

Cities for the Future Report 2018



roadsaustralia



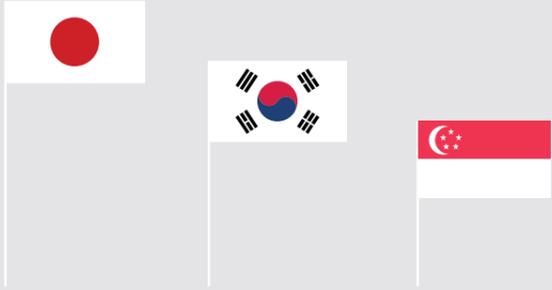
Introduction

In Australia, we can learn from Governments in our region who have markedly different approaches to integration of transport strategy and land use planning, smart infrastructure and technology delivery, transport investment priorities and customer focused mobility solutions.

The next decades will see our major cities growing rapidly, presenting huge challenges for governments and societies in delivery of equitable transport solutions.

SEPTEMBER 2018

Roads Australia, the national peak body for transport and infrastructure stakeholders, led a delegation of senior government and industry leaders on a study visit to investigate how major Asian national and city governments were developing their city transport networks to cope with population growth, livability, changing demographics and the introduction of autonomous vehicles on their networks.



The delegation was privileged to be given access to the highest-level Government and industry players in Japan, South Korea and Singapore. This report offers insights into their priorities and approaches to mass transport and mobility solutions. We hope this will provide a platform for different thinking on how Australia manages and leverages the technologies of the Fourth Industrial Revolution.

Key findings

Mass transit is king

- Public transport thinking, investment and culture dominates in major cities
- Australian cities need massive investment in renewal and expansion of public transport systems
- Our governments need to actively discourage private car use in the overall journey mix
- Much stronger collaboration is needed between our tiers of government to integrate transport and land use planning

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Be aligned or be behind

- High level national government collaboration with industry and academia sets the transport agenda for our neighbours
- The Australian government must be the lead collaborator in developing long-term, people-oriented transport outcomes
- Australia's current state-by-state approach will leave us behind
- City governments need to cast a wider net and be at the table

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Use the quiet before the storm

- Good preparation will lead to early adoption of autonomous technologies and rapid roll-out of driverless functions from 2025
- Strong coordinated development of network control technologies and mapping systems is the key – do we need a rethink of Australia's approach?
- Better coordination of Australia's autonomous vehicle trials, enabling law and regulatory processes is essential
- Governments should be engaging now to help remove consumer/societal barriers to the introduction of new autonomous technology

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"Big Data" changes the paradigm

- Coordinated transport data control and management has a high strategic focus
- Integrated management of investment, demand and pricing of multi-mode transport needs "big data"
- Australia must mandate open access to all transport network data as a pre-requisite for participation
- State and City governments should implement integrated charging and demand management systems across the total commuter journey

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Look for stepping stones

- Electric Vehicle introduction is strongly supported by manufacturers and Government in Japan and South Korea
- Hydrogen Fuel Cell powered fleets, particularly for buses and heavy transport are the likely end game
- Australia should take the opportunity to collaborate early on these developments – as a potential producer of Hydrogen for our future transport fuel needs

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Summary of key findings and recommendations

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Mass public transport is the mode of choice in our neighbouring cities

The contrast between transport mode choices in these cities compared to Australia is stark. Public transport thinking, investment and culture has dominated the strategic agenda for generations.

The Tokyo Metropolitan Government is strongly focused on building capacity and resilience in the city's public transport systems to accommodate the rapid growth in foreign visitors to Tokyo (up to 13 million in 2017, a 250% increase in the past decade).

The positive public transport culture in Tokyo, built over many decades since the underground rail network began its rapid expansion in the 1950's, has a strong influence on transport mode investment priorities for the city government. Passenger transport statistics for Tokyo would be the envy of most city governments around the world, with the indicative breakdown of mode share 51% public transport, 37% cycling/walking and only 12% private car use.

With evident similarities to Japan, the Seoul Metropolitan Government agenda is strongly focused on mass passenger transport systems. The city government is responsible for transportation services covering Seoul and the Greater Metropolitan area, for a population of 26.2 million people.

