facilitate trials and provide certainty through regulations. Government support, including strategic investment planning and clear regulatory frameworks, is crucial for attracting private investment and accelerating deployment.

NATIONAL COORDINATION AND MULTI-MODAL COLLABORATION

The successful implementation of connected and automated transport requires collaboration across all tiers of government, industries, transport modes and communities.

Australia's air services are managed at a federal level, while road, rail and port systems are managed by states and territories, with each having their own regulations.

This diverse management model cross transport modes and jurisdictions demands strong and effective national collaboration to avoid duplication, manage regulaory costs, and prevent incompatibility.

LEVERAGING R&D TO STIMULATE INDUSTRY GROWTH

With existing capabilities in research and development, Australia is positioned to drive the growth of a domestic transport technology sector, unlocking flow-on opportunities in transport-dependent industries such as retail and agriculture. Australia could accelerate industry development, attract investment, and build domestic and export markets by adopting models like the UK's co-investment in R&D, particularly by leveraging its competitive strengths in areas such as mining automation.

Realising the benefits of self-driving vehicles in the UK.

The UK government has worked alongside industry to de-risk research and development to support the development of the connected and automated mobility sector. This has underpinned growth and job creation, with companies securing private investment.

The UK market alone could be worth as much as £42 billion by 2035, creating as many as 38,000 jobs in the sector

SUMMARY OF KEY CHALLENGES

- **Absence of a cohesive national productivity vision**
- **Need for national coordination and strategic support**
- **Industry silos and fragmented initiatives miss opportunities for end-to-end supply chain efficiency**
- **New public-private partnership models needed for strategic investments**
- **Need to leverage research and development for industry growth**

Sustainability

Highly efficient vehicles and networks maximise sustainable traffic flow, minimises congestion and cut emissions.

The future of vehicle automation is intertwined with electrification. The strategic deployment of transport technologies will therefore strongly contribute to sustainability goals, particularly in reducing emissions.

Digitalisation and electrification are transforming all transport modes and connected and automated transport provides a key opportunity to improve energy efficiency, optimise traffic flow, encourage public transport use, and enable shared mobility options like ride-share and robotaxis. Drones also have the potential to reduce road congestion by replacing some trips currently made by emissions-producing vehicles used for parcel, medical and food delivery, offering an efficient alternative for time-sensitive or last-mile logistics.

These benefits, however, are not guaranteed. If vehicle travel becomes more attractive for more short trips and longer journeys, increased vehicle use may exacerbate existing challenges.

INTEGRATING CONNECTIVITY AND AUTOMATION FOR A SUSTAINABLE TRANSPORT FUTURE

The Australian government's Transport and Infrastructure Net Zero Roadmap and Action Plan's focus on vehicle fuel efficiency, sustainable fuels and electrification underrepresents the significant potential of connectivity and automation. This lack of strategic integration risks missing substantial opportunities to reduce emissions – especially for hard to decarbonise fleets and operations, like long haul road freight.

Airservices Australia charts course for 60 million drone flights by 2043

Analysis commissioned by Airservices Australia predicts the annual number of drone flights in Australian skies will surge from 1.5 million a year in 2023 to 60.4 million a year by 2043.

This growth could potentially replace many on-road deliveries, reducing emissions and congestion.

Self-driving, or highly automated vehicles advance transport decarbonisation opportunities because they can be programmed for environmentally friendly driving practices that optimise speed, acceleration and braking. Consistent travelling speeds also mean less wear and tear on vehicle consumables, such as brakes and tyres, that can also cause air pollution.

Connected vehicles communicate with other vehicles and can be alerted to congestion or on-route hazards. Using real-time traffic data, connected vehicles can reroute or alter driving styles to meet the challenges ahead and reduce fuel or energy consumption.

Automated transport opportunities are enhanced because they can easily operate at any time of the day, gaining significant efficiencies by operating at nighttime when traffic is lighter. On long-haul trips, without the constraint of a human driver schedule, vehicles can 'slow steam' (travelling at lower speeds) to conserve energy over a given trip.

Waymo even reports that human driver behaviour improves in the presence of highly predictable self-driving cars, which can further enhance traffic flow.

