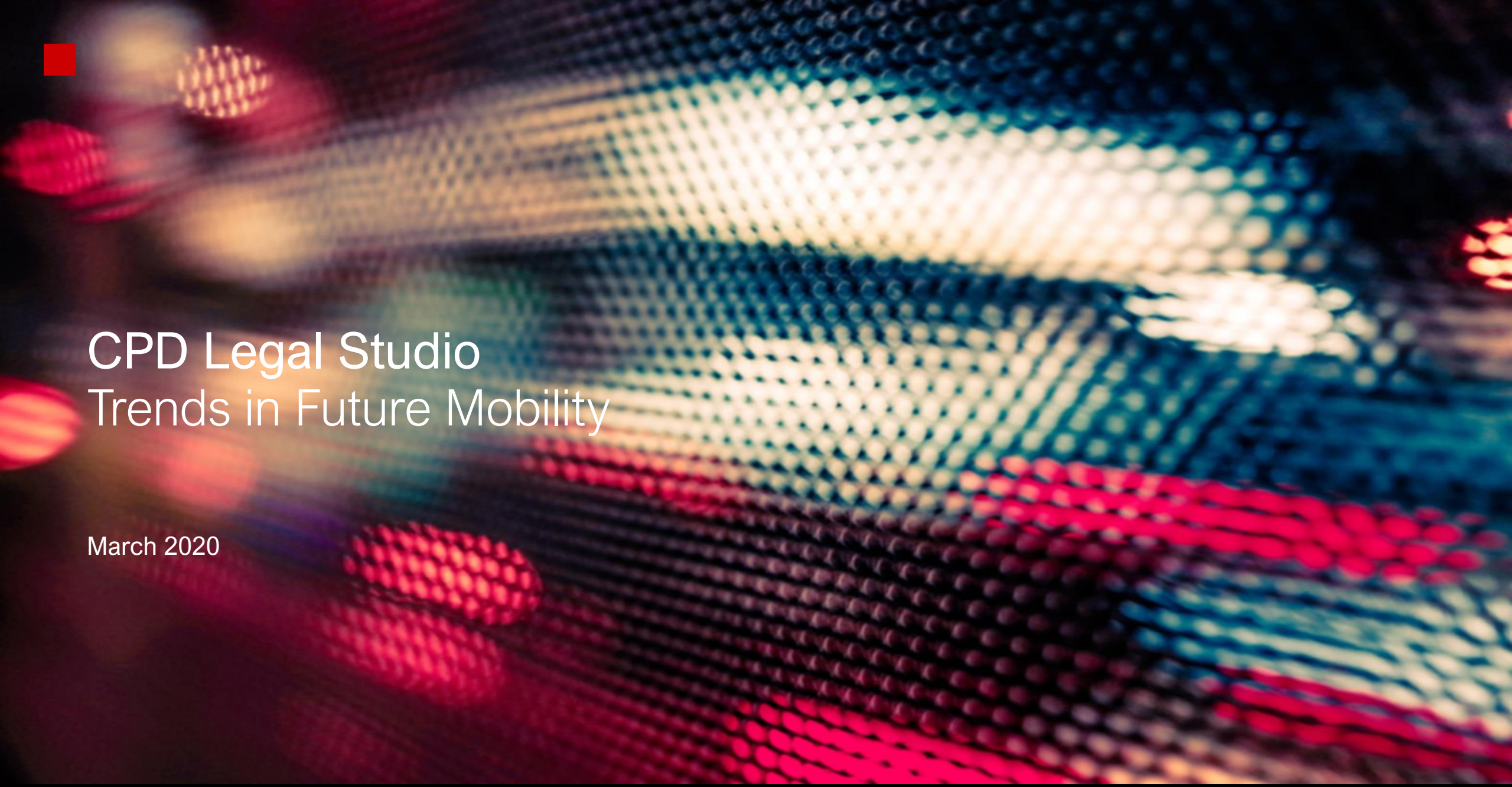

# CPD Legal Studio
## Trends in Future Mobility

March 2020

# Why 'mobility' and not 'transport'?

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# Mobility as a Service – Customer Focused End to End Journey Approach