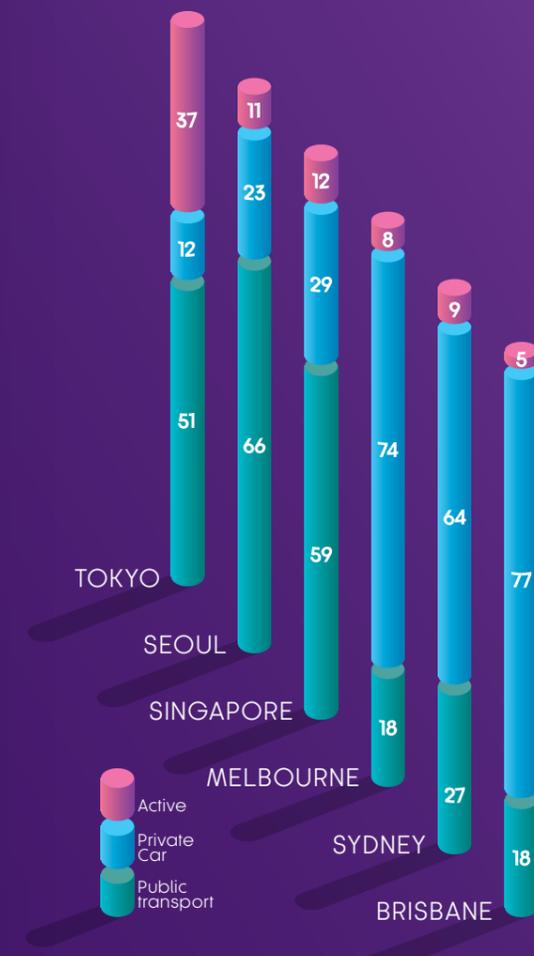
Seoul has responded to heavy traffic congestion experienced in the 1990s, with a Beyond 2000 strategy focused on moving from the car to public and active transport modes. They firmly believe that building new road infrastructure in the past did not improve congestion in the long-term and have an ongoing concern about vehicle contribution to the city's air pollution challenge.

The combined impact of limited road expansion for the past two decades, and investment in a world class subway system integrated with city and suburban bus services, has seen indicative mode share of public transport in Seoul grow significantly to around 66% of all journeys, including taxis at 7%, with private car use 23%.

As a unique city state, Singapore has developed a similarly unique approach to urban transport that has lessons for many growing cities around the world. The very densely populated city of 5.6m people has little room for expansion. The first striking statistic is that the scale of the road expressway network in kilometres is exceeded by the size of the Mass Rapid Transit network.

A strong focus on mass public transport system investment, combined with a "car lite" policy sees public transport dominate as a mode of choice. Indicative mode shares for Singapore are 59% public transport and 29% private car use. Peak-hour public transport use is even higher, reaching 67% in 2017, with a 2030 target of 75%.

The contrast with Australia is stark. In our two largest cities with populations of over 5 million people the private car dominates. This diagram shows indicative mode shares compared to our neighbours:



As we look towards 2050, with rapid growth predicted, Australian cities will need massive investment in the renewal and expansion of our public transport systems to maintain the livability we cherish. This is not an easy or short-term challenge. It has been heartening to see the emerging support by state and federal governments for public transport investment, particularly over the past decade. The challenge we face is generational in magnitude.

Our city neighbours have been building their metropolitan rail networks, as core interconnectors, only since they emerged from the devastation of the mid- 20th Century global conflicts. They are modern, strongly interconnected grid networks, with high frequency, fast, affordable, safe and reliable services. These networks are being continually upgraded and rapidly expanded, for example Singapore expects to add a further 75% to line length in the MRT network by 2030.

In Australia's major cities, our city rail networks have their foundation in the 19th century. These essentially radial, suburban to city centre connectors, do not have the interconnectivity, frequency, speed and reliability of services to make them attractive as the commuter mode of choice. The lack of connectivity detracts from the unique advantages that our cities, such as Sydney (Ferries) and Melbourne (Trams) already have in their transport mix. Strategic investment by state governments in suburban rail is already high on the forward agenda. The reality is we will need exponential investment to cope with the expected population growth that could see Melbourne and Sydney reach 8 million people by 2050.

Australian cities of the future need to have much less reliance on private car travel

In parallel with rapid upgrade in the mass public transport systems, Australian governments need to put more effort into actively discouraging private car use in the overall journey mix.



All of the cities we visited have their own approach to minimise car usage. Singapore is the most extreme, with a car-lite policy that severely limits the number of privately-owned vehicles in the country. While many countries have implied cross subsidies between private and public transport, in Singapore it is explicit government policy to generate revenues from car owners to fund public transport capital investment. The results have been outstanding - while over the past ten years Singapore has seen a population increase of around 16% (4.84m to 5.61m), vehicle growth has been around half that level, with an almost negligible increase over the past 5 years. The 2013 'Enhancing Travel Experience' strategy has an even stronger customer journey focus, investing in more PT connections, enhancing services with a focus on livability and inclusivity, and even further reduction on the reliance on private transport.