This fine-tuning makes connected and automated vehicles highly efficient and environmentally friendly, in ways that cannot be achieved by human driver.

MANAGING UNINTENDED ENVIRONMENTAL CONSEQUENCES

The potential environmental impacts of connected and automated transport are complex and multifaceted. While intelligent traffic management and connected vehicles can reduce emissions and improve air quality, self-driving vehicles with their increased convenience and productivity during travel may also encourage longer commutes, lead to more single (and even zero) occupancy trips and a shift away from public transport.

The environmental impact of automated vehicles therefore hinges on their deployment strategies and the demand they generate.

INTERTWINED TRANSFORMATION AND PLANNING

Automation, connectivity, electrification and shared mobility are deeply intertwined technological transformations. A holistic approach is needed to maximise their combined benefits and mitigate potential negative impacts. The future of sustainable transport lies in the seamless integration of these technologies, rather than treating them as isolated solutions.

Electrification of light vehicles and public transport is underway and accelerating. Where these vehicles are also automated—such as self-driving ride-share cars or autonomous buses—they are typically paired with advancing battery technologies. Currently, electrification of the light vehicle fleet is progressing faster than widespread automation. How the two technologies will converge as deployment matures remains uncertain. Decarbonising load-towing and freight-carrying vehicles—from caravans to road trains—is more complex. Where electric drivetrains are not yet commercially viable, automation may be the first step toward decarbonisation. This is evident at mining sites in Western Australia, where automated heavy haulage has preceded electrification. Ultimately, both technologies are essential for achieving long-term operational and environmental goals.

A shift away from individual vehicle ownership towards shared mobility models, facilitated by connected and automated vehicles, can dramatically decrease single-occupancy vehicle trips and associated emissions. However, without careful planning, automation could increase emissions.

SUMMARY OF KEY CHALLENGES

Potential for increased vehicle travel and energy Use

Lack of strategic integration in decarbonisation plans

Uncertainty in the interplay of electrification and automation

Decarbonising heavy vehicles may start with automation

Social legitimacy

Connected and automated transport is embraced by the public due to acknowledged safety, cost-effectiveness, comfort, and predictability, enhancing mobility for all, including those with limited options.

SECURING SOCIAL LEGITIMACY

Connected and automated transport technologies have significant implications for communities and workforces, influencing their needs, perceptions and experiences. These technologies offer the potential to enhance mobility and accessibility, especially for older adults, people with disabilities, and other groups who could benefit from safer and more inclusive transportation choices.

Community acceptance hinges on several factors, including understanding and trust in the technology itself, as well as addressing concerns about safety and data security. Direct experience through local trials and demonstrations significantly fosters acceptance, and this is further enhanced by effective communication and proactive community engagement strategies.

Workforces will be significantly impacted as automation and technological advancements reshape existing roles, generate new opportunities, and necessitate reskilling or transitional support, particularly within the transport, logistics and infrastructure sectors.

Together, these considerations highlight the need for a people-centred approach to the deployment of automated technologies—one that ensures communities and workers are informed, engaged and supported throughout the transition.

BRIDGING THE GAP BETWEEN INNOVATION AND PUBLIC ACCEPTANCE

Public support is critical in realising the potential benefits. International examples have demonstrated that when strategic vision is not well defined for community engagement, it can result in scepticism and underutilisation.

The Australian Research Centre's (ARC) Training Centre for Automated Vehicles in Rural and Remote Regions (AVR3) is a pioneering research hub dedicated to advancing automated vehicle technologies tailored for rural, regional, and remote Australian roads. AVR3 is working with rural and remote communities to define real-world use cases that improve mobility, safety, and economic resilience in rural and regional Australia.

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In the US, Waymo demonstrates the power of structured trials and public engagement. Programs like "Trusted Testers" and "Let's Talk Self-Driving" foster transparency and understanding, building trust and acceptance.

These initiatives are important tools for improving public perception and building trust in safety and reliability of connected and automated transport.