**Mobility and Mobility as a Service is about a customer focused end to end journey focus**

**The discussion and solution are no longer about singular transport modes**

**Making connections is key to mobility success**

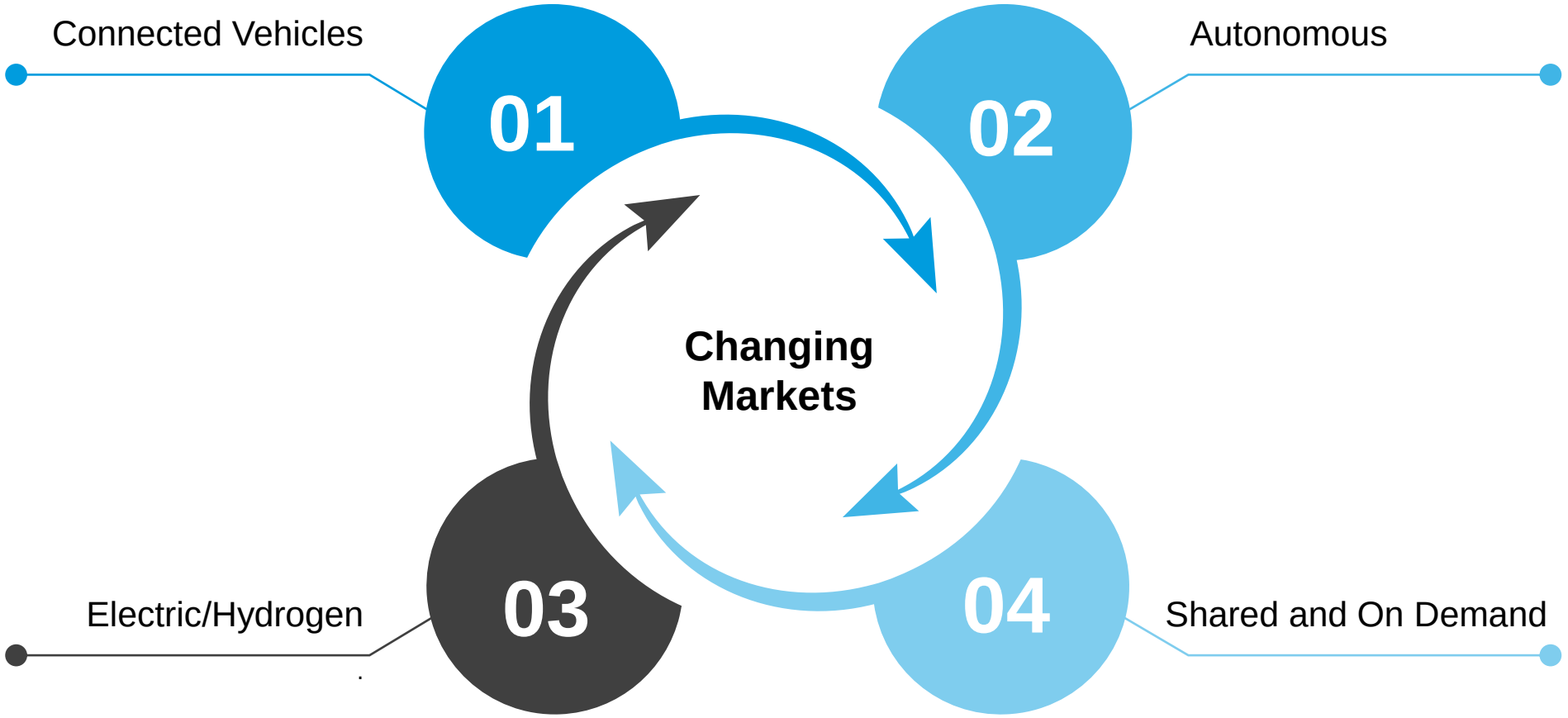
**Mobility as a Service (MaaS) is emerging as an efficient way to move people and freight**