Tokyo, with the lowest percentage of car usage relies on continued investment in the subway train network to reduce passenger congestion and improve frequency. Their target is a 2 to 3 minute wait time and proximity of within 10 minutes' walk from stations for the majority of residents. Improved access for elderly and disabled passengers has been a strong focus, with elevator installation at 93% of the 755 metro stations completed by 2017. Safety investment, through installation of platform screen doors is also a continuing investment program. Rail investment has been backed up by the development of Bus Rapid Transit services and conversion of the commuter bus fleet to step-less low floor access across the fleet.



2 to 3 minute wait time

10 minutes' walk from stations



Access for elderly and disabled

Elevators in 93% metro stations



In Seoul, there has been significant expansion of median Bus-Only lanes across the city (155km by 2020), aimed at further improving transit times and reliability. Continued expansion of the urban rail network aims to reduce travel times by a further 10% and road congestion by 15%. Overall, the Seoul Metropolitan Government has an ambitious target of increasing public transport usage to 75% of total journeys. Next steps could see Seoul move to restrict, then block diesel vehicles from entry into the inner city, mirroring London's low emissions zone policies.

Australia has a challenge ahead. Our reliance on private car ownership threatens the enviable high livability rankings that our major cities currently hold. The strategic thinking on how this can be achieved and the necessary engagement with all Australians in the change process, needs to have the highest possible focus by all governments.

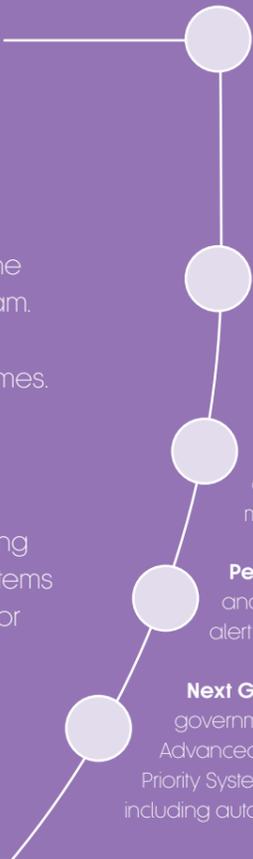
Much stronger collaboration is needed between our tiers of government to integrate Transport and Land Use Planning. We saw strong evidence in the three cities we visited of the benefits of this integration - with public transport connections often the lead development in new residential or urban renewal projects.

Be aligned or be behind

High level national government collaboration with industry and academia informs the transport agenda for our neighbours. We strongly encourage the Australian government to take the role as lead collaborator in development of long-term, people-oriented transport outcomes.

The Japanese Government has a strong collaborative approach with Industry and Academia, through the Cross-Ministerial Strategic Innovation Promotion Program (SIP). Established and funded by the Bureau of Science, Technology and Innovation within the Cabinet Office, the program is entering the second phase of a planned 10-year program. Transport has a high focus, with Automated Driving Systems one of the 12 strategic SIP themes.

A key characteristic of SIP is the appointment of lead project directors from Industry and Academia, rather than Government, which sets a very strong tone from the top in fostering collaboration. The SIP Automated Driving Systems program (SIP-adus) is headed up by a senior Toyota Motor Corporation Executive. Key sub-elements of the program are focused on R&D and implementation testing in five key areas:

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Dynamic Mapping – through the Dynamic Map Platform Company, established in collaboration with six surveying/mapping companies and the 10 Japanese automakers.
- Human Machine Interface** – a consortium of manufacturers, industry associations and universities gathering and integrating public road data for future AI applications.
- Cyber Security** – cooperative development of technology evaluation guidelines, establishing regulatory organisations and central data management systems.
- Pedestrian Accident Reduction** – University and government led development of mutual alert systems and behavior predictors.
- Next Generation Transport** – University and government collaboration on establishment of Advanced Rapid Transport (ART) and Public Transport Priority System (PTPS) central control centre functions, including autonomous bus operations.

In addition to the social objectives of the program, the industry collaboration in SIP-adus has a strong commercial purpose. Automotive manufacturing industry employs 5.29 million people in Japan and generates 53 Trillion Yen in product sales annually. SIP-adus expects the program to facilitate the creation of new associated future industries, including vehicle sensor equipment, communications devices and digital infrastructure for the local and world markets.

Similarly, the South Korean Government has a strong research-based approach to transportation policy. Through the Korea Transport Institute (KOTI), established in 1986, the Government aims to be a leader in shaping and coordinating human-centric and safe transport systems. The national government “people oriented” transport policy, through the work of KOTI, follows the message we heard from the Seoul Metropolitan Government, who put citizens at the centre of transportation planning.