Case Study: Regional Trials

The ARC's Training Centre for Automated Vehicles in Rural and Remote Regions will build skills and capability to test and deploy safe, socially acceptable, automated vehicles for rural, regional, and remote Australian public roads. Rural and regional Australia is home to manufacturing, agriculture, mining, and defence industries that face significant challenges of driver shortages, rising costs, long distances, rough roads, and environmental impacts.

Case Study: NRMA Drive Days

NRMA Drive Days provide an opportunity for the public to experience electric vehicles.

ENHANCING MOBILITY FOR PEOPLE WITH LIMITED TRANSPORTATION ACCESS

Automated transport holds considerable promise for enhancing mobility and inclusivity for individuals with disabilities or mobility challenges and those without driver's licenses. Such transport solutions can offer greater personalisation and improve access to services for people in remote and regional communities. Furthermore, the potential for lower operational costs suggests opportunities for on-demand services and increased efficiency on challenging routes.

Significant innovation is still needed to demonstrate capabilities of vehicle technologies and their potential impact on the lives of people with limited transport access. It is essential to proactively design transport infrastructure, vehicles, and technologies with accessibility at their core to avoid widening existing inequalities. A thorough understanding and consideration,

of the specific needs of these populations is paramount. International examples, such as Waymo's Accessibility Network, illustrate the viability of tailored services that effectively promote accessibility and independence.

The Waymo Accessibility Network

The Waymo Accessibility Network brings together disability advocates who share in the mission of improving access, mobility and safety in communities.

MANAGING UNCERTAINTIES AND SKILL DEVELOPMENT

The shift towards connected and automated transport sparks important conversations about potential job displacement.

History tells us that technological transitions generally unfold over extended periods, however, change can also occur suddenly. Depending on implementation timeframes, workforces can plan for adaptation through retraining and upskilling initiatives. Collaborative and coordinated planning can focus on leveraging automation and associated technological progress that can boost productivity and competitiveness and contributing to long-term job security.

Addressing workforce concerns requires a proactive approach, including:

- Understanding future needs Governments, industry and unions collaborating to identify emerging skill needs and develop appropriate strategies to respond to gaps.
- Investing in skill development Strategically designed, industry informed training programs and apprenticeships to build a multi-skilled workforce in areas such as engineering, electronics, telecommunications, information technology, artificial intelligence, robotics, data science and cybersecurity.
- Workforce transitions Opportunities to deploy humans alongside connected and automated vehicle applications (such as in public transport and freight settings) can provide an iterative pathway for workforce education and transition.

The Commonwealth Government has established Jobs and Skills Councils to provide industry with a stronger voice to ensure Australia's vocational education and training sector delivers better outcomes for learners and employers.

Industry Workforce Planning

As a Jobs and Skills Council, the Australian Mining and Automotive Skills Alliance (AUSMASA) use information based on labour market trends, national data and on-the-ground insights from industry to help inform development of the annual workforce plan.

OVERCOMING NEGATIVE PERCEPTIONS

History tells Negative perceptions of an unknown future, coupled with cultural attachments to traditional driving, can hinder the successful transition to connected and automated transport. Isolated incidents, whether caused by technology or human error, and the resulting media coverage, can significantly impact public trust. Insights from Australian and international experts highlight to the importance of:

- Community education programs focused on raising awareness and managing misinformation.
- Trial programs and testbeds that prioritise community engagement and demonstrate safety and transparency.

Case Study: EastLink SELF-DRIVING & ELECTRIC CAR SURVEY

EastLink's Self-driving & electric car survey, the largest of its kind in Australia, sheds light on evolving vehicle power preferences and perceptions of self-driving and connected technology.

Case Study: PAVE

Partners for Automated Vehicle Education (PAVE) is a US-based coalition of public and private sector partners with one goal:

To bring the conversation about automated vehicles to the public so everyone can play a role in shaping our future.

RAISING AWARENESS AND BUILDING PUBLIC TRUST

Gaining community trust in connected and automated transport necessitates a collaborative approach involving governments, industry sectors and the community. Measuring public attitudes through broad consultation will be essential to understand concerns and plan responses.

Building public support relies on actively including communities in the conversation through clear and transparent communication at every stage of the rollout. By proactively understanding and addressing concerns, Australia can build the social legitimacy vital for the successful integration of connected and automated transport.

