future
transport
TECHNOLOGY

NSW GOVERNMENT | Transport for NSW

NSW MAKING IT HAPPEN

The Future Transport Technology Roadmap: An Overview

Emerging technology has the potential in the coming decade to revolutionise transport by making it a much more personal service for customers. It also has the potential to unlock the full value of our transport and networks.

The NSW Government has completed a study, with extensive industry input, to uncover the next generation of technology development and apply it to transform service delivery, better connect communities and enhance the customer experience. This overview is a summary of our full report .

Below we describe the key trending new technologies and how they might influence personal mobility and the movement of goods and services in the future. We set out the five technology-enabled strategies that will be implemented to capture the potential benefits of these technologies for NSW citizens.

We have developed a Technology Roadmap that shows for each of these technology-enabled strategies what we are doing now, what we plan to do next and what we will stay focused on in the longer term.

It concludes by explaining what this will mean for customers in a few short years.

The 12 key trending technologies that will transform transport

There are 12 emerging and developing fields of technology that will transform transport as they mature, interact and converge in the next 10 to 20 years.

Customer interface technologies

- Personalised engagement with customers using interactive social and digital channels that deals with their specific mobility needs in real time

- Dynamic demand management systems that match demand and capacity

- Frictionless access, payment and identification so customers entitlements can be validated and their account charged automatically

- Mobility-as-a-Service platforms that enable shared or personal transport on demand.

Data and insight technologies

- Advanced analytics, machine learning and real-time and predictive decision support tools that generate insights from smart infrastructure and customer service systems

- Open data, data sharing and shared development of intellectual property with multi-party collaboration to develop innovative solutions to key challenges.

Infrastructure technologies

- Smart transport infrastructure, sensors and devices that allow more efficient congestion, capacity and traffic management

- Next-generation information and communication technology that allows for real-time digital management, increasing the flexibility, connectivity and security of transport assets, while reducing cost and risk.

Vehicle technologies

- Connected and automated vehicles (CAVs) that make public, private and shared fleets intelligent, and improve safety with minimal driver input

- Personal mobility devices such as pods and powered bikes that offer new options for first- and last-mile travel between homes and key public transport nodes

- Alternatively fuelled vehicles, which can deliver greater sustainability and a quieter ride.

It's the human response that drives disruption

It is not the technology itself, but rather how humans respond to it - both individually and the collective changes in behaviour that it triggers – that will drive disruption and change how the NSW transport system works. We have developed four potential scenarios that may emerge in the next two decades, as the uptake of these transformative technologies changes and disrupts consumer behavior. These scenarios help identify key issues and consequences that may need to be addressed, given the range of different outcomes emerging technologies will make possible. They are briefly described below.
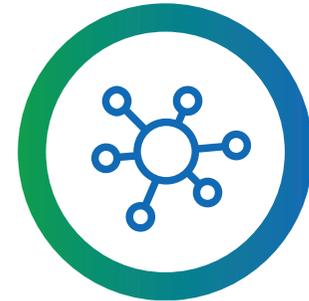
Scenario one:
My (autonomous) car is (still) king

Automation drives a fundamental shift in the cost in the economics of point-to-point (or door-to-door) transport services for people and goods, inducing demand. More private and commercial vehicles on a heavily used road network, drives strong demand for additional road capacity. This makes smart management of the transport network vital. A central hub coordinates technologies and data sets to predict congestion, manage traffic flows and prioritise fleet movement. It also deploys dynamic demand management systems to better match capacity with demand.

Scenario two:
We're all in this together

The sharing economy has continued to gather strength and technology disrupts the model of individual vehicle ownership with a strong shift towards shared mobility-on-demand services, using with automated vehicle technologies. Customers access a mix of different transport options including cars, mass transit and personal mobility devices, based on cost, convenience and their particular needs and preferences, using a mobility service account. Major fright providers are aggregating capacity on major trunk routes. Demand for additional road and public transport investments are strong.