**MaaS will help meet the needs of the young, elderly and disabled**

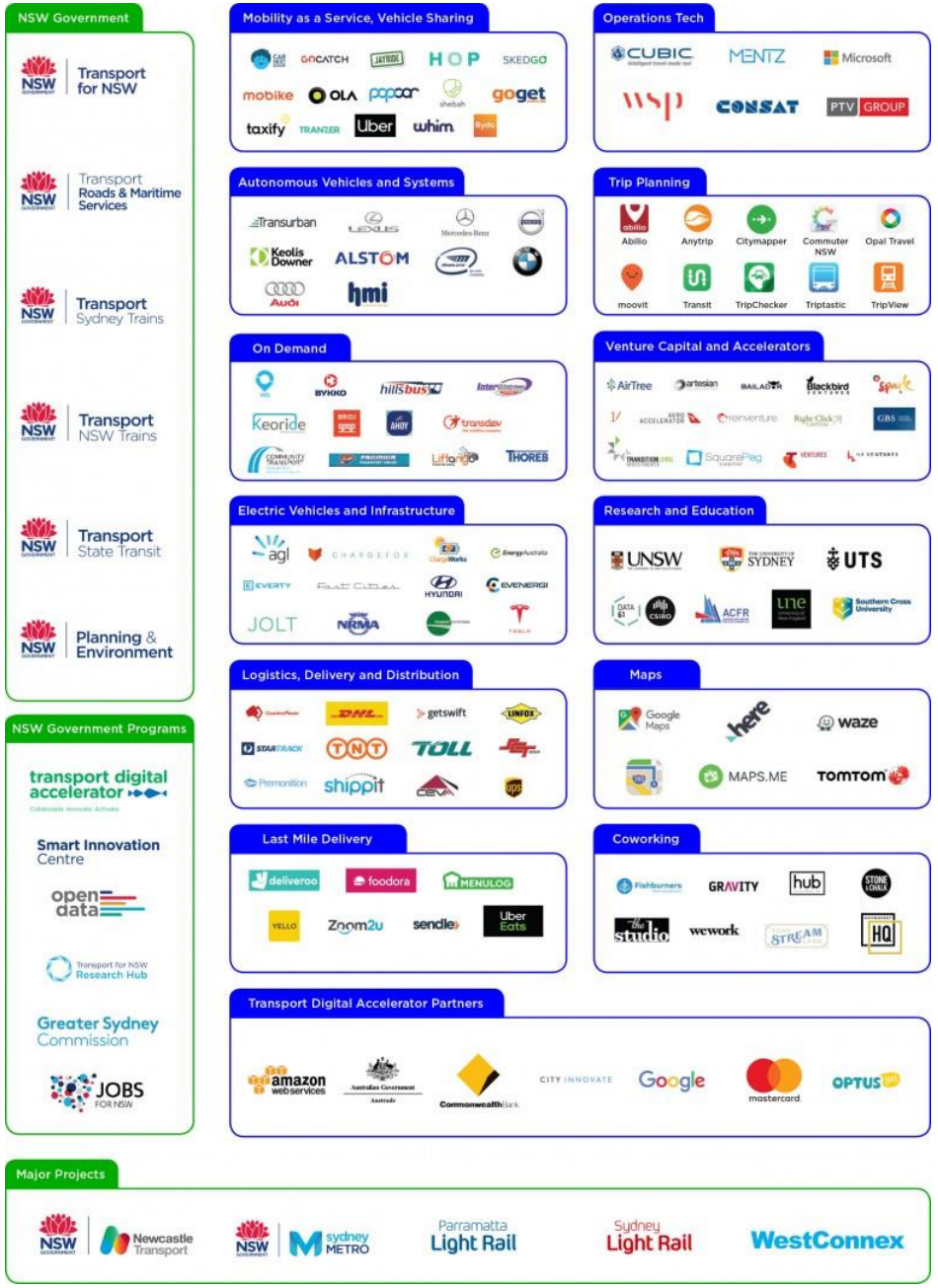
**Transport agencies are developing solutions to provide MaaS – TfNSW Digital Accelerator launched MaaS Innovation Challenge in 2018**

***"The vision for TfNSW is to enable a vibrant, open mobility marketplace where providers compete to best meet community & customer needs with compelling alternatives to car ownership"***