SUMMARY OF KEY CHALLENGES

Bridging the gap between innovation and public acceptance

Enhancing mobility for people with limited transport accessibility

Managing employment uncertainties and facilitating skill development

Overcoming negative perceptions and building trust

Raising awareness and ensuring public engagement

Managing data security concerns

Infrastructure

Infrastructure planning proactively integrates the rapid evolution of connected and automated vehicles and optimises existing physical infrastructure to minimise or eliminate the need for new builds.

PHYSICAL AND DIGITAL INFRASTRUCTURE FOR CONNECTED AND AUTOMATED TRANSPORT

Infrastructure enables connected and automated technologies to thrive.

Our understanding of the short and longer term physical and digital infrastructure required to unlock the full potential of future transport technologies is still emerging, along with new business models and use cases.

Australia's infrastructure ownership models present challenge to realising the benefits of emerging business cases.

THE ROLE OF INFRASTRUCTURE IN ENHANCING AUTOMATION OUTCOMES

Physical infrastructure has an important role in providing data that enhances perception and redundancy for automated systems. This contributes to increased safety and public trust—much like the role of lighthouses in maritime navigation or air traffic control in aviation.

Lessons from the aviation sector—where physical radar infrastructure became mandatory following major accidents—underscore the value of proactive infrastructure planning to prevent future incidents.

ADDRESSING INFRASTRUCTURE UNCERTAINTY AND STIMULATING INVESTMENT

National agreements, consistent regulations and standards are essential to provide industry certainty that shapes planning and drives investment in necessary physical and digital infrastructure. Infrastructure decisions must account for the evolving needs of transport users and technology alike.

Future infrastructure needs remain uncertain. Evolving business models, shifting public attitudes and complex human behaviours, are just some of the risks.

As a technology adopter rather than a developer, Australia's infrastructure planning and investment must align with international standards to remain interoperable and competitive. Inconsistent infrastructure and communication assets, risk stalling national-scale implementation.

Infrastructure planners and investors take on the risk that some investments may fail. But if they wait for the future to be more clearly defined, they may miss the benefits.

Navigating this uncertainty requires collaboration across business, community and government. In some cases, private sector investments will require incentives.

Can major change be achieved? Case Study: Australia's energy transition

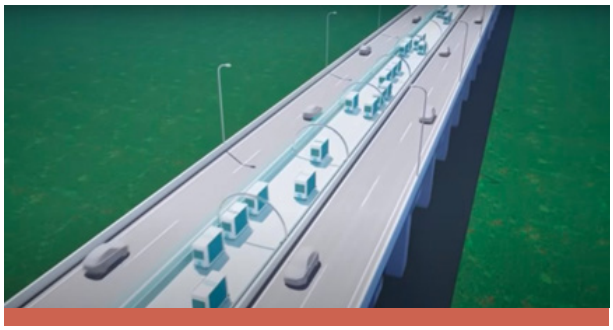
Australia is actively transitioning to a renewable energy-based system, aiming for 82% renewable electricity by 2030 and net-zero emissions by 2050. This transition involves significant investments in renewable energy infrastructure, grid upgrades and supporting policies. The Australian government is working collaboratively with states and territories and the private sector through the National Energy Transformation Partnership to achieve these goals, focusing on maximising economic opportunities, ensuring reliable and affordable electricity and delivering benefits to communities.

The scale of the energy transition underway provides a template for the sustained collaboration and investment in new, adapted or re-purposed transport infrastructure needed to drive Australia's future mobility and economic prosperity.

RETHINKING OWNERSHIP AND GOVERNANCE

Governments have traditionally owned and managed much of Australia's transport infrastructure in the public interest. While this approach has delivered significant benefits over time, the growing scale, complexity and cost of transport projects are placing increasing pressure on government resources—both financial and technical.

To help meet these challenges, public-private partnerships (PPPs) have played an important role by enabling private investment, particularly where projects have clearly defined user bases and revenue streams, such as toll roads. However, this model may not always be suitable—particularly for initiatives that support dispersed populations or deliver broader social or economic benefits. In some cases, varied ownership and pricing models can lead to fragmented networks, which can pose integration challenges for emerging services such as robotaxis.