KOTI has a strong focus on Transport Research for the “Fourth Industrial Revolution” with a wide remit to connect South Korea with, and contribute to, global transport research and policy initiatives. Current KOTI activities are focused on field oriented and data driven research in big data technology, autonomous vehicles, unmanned aerial vehicles, new age logistics and smart mobility. With nearly 300 highly credentialled academic staff, KOTI coordinates research and policy development in the following areas:

Transport Research for Fourth Industrial Revolution –

Integrated Mobility; Smart Cities and Transport; AI and Big Data; and Autonomous Driving and Future vehicles.

Comprehensive Transport

– Metropolitan Transport and Administration; Commuting and Multimodal Transport; Mobility for the Disadvantaged; Climate Change and Sustainable Transport; and Urban Regeneration and Transport.

Road Transport – Policies and Operation: Pedestrian and Eco-friendly Transport; Legislation and National Safety; and Funding and PPP on Highways.

Railway Transport – Metropolitan High-speed Rail; Private Finance for railways; Infrastructure in Northeast Asia and North Korea.

In 1996 the Singapore Government launched its “World Class Land Transport System” agenda. This rapidly implemented strategy integrated Land Use and Transport Planning with strategic road and public transport investment, with a strong demand management focus. The strategy included establishment of a world first Electronic Road Pricing (ERP) system and curtailment of car ownership through the Certificate of Entitlement process.

Singapore’s Land Transport Authority (LTA) has maintained this integrated approach throughout successive strategic plans including:

2008 Land Transport Master Plan – “A People-Centred Land Transport System” strongly focused on public transport as the mode of choice, continuing the downward pressure on road usage, and progressing investment in diverse customer needs, such as access and safety.

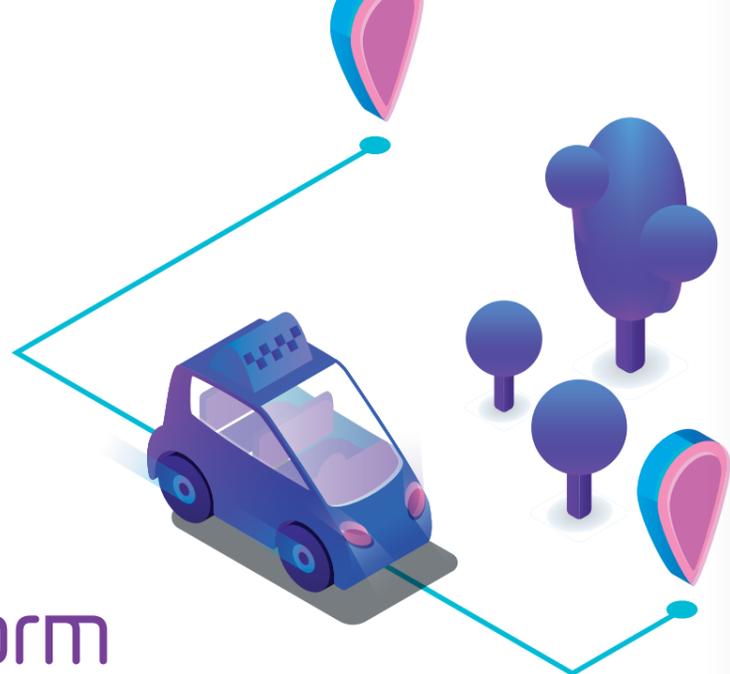
2013 Land Transport Master Plan – “Enhancing Travel Experience” with an even stronger customer journey focus, investing in more PT connections, enhancing services with a focus on livability and inclusivity, and even further reduction on the reliance on private transport.

Singapore has the strongest integration of Land Use and Transport planning of all the cities we visited. With a striking ratio of land under roads (12%) almost equalling the residential building footprint (14%); Singapore has embarked on a “reclaim urban space” strategy. This includes the current 21.5km North-South expressway project, where much of the existing road corridor is being moved underground. The project provides: dedicated Bus-Lanes in the tunnels; at grade public bus connections; cyclist and pedestrian facilities; and a predicted 30-minute reduction in travelling time from North to City Centre.

In Australia, while we acknowledge the challenges set by our federation, there are many areas where our current state-by-state approach to strategic transport planning will leave us behind our neighbours. There are many academic institutions working on these important issues, however stronger collaboration and strategic support at the Federal Government level is needed to focus and leverage their efforts.

Expanding the national focus on our growing cities, already commenced through the “City Deal” process, is strongly recommended. In this process, our major city Governments need to be at the table, however as a precondition they should be encouraged to cast a wider net - collaborating or combining with suburban local governments to harmonise their strategic input to a “whole of city” approach.

Use the quiet before the storm



The preparation by our neighbours is likely to lead to early adoption of autonomous technologies and rapid roll-out of driverless functions from 2025 onwards. In all cases, a strongly coordinated development of network control technologies and mapping systems is the key. It is not too late for Australia to rethink our current approach and take a big step forward through strategic alliance with one of our key international trading partners.