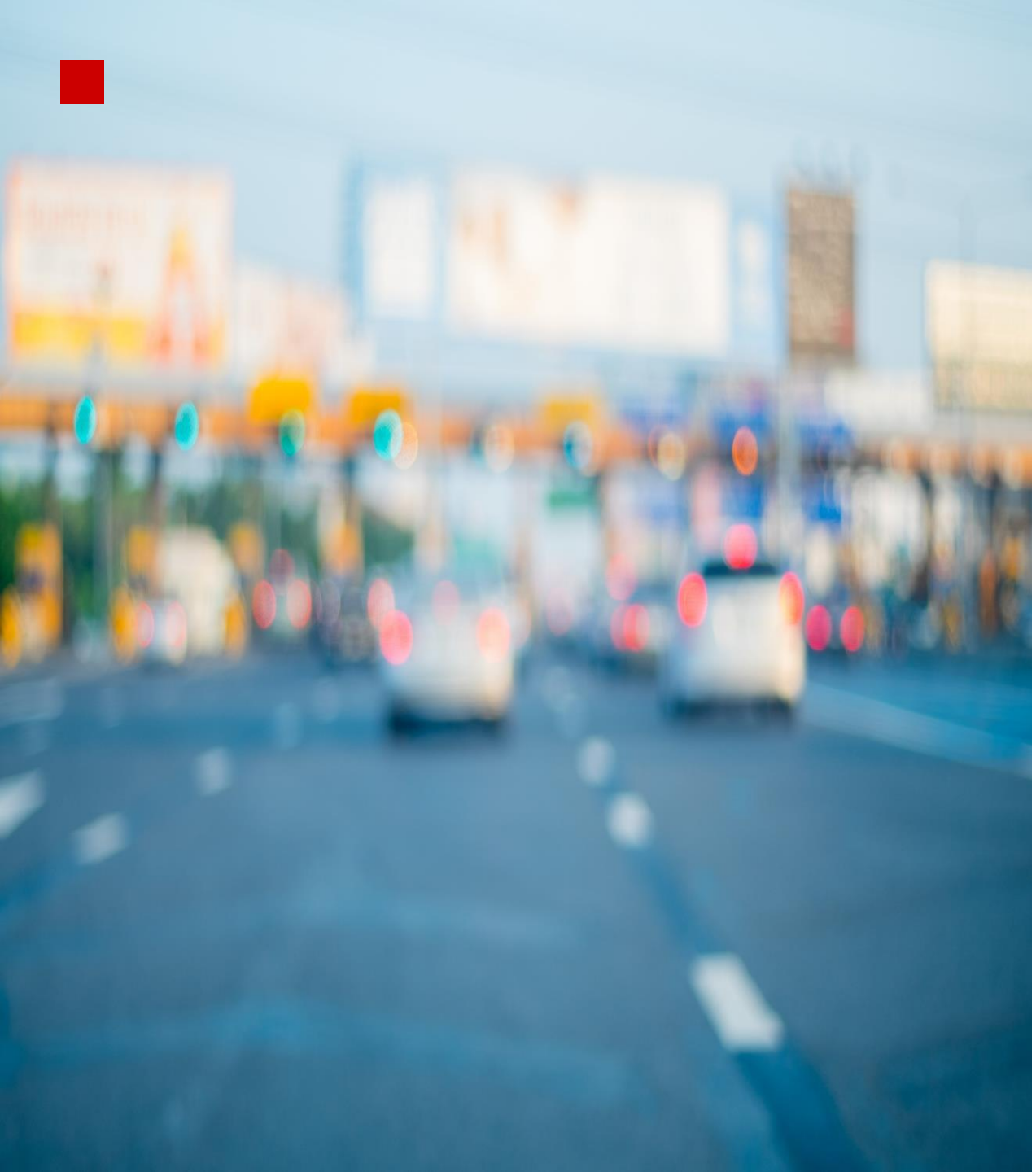
# Transport Trends



# NSW future mobility ecosystem




NSW Future Mobility Prospectus



# What's new in connected and driverless mobility development?

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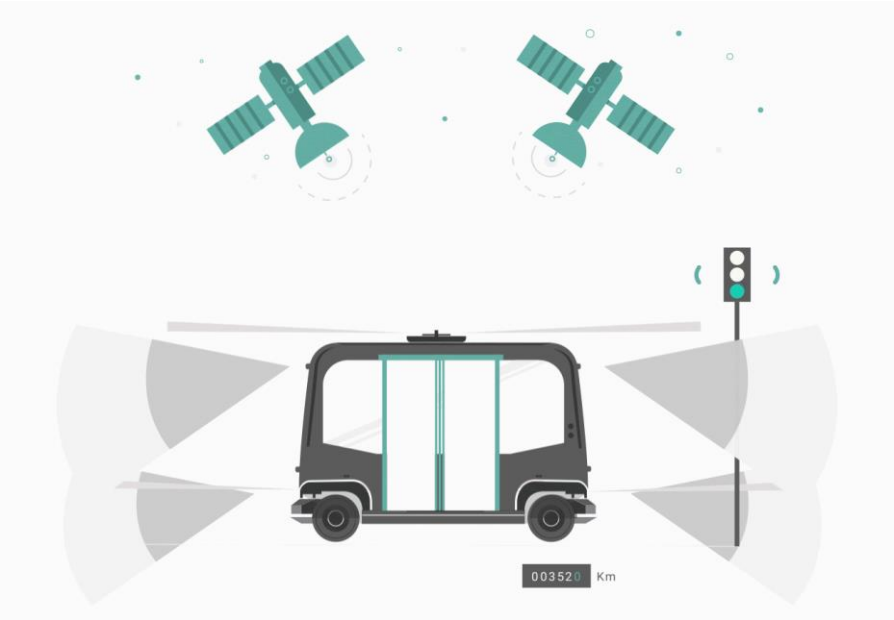
# Autonomous Uber and LEAP