Japan's 500km Cargo Conveyor Belt

The Japanese government is spearheading an ambitious project to construct a 500-km conveyor belt system named the Autoflow-Road, aimed at revolutionising cargo transport between Tokyo and Osaka. Proposed by Japan's Ministry of Land, Infrastructure, Transport and Tourism, this initiative could address the country's significant logistics challenge and is an example of connected and automated transport technology that could support efficiency, sustainability, safety and productivity for global supply chains.

Private sector involvement in transport infrastructure has also grown significantly. Many key assets—such as airports, ports, railways and motorways—are now privately owned or managed. Industry participants, including transport operators, infrastructure owners, and manufacturers, are central to how our system functions today. Yet, their role in planning and governance is still often limited to consultation. As our transport landscape continues to evolve, there is opportunity to strengthen collaboration with these partners and explore more inclusive decision-making approaches—particularly in delivering complex projects like connected and automated transport and freight innovation.

Collaboration could also be enhanced between different levels of government. Australia's federal system, shaped by constitutional and historical arrangements, creates a multi-layered governance environment that can add complexity to transport planning and delivery. While coordination efforts are ongoing and important progress has been made, there is still room to refine how responsibilities are shared across federal, state and local levels, to ensure all aspects of planning, policy, regulation and investment are appropriately covered. Continued dialogue and partnership across jurisdictions are critical to achieving efficient, integrated transport solutions.

PHYSICAL INFRASTRUCTURE NEEDS AND CHALLENGES

The perceived infrastructure requirements for connected and automated transport have shifted focus over recent years.

Many self-driving systems are now being developed and deployed on the basis that no new or specialised infrastructure is needed. If the infrastructure is suitable for human drivers, the self-driving system is expected to operate safely and effectively. This is particularly the case with self-driving ride-hailing services, such as robotaxis, which have proved to be effective in US residential streets without centre lines, in Las Vegas where lane markings are deemed poor, and in a range of weather conditions.

Specialised infrastructure is nonetheless highly relevant in enabling connected technologies to enhance benefits. Examples include:

- Enhanced traffic management – where intelligent signs and traffic lights communicate with connected vehicles and dynamically change to prioritise public transport or emergency vehicles and improve traffic flow
- Traffic segmentation – including separating public transport paths from general traffic and potentially separated automated freight networks
- Dedicated pick up and drop off points for both passenger and cargo, including for advanced aerial mobility (automated aviation).

This focused approach enables the implementation of specialised infrastructure and connectivity solutions that optimise operational efficiency and enhance safety, while also prioritising asset strength and longevity over capacity alone.

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DIGITAL CONNECTIVITY NEEDS AND CHALLENGES

Digital infrastructure is essential for the seamless operation of connected and automated transport and the effective exchange of data.

Reliable and consistent communication services, including widespread 5G coverage, may be required to support real-time vehicle-to-everything (V2X) interactions. Equally important are high-definition maps and accurate positioning, which are critical for efficient navigation.

Secure and efficient data access and exchange between vehicles, infrastructure and operators is a priority for governments in setting Cooperative Intelligent Transport System (C-ITS) strategies and plans. To maintain public trust, robust legislation and clear guidance are needed to ensure the privacy and security of data collected and shared.

Other challenges include gaps in communication service coverage, limitations in the accuracy of positioning, concerns around data ownership, control, and usage—including privacy and security—and the lack of interoperability between differing communication technologies.

WA C-ITS Roadmap

The Main Roads WA C-ITS Roadmap aims to support the implementation of a nationally harmonised C-ITS ecosystem across the Western Australian road network to enhance safety, movement, regional resilience, and enable future vehicle technology.

VEHICLE AND INFRASTRUCTURE COMPATIBILITY

Incompatible vehicle and infrastructure technologies are a barrier to integration. Australian's public transport system largely relies on aging or legacy technology, creating difficulties when interfacing with newer systems. This can lead to disjointed passenger experience and hinder the development of a unified network.