Scenario three:
Super-commuting with public, active and shared transport

A wave of next-generation technology investments delivers dramatic improvements in public transport, with sustained levels of superior customer experience. Dynamic timetabling is possible, with adjustments made to accommodate real-time fluctuations in demand caused by weather and events, delivering on-demand mobility. While this drives a significant increase in the use of mass, public transit services, the road network continues to remain important, enabling the freight task, as well as providing the capacity for operation of a broad range of public and shared transport services.

Scenario four:
Why travel so much?

Personalised services delivered door-to-door have improved dramatically and become significantly more affordable, reducing the need for people to travel as much in the first place. The spread of cloud computing and digital presence technologies, along with community activity hubs, has given people more flexibility than ever to choose where they work, learn and play – and most chose to do as much as they can at, or nearer, to home. This flattens the need for investments in additional capacity on the road and mass transit network, compared with other scenarios.

The five technology strategies we will adopt

It is uncertain how these technologies may evolve and impact on how people, goods and services move. It is even more difficult to predict how customers and businesses may respond to new services built on technologies that are yet to be conceived. Clearly, a flexible strategic framework is needed to accommodate a range of potential futures.

There are five strategies we will adopt aimed at shaping the most customer-centric, innovative, digitally-enabled transportation system in Australia. By testing, trialing and adopting new world-class technologies as they emerge, Transport for NSW will:

1. **Personalise customer interactions**. Develop and connect real-time digital information, navigation, payment and engagement platforms so they are simpler to understand, easier to use and can give personalised service relevant to individual needs and preferences

2. **Transform mass transit networks**. Increase automation and apply new technologies to mass transit networks improve efficiency, deliver better service frequency and reduce transit times, increasing the attractiveness of the services they offer their customers.

3. **Foster shared demand-responsive services**. Stimulate the development of new technology-enabled service offerings to offer a greater variety of mobility options and flexibility of choice that matches customers particular needs

4. **Enable connected and automated vehicle platforms**. Pursue national standards for the road infrastructure, systems, safety and regulatory frameworks needed to adopt of greater levels of vehicle automation earlier, and identify how best to deliver community benefits that autonomous vehicles will bring

5. **Create intelligent transport networks managed with data**. Invest in smart infrastructure and collect and use the data generated to enable increasingly efficient, flexible and dynamic service delivery with improved safety, availability, reliability and responsiveness.

This Roadmap is for the mobility of people, goods and services
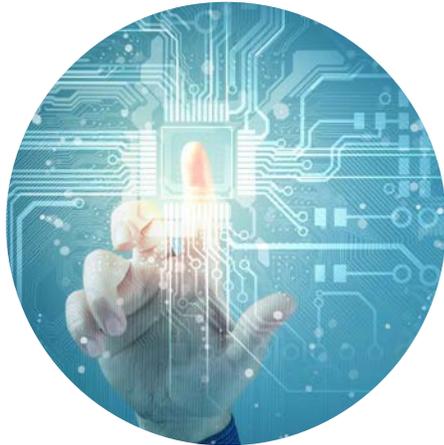
The scenarios, the strategies and the Technology Roadmap will encompass initiatives focused on applying new technologies to the freight sector as well as personal mobility. This is the part of the transport network that focuses on the movement of goods and services, and is vital to our economy. There are some slight shifts in focus for freight, where the strategy is to:

- **customise freight services and transactions**

- **transform the core elements of the supply chain**

- **foster shared, demand-responsive services**

- **enable connected and automated vehicle platforms**

- **create intelligent freight transport networks, managed with data**

As freight operates principally on shared transport networks, the intent in this Roadmap is to ensure that each of the 'no-regrets,' next steps initiatives deliver benefits and outcomes for both personal mobility and freight where it is relevant.

What this Roadmap will deliver for customers

Our customers will begin to feel the benefits of this Technology Roadmap immediately. Starting in 2017, we will begin implementing the initiatives from our Roadmap to deliver a transport experience that is safer, more efficient, less congested and, above all, more personalised. Our vision for 2020 and beyond is for customers to be able to:

- **make easy, well-informed transport choices based on their personal needs and preferences**

- **have more public transport services delivered more reliably**

- **get from door to door more easily with flexible transport connections and seamless transfers**

- **enjoy the benefits of the latest automated vehicle technology reliably and safely**

- **fulfil their mobility needs efficiently and sustainably**

- **manage their mobility costs and pay for services simply and conveniently.**

What will the Roadmap mean for how customers travel in the future?