In Pittsburg, PA, Uber are developing its fleet of autonomous Volvos – currently in trial on public streets

The autonomous Linden LEAP serving a roughly 3-mile route and first-mile/ last-mile solution to connect residents to community resources





# 3D Printed Autonomous Vehicles

Local Motors

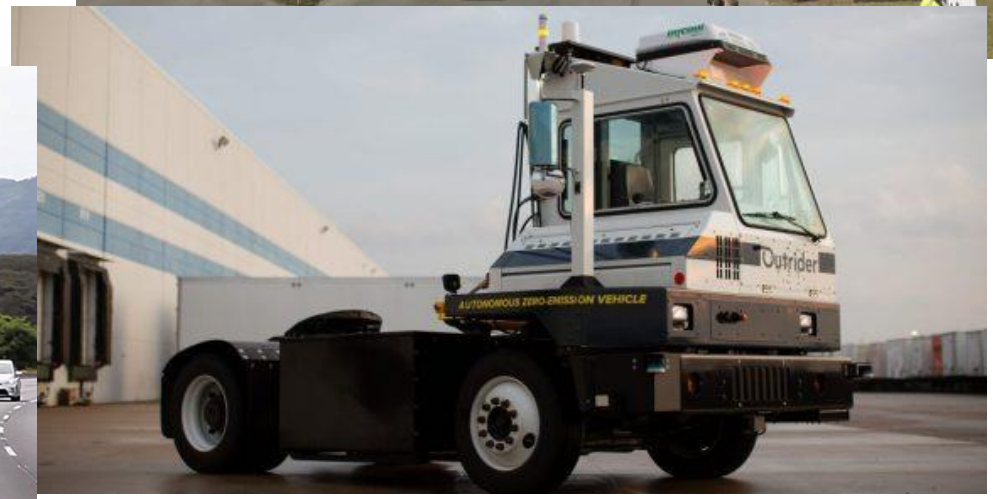
Olli Autonomous 3D Printed Bus


# Autonomous Trucks & Platooning

**Cab-less and autonomous, fully electric truck in commercial operations on public road – Sweden**

Modular self-driving electric autonomous shipping vehicles for logistics
Autonomous platoon trials





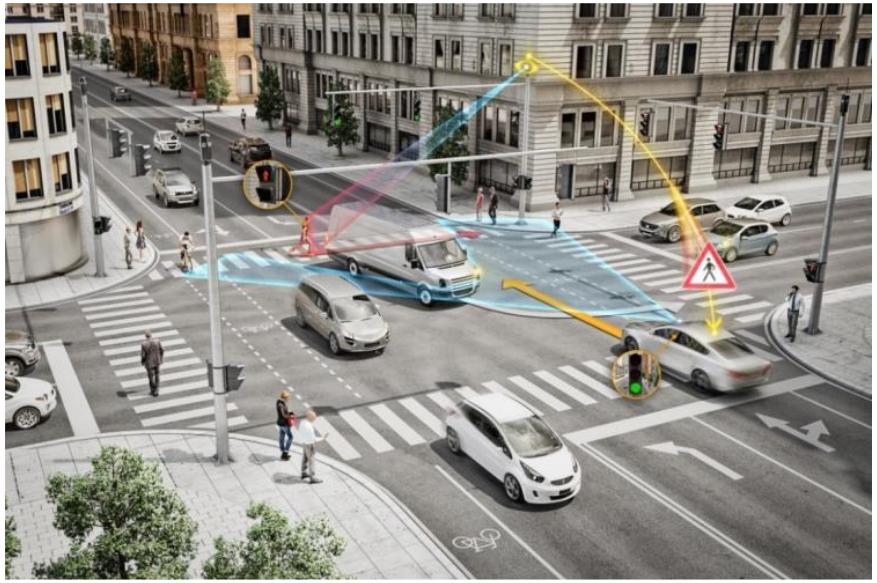
# Surtrac and AI

**Artificial intelligence traffic control is being trialled in Pittsburg Developing and deploying the technology to keep the traffic flowing took a team of researchers and roboticists from Carnegie Mellon University together with the help of city engineers and funding from foundations**