Inadequate road design and maintenance, inconsistent signage, traffic signals, and line markings, as well as limited real-time monitoring and management of traffic conditions—especially at roadwork sites or during natural disasters affecting road and rail infrastructure—also pose challenges to automated systems and operations.

POPULATION GROWTH

Australia is also confronted with rapid and intense population growth.

According to forecasts published by the Victorian Government, Melbourne's population is projected to grow from 4.5 million to almost 8 million by 2051 — just below the size of London today.

It is highly unlikely that we can meet these transport needs within twenty-five years by expanding traditional infrastructure and traffic solutions.

CHANGING COMMUNITY EXPECTATIONS

The challenge of paying for transport infrastructure coincides with an increased community expectation that infrastructure and services meet increasing diverse transport user needs. Coupled with this, there's increasing expectation that public transport and road access should be provided by government as a community service at minimal user cost. Examples include Melbourne's free tram zone and Queensland's 50 cent public transport fares, and national reductions in fuel excise and road user charges for heavy vehicles. Some emerging commercial providers also aspire to access our transport resources at concessional rates.

INTERNATIONAL COMPETITIVENESS

Australia's vast geography and comparatively small, dispersed population present unique challenges for infrastructure development and service delivery. In contrast, densely populated regions such as Japan and Europe who have natural advantages—such as compact urban forms and economies of scale—that support more effective investments and more efficient transport networks. To be globally competitive, Australia must respond with strategic planning, targeted investments and a strong emphasis on innovation and collaboration.

THE PLANNING IMPERATIVE

Current infrastructure plans largely present as a patchwork of individual projects and initiatives, reflecting varying geographic priorities rather than a unified transition strategy. A long-term national strategic, integrated infrastructure plan reflecting a clear vision, implementation strategies and milestones for the transition to connected and automated technologies could address this. Some areas also need increased emphasis, including automated freight corridors, system interoperability, safety and emerging opportunities such as aviation and agriculture.

THE INFRASTRUCTURE CHALLENGE

These challenges represent significant issues that warrant our immediate and focused attention.

A constant thread appears to be the role and capacity of government itself. Indeed, public ownership and its focus on community benefit is a fundamental reason for the success of the transport system as it stands. Nonetheless, the path to the future may need to change.

That path may well be shared responsibility between government, industry and the community. This would broaden the available expertise, financing and share risk. It could help overcome trust issues and support partnerships with so-called 'transport disrupters'.

SUMMARY OF KEY CHALLENGES

Infrastructure needs are diverse and extensive

Significant uncertainty and investment risks call for strong partnerships and effective planning

A clear national vision and a national infrastructure plan will provide greater certainty

Responsibilities between levels of government are divided

Infrastructure ownership and management is fragmented

Transport user needs and technology are outpacing infrastructure upgrades

Digital connectivity gaps and data management limitations

Incompatible vehicle and infrastructure technologies

Public consultation

CONSULTATION QUESTIONS

1. What challenges are missing and how would they address the vision?
2. Do you agree with the challenges described and how might these affect you or your industry?
3. What are your solutions or recommendations for addressing the challenges?
4. How would you prioritise the proposed solutions, and what would be the first steps?

The National Future Transport Summit will deliver collectively agreed recommendations as a blueprint for the future. In forming these recommendations, we need to hear from all interested beneficiaries and potentially impacted businesses, groups and individuals. The draft recommendations – informed through consultation and negotiations – will be formally debated and agreed upon at the Summit event in September 2025.

This discussion document has stated the national imperatives for action, set out a vision for the future of transport, outlined our current and emergent technology applications and articulated a set of challenges that need to be overcome or managed.

We seek recommendations from the community and all interested stakeholders on how to respond to the challenges identified in this discussion paper.

We are also interested to know whether we have missed anything important or been mistaken in any of the challenges we have described.

HOW TO PROVIDE FEEDBACK

Refer to the HOW TO MAKE A SUBMISSION? In the National Future Transport Summit section above. Further instructions on how to provide feedback will be provided on the Summit website: www.ccat.org.au/summit

Submissions are due by **Friday 25th July 2025.**