In Japan, due to the public transport emphasis and the conservative risk adverse culture, there is less strategic attention on the potential benefits and impacts of autonomous vehicles within the Tokyo city system. However, during the delegation visit a Toyota sponsored trial of driverless taxis commenced in Tokyo. It was also acknowledged that the 5000 strong bus fleet in Tokyo could provide a great platform for the first major move into driverless operations.

The recent announcement of a joint venture between Toyota and SoftBank is a potential pathway for Tokyo to bypass driver based MaaS systems, with a move directly into driverless technology. Monet Technologies combines Toyota's mobility services platform and information infrastructure for connected vehicles with SoftBank's Internet of Things platform. From 2019, Monet plans to deploy an on-demand transportation service and corporate shuttles, progressing to an autonomous MaaS fleet, called e-Pallete, using Toyota's battery-electric vehicles by the mid-2020s.

While the "on road" evidence of a move towards Autonomous Vehicles in Japan is moderate, the delegation was extremely impressed by the genuine collaborative efforts of individual industry and university organisations who have put aside competitive constraints for the universal benefits to Japanese society and the economy. This leaves little doubt that the ambitious targets for autonomous vehicle introduction in Japan will be achieved, including: unmanned autonomous driving transport services in specified areas by 2020; fully automated driving of trucks on expressways from 2025; level 4 fully automated private vehicles on expressways, circa 2025; and level 2 or higher automated driving of buses on expressways from 2022.

2020 | Unmanned autonomous driving transport services in specified areas by 2020

2025 | Fully automated driving of trucks on expressways from 2025

2025 | Level 4 fully automated private vehicles on expressways, circa 2025

2022 | Level 2 or higher automated driving of buses on expressways from 2022

South Korea's automotive testing and approvals authority KATECH has responsibility for coordinating autonomous and connected vehicle (CAV) introduction. The long history of CAV development in the country goes back to light vehicle platooning tests in 1998. The South Korean Government timetable for introduction of automated and connected vehicles is progressing with many on-road trials, including driverless shuttles planned to be deployed within 2-3 years in Sejong City.

While the technology is expected to be ready for introduction of level 3 autonomous vehicles within 3 years, it is acknowledged achieving accident-free roads using AV technology will require three pillars of acceptance:

Social // Consumer // Industry



Singapore's continued "car-lite" strategy has not taken away from consideration of the future benefits and challenges of the introduction of autonomous vehicles. Prime Minister Lee Hsien Loong's "Smart Nation" platform encourages smart thinking to address Singapore's demographic challenges. Singapore has a projected 30% population growth to 6.9 million, with one in four Singaporeans to be over 65, by 2030. Autonomous vehicles could have a dramatic impact on connectivity and road safety outcomes, in a city with one of the highest population densities in the world.

The Singaporean Government has not committed publicly to an autonomous vehicle introduction timetable. AV trials in Singapore have a strong focus on safety, with an autonomous future for taxis and buses high on the agenda. LTA's Smart City Transport & Infrastructure Technology approach will integrate new vehicle technologies, building on their existing advanced planning systems, recognising that law makers need to be increasingly nimble to keep pace with emerging technology.

A focus on taxis and buses also allows the government to retain control of trials and implementation timetables. This is due to the high sensitivities around managing disruption in the point-to-point industry, particularly the 45,000 active taxi drivers. LTA estimates that half of the taxi fleet is driven by guest workers from Malaysia and Indonesia and the bus fleet is also heavily reliant on guest workers to operate.

The government officials we visited all placed a high emphasis on gaining a better understanding of community acceptance of autonomous technologies on the road networks. There is also a strong safety-first approach, where staged and well-coordinated on-road trials have a government controlled technology system safety-net.

Better coordination of Australia's autonomous vehicle trials, enabling law and regulatory processes, is essential if we are to keep up. Our governments should be acting collectively and engaging now on strategies to help remove consumer and societal barriers to the introduction of new autonomous driving technologies.

The control of road network operating technologies and the development of systems to support the introduction of autonomous technologies is markedly different to Australia's approach.

The approach in Western countries has been dependent on individual proprietary mapping systems, such as Google and vehicle manufacturers systems, to support vehicle automation and connectivity.

Australia's state-by-state approach to AV introduction, while supported by National Transport Commission's regulatory advice, has the potential to see a fragmented approach to AV introduction. It is incongruous that our national highway system could see markedly different network control and management systems in place as vehicles transverse state and territory borders. We could be faced with the dilemma of accepting a significant delay to AV introduction until all states and territories have adequate systems in place; or staggered jurisdiction implementation. Australia's productivity and road safety outcomes can be strongly improved by the introduction of autonomous vehicles, initially in the heavy freight sector then through the light



vehicle fleet with driverless capability. The lack of a nationally coordinated and integrated system, ambivalent to jurisdiction borders, will delay these benefits, potentially for many years.