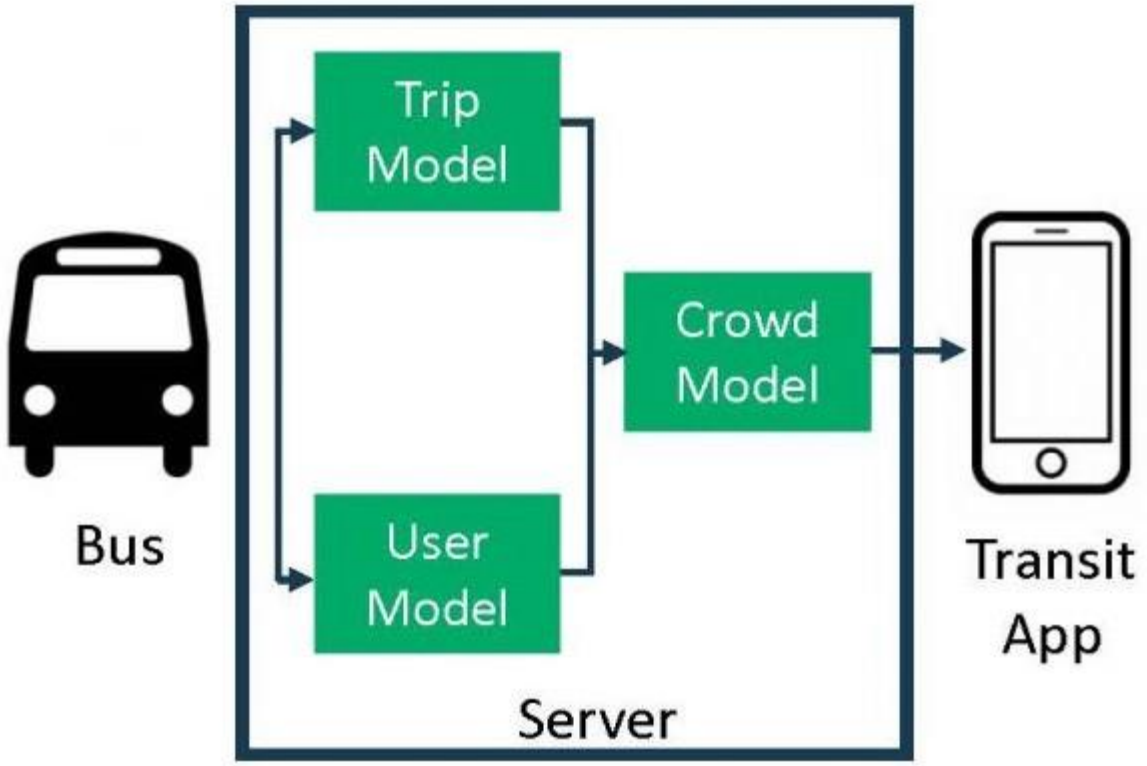
Surtrac is a real time signal control system developed at Carnegie Mellon University that reduces travel times, emissions and supports economic opportunity and quality of life

The Software allows the signals to “talk to each other.” Each signal makes its own decisions on timing by sensing approaching traffic streams and generating a timing plan to optimize movement through intersections. The signals then share plans with neighbouring signals to create coordinated actions

The system also connects to cyclists and pedestrians through phone apps and wearable devices that are also designed for people with vision impairment and disabilities



# Real Time Detection of Crowded Buses via Mobile Phones




Accurate knowledge about the utilization of public transit vehicles by riders, such as bus fullness, is critical information for public transit planners.

Automatic Passenger Counter (APC) information is used by transit planners to detect transit bottlenecks, assess overcrowding of vehicles, and provide rider experience. APC data may be a good measure of rider counts but can suffer from high error when considering individual due to compounding errors.

The purpose of this research is to investigate a new technique for recording information about bus vehicle fullness using participatory sensing, via a user's smartphone acetometer and GPS.