Less about	More about
• Accessing generic information	• Information tailored to my needs
• Specialised information channels	• In my preferred digital and social channel
• A different payment account for every mode	• A single account for my mobility
• Drive or taxi to the station	• Shared autonomous service to interchange hub
• Limited public transport options	• More public, shared and active transport options
• Set timetables that I organise myself around	• Timetables that adjust to changes in demand
• My car is a simple machine	• My car is smart and helps me drive better
• Encountering changes and disruptions	• Proactive alerting of issues and options
• Unproductive time in traffic	• I can do what I want whilst on the move

Give us your feedback

We have deliberately not made decisions about timescales or approach, as we seek industry input on the best way to scope, develop, stage and deliver these initiatives for maximum early benefit.

It is intended that work commence on some of these initiatives in 2017. However, we have also not decided which initiatives to prioritise so we can seek industry input and guidance on the optimum approach.

To finalise this Roadmap, we will engage further with industry and stakeholders to gather feedback and recommendations on how best to execute the initiatives. Input is now invited in the period to 31 January 2017. Then the Roadmap and a 2017 Implementation Plan will be finalised, and work will be programed.

Options for Providing Feedback

The options for providing input are:

- **Via our moderated online forum:** Join the conversation on our ideation platform, where you can discuss your feedback with our team and your peers. Open discussion will be encouraged until 30 November, after which the conversation will be refined to focus in on the key themes.

- **Via our website:** Use the feedback form at future.transport.nsw.gov. au to send us your analysis and comments on the roadmap.

- **At an industry engagement session:** You can also request a person-to-person industry engagement meeting, which will be scheduled in January 2017. A written innovation proposal should be submitted providing the information and addressing the criteria set out in more detail below.

Innovation Proposals

We are also looking for Innovation Proposals from industry that would allow us to accelerate implementation of our initiatives portfolio. All innovation proposals should be submitted to FutureTransport@transport.nsw.gov.au by 31 December 2016. Further information about how to make an Innovation Proposal is in the full Roadmap document.

How we produced this Roadmap

The NSW Government launched the Future Transport program in February 2016. Our aim has been uncover the next generation of technology development and find innovative ways to work with industry to make transport and better for all our customers. As Minister for Transport and Infrastructure Andrew Constance explained:

" As well as building new infrastructure, we need to look at smarter systems and technology-driven solutions to cope with demand.
We need to stay ahead of the game so it's time we ask, what are the next big ideas? What are the next systems and technologies that are going to challenge us and shape the transport system in NSW? "

The Future Transport Summit, held in Sydney in April 2016, assembled some of the brightest minds from Australian and around the world, as well as respected leaders from all corners of science and technology industries. Ideas from this event have helped inform our analysis, along with a Youth Summit we held in September, engagement with the staff of our transport agencies through the Intrapreneurs' Hothouse, and continued consultation with industry. We have also looked at equivalent transport agencies across the globe, researching new ways they are using technology and at how governments in Australia and around the world are working with the private sector to bring big ideas to life.

From this work, Transport for NSW has created the Future Transport Technology Roadmap. In simple terms, it sets out a vision for a technology-enabled transport future which will deliver more customised and personalised services for customers, while unlocking the full value of our road and mass public transport networks.

Reflecting our desire to open up, embrace new thinking, gain the benefit of the expertise from market leaders, collaborate with strategic industry partners, and rigorously test Transport for NSW plans and programs, the development of the Roadmap has been guided by a Leaders' Panel. The Panel was co-chaired by David Thodey, Chair of the CSIRO and JobsNSW, and a former Chief Executive Officer of Telstra, and Andrew Stevens, Chair of the Advanced Manufacturing Growth Centre and former Managing Director of IBM Australia and New Zealand. It also brought together senior representatives from private sector and government.

Where can I find a copy of the full Roadmap document
The full Technology Roadmap can be found by clicking here.

TECHNOLOGY ROADMAP