Japan has taken an alternative approach,

establishing the Dynamic Mapping Platform as their core vehicle management and control safety net. This combination of satellite and cadastral mapping systems has the potential to be much more precise (down to centimetre position accuracy) and more efficient than collective proprietary systems. To operate in Japan, vehicles must be compliant with the DMP. The approach offers significant safety and security measures, with future network asset management and road user charging options that will be more difficult to achieve under the alternative approaches.



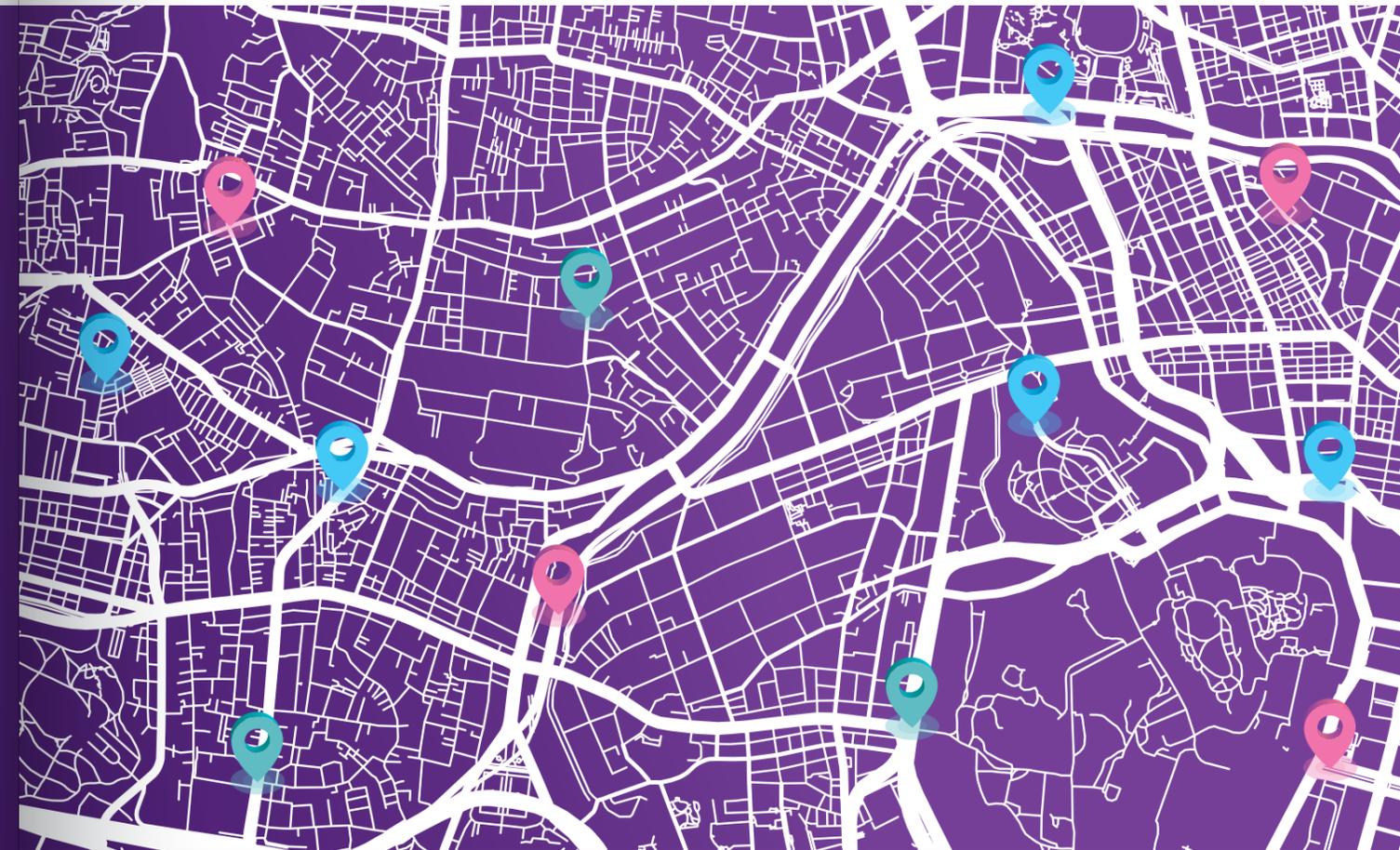
In South Korea the anticipated overall

connected and autonomous management systems are to be government controlled. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) is funding the development of the Advanced Systems for Automated Driving (C-AHS). This includes development of precision dynamic mapping, GPS communications and real-time road traffic information collection systems. The C-AHS program also incorporates investigations into required improvements in road structures, for precise positioning and sensor perception improvement, and improving road structure construction specifications to facilitate autonomous vehicle driving.