# Autonomous Vehicle Test Tracks



Mcity operates the world's first purpose-built proving ground for testing the performance and safety of connected and automated vehicles and technologies under controlled and realistic conditions


# What's new in driverless mobility development?

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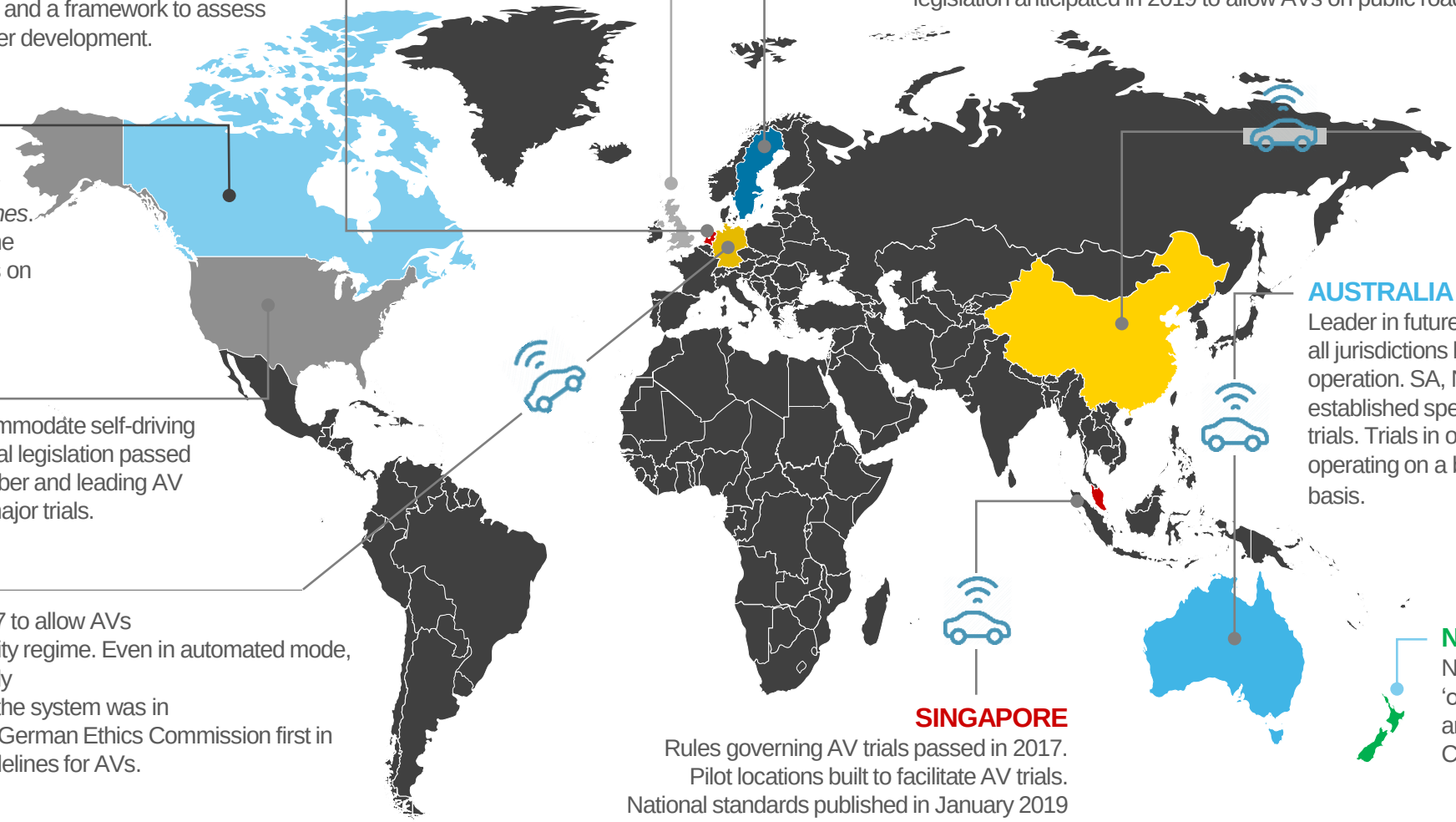
# Current trials and international developments



## UK

The HumanDrive initiative established which will see an AV drive 200+ miles in live traffic.

## NETHERLANDS

Ranked 1st by KPMG. Legislation to facilitate AV trials introduced in 2015. AV licensing requirements and a framework to assess the robustness of AV software under development.

## SWEDEN

World's first electrified road for charging vehicles (approx. 2km in length). RTA authorised to issue permits since 2017. New legislation anticipated in 2019 to allow AVs on public roads.