With no local automotive manufacturing,

Singapore has limited ability to influence autonomous vehicle technology. However, their next generation ERP II system, which is expected to be commissioned by 2020, will provide an integrated technology and transport management platform. ERP II will use a Global Navigation Satellite System (GNSS), removing the existing physical gantries and paving the way for the possibility of dynamic autonomous vehicle management.



The concept of Japan's integrated Dynamic Mapping Platform could lead other countries to question the logic and long-term effectiveness of their current approach – Australia should urgently consider the potential for high level government collaboration with Japan on this approach.

Big data changes the paradigm

Coordinated transport data control and management has a high strategic focus in the countries we visited. While these big city governments have a focus on public transport, they are also building strong capability in collecting data on the total end to end customer journey.

The Seoul Metropolitan Government's strategic agenda towards a human-oriented transportation system is well advanced, with the potential to make them a benchmark for other mega cities to follow. Their electronic payment Transit Card is implemented as a multi-mode total journey system. The Card can be used on buses, subways, taxis, railways and for expressway tolls, with parking to be incorporated in the near future. Managed by central Transportation Management Centre, the Card provides input to real time traffic management and information flow, which together with other traffic "big data" analytics helps to develop long-term transportation policy and investment priorities.



The Card can be used on buses, subways, taxis, railways and for expressway tolls, with parking to be incorporated in the near future

In Singapore, movement towards multi-modal travel on a single platform is also well advanced. The ERP stored value cash card has already been extended for use in car parking, with a strong possibility that this can be extended for use on the city's extensive public transport network.

There is no doubt that demand management of commuting choices in the future will be enhanced by integrated charging systems. In Australia, we encourage state and city governments to extend the development of their public transport travel cards to incorporate the total commuter journey.

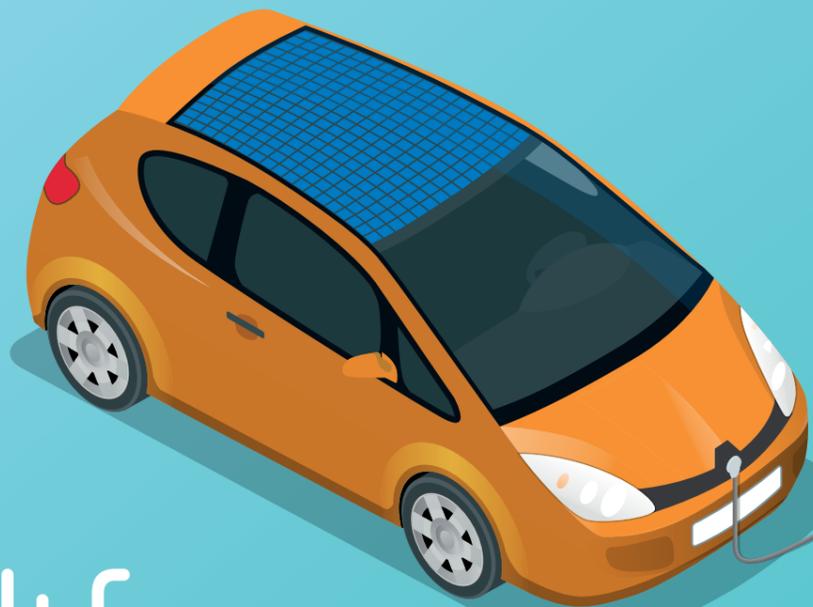
The message from all the city governments we visited was that integrated management of investment, demand and pricing of multi-mode transport in the future will need access to "big data". In Australia, city transport managers certainly have access to public transport data. However, the missing link in the future could be the road user travel data that will be essential to understanding and influencing customer travel patterns.

The approach in Japan, South Korea and Singapore enables central management and collection of road use data across their road networks with the ability to link to other transport data sets. While direct road user charging was most evident in Singapore, the availability of individual vehicle travel data has the potential to be used in future road user charging regimes.



If Australia is to harness the important road transport travel data that will be provided by autonomous vehicles in the future, it must consider mandating access to all transport network data as a pre-requisite for participation of these vehicles on the network. While there is no current agenda in Australia to move from the fuel excise system towards a more equitable road user charging system, there can be no doubt that access to vehicle travel data will be essential for any alternative system.

The strong message for Australia is that access to data for all transport modes will be essential for managing demand and delivering customer focused services across an expanding range of mode choices.



Look for stepping stones

Electric Vehicle introduction is strongly supported by manufacturers and governments in Japan and South Korea. While this is understandable given the importance of the international export markets for these countries, they may be seen internally as a stepping stone to a Hydrogen Fuel Cell powered future.

Japan sees a world after 2025 where the country produces its own transport fuel through the home manufacture of hydrogen.

South Korea is also at the forefront of hybrid and EV development in the world, with Hyundai vehicles winning both the Hybrid and EV awards for best in class in recent years. Despite the significant investment in both technologies by the private OEMs, the South Korean government has established their strategic goal of introducing Fuel Cell (hydrogen) powered buses with large trials of Fuel Cell powered buses underway.

Like Japan, South Korea intends to move to a fully Hydrogen powered fleet, as Fuel Cells are mass produced, and is focused on a future where the country produces its own transport fuel through the manufacture of Hydrogen.

Japan and South Korea see a world where the countries produce their own transport fuel through the home manufacture of hydrogen.



A recent announcement that New Zealand and Japan are working together to transition away from a reliance on fossil fuels is an interesting development. New Zealand has signed a Memorandum of Cooperation on hydrogen with Japan that helps signal New Zealand's interest in working in partnership with Japan to develop hydrogen technology. The announcement indicates that New Zealand and Japan are both intent on transforming their respective energy and transport sectors in transition to a low-emissions economy and that the partnership will allow the exchange of information to enhance hydrogen development.

New Zealand, like Australia, has energy sources that could be used to produce hydrogen as a next generation sustainable fuel. Projections show that there will be a significant impact on the electricity grid and demand in Australia as use of Electric Vehicles grow. Hydrogen production could potentially offset this pressure on the distributed electricity grid, with heavy transport the likely first adopter.



As a potential producer of Hydrogen for our transport fuel needs in the future, Australia should take the opportunity to collaborate with Japan and/or South Korea as Hydrogen Fuel Cell technology develops.

Summary of key findings and recommendations

1.

Public transport thinking, investment and culture dominates our three near-neighbour cities.

Governments should ramp-up investment in the renewal and expansion of mass public transport systems in Australia's major cities.

2.

While strategic approaches differ across the region, there is overt pressure by governments to reduce private car use in the overall journey choice mix.

Deliberate actions by Government are required to reduce private car use as the mode of choice for commuters in Australia's major cities.

3.

City Governments have a strong controlling interest in the transport agenda, which is strongly integrated with Land Use Planning.

Stronger collaboration is needed between the three tiers of government to lift integration of Transport and Land Use Planning for our major cities.

5.

There is lower than expected evidence of on-road autonomous vehicle trials, however behind the scenes preparation is likely to result in early adoption of autonomous technologies, with rapid roll-out of driverless functions from 2025.

Better coordination of Australia's on-road autonomous vehicle trials, enabling law and regulatory processes is essential for early adoption.

4.

There is strong, high level national government collaboration with industry and academia in developing long-term, people-oriented transport agendas.

High level national government collaboration with state and territory Governments, industry and academia is essential for development of long-term, people-oriented transport agendas.

6.

In common with other jurisdictions, the development of enabling law and consumer/societal acceptance are likely to be greater barriers to introduction than technology.

Governments should have more engagement on the consumer/ societal acceptance of new technologies to help remove barriers to introduction.

7.

The coordinated approach to transport data control & management in these countries strongly positions them to leverage the "big data" for future integrated management of investment, demand & pricing of multi-mode transport.

Governments need to establish the framework for access to essential data from all transport network participants, as a prerequisite for access.

8.

There is significant effort towards managing the total commuter journey through single travel payment systems – with potential for future dynamic demand-based pricing across the modes.

State and City Governments should move urgently to develop single payment platforms for the total commuter journey.

9.

While the introduction of Electric Vehicles is strongly supported in Japan and South Korea, these are seen as a stepping stone to a future Hydrogen Fuel Cell powered fleet, particularly for buses and heavy transport.

Australia has an opportunity to collaborate with Japan and Korea on fuel cell technology for use in buses and trucks and to consider the potential production of Hydrogen as a fuel for use in transport.

10.

While approaches vary, the three countries have a strong focus on coordinated and integrated development of the network control technologies and mapping systems required for the introduction of autonomous vehicles.

The concept of Japan's integrated Dynamic Mapping Platform could lead other countries to question the logic and long-term effectiveness of their current approach.

The Transport and Infrastructure Council should re-examine the national mapping and network control approach for introduction of autonomous vehicles.

Australia should urgently consider high level government collaboration with Japan on the Dynamic Mapping Platform approach.



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