## CANADA

In December 2018 Federal Government introduced the *Testing Highly Automated Vehicles Guidelines*. Specific legislation enacted by some States (eg Quebec) to regulate AVs on public roads.

## CHINA

First official tests of AVs on public roads in 2018.

## USA

Significant number of States accommodate self-driving vehicles on public roads. No federal legislation passed yet. Home to most significant number and leading AV and technology companies, and major trials.

## AUSTRALIA

Leader in future regulation of CAVs. Nearly all jurisdictions have C-ITS or CAV trials in operation. SA, NSW and VIC have established specific legislation governing trials. Trials in other States and Territories operating on a by exemption / approval basis.

## GERMANY

Government legislated in mid-2017 to allow AVs on public roads and establish liability regime. Even in automated mode, the driver (and owner) will be strictly liable *unless* it can be proven that the system was in control at the time of the accident. German Ethics Commission first in the world to release 20 ethical guidelines for AVs.

## NEW ZEALAND

No specific AV legislation, but 'open for business' policy. Trial area established in part of Christchurch in 2017.

## SINGAPORE

Rules governing AV trials passed in 2017. Pilot locations built to facilitate AV trials. National standards published in January 2019 to guide industry development of level 5 CAVs.



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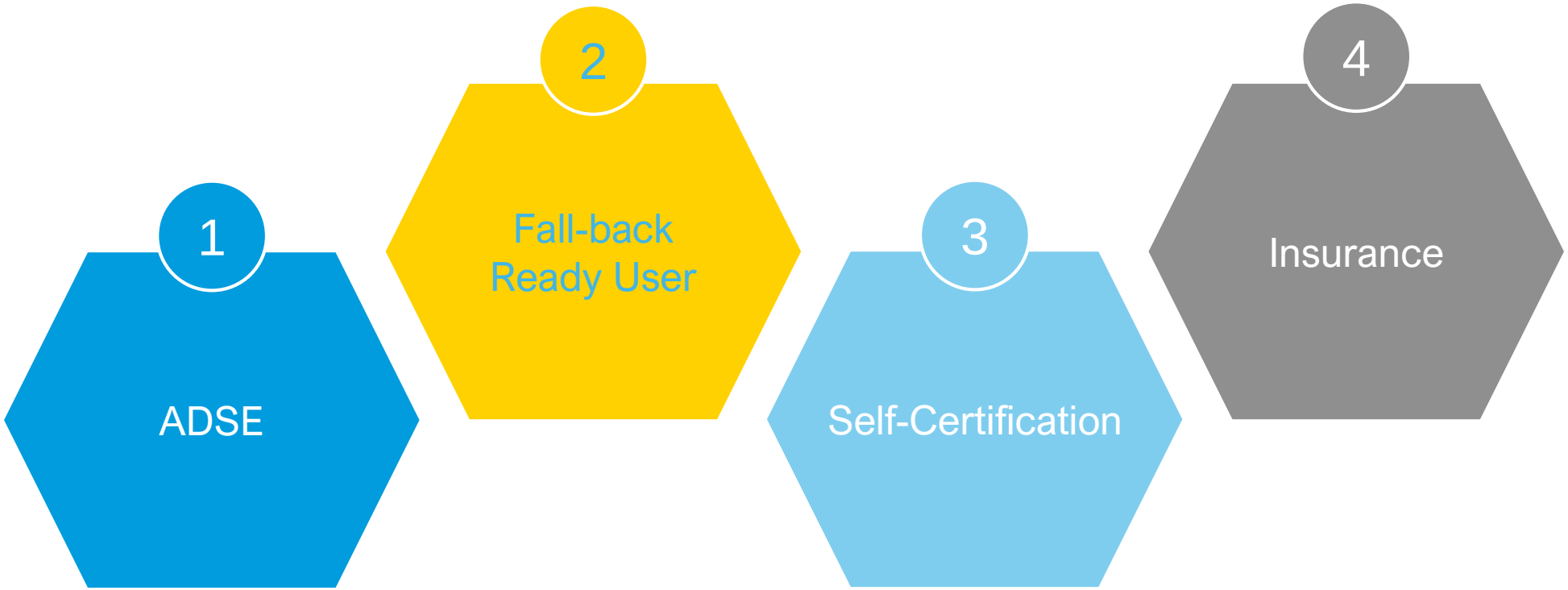
# Australia’s changing laws



# Who is in control of the CAV?

**For high and full automation (SAE levels 4 and 5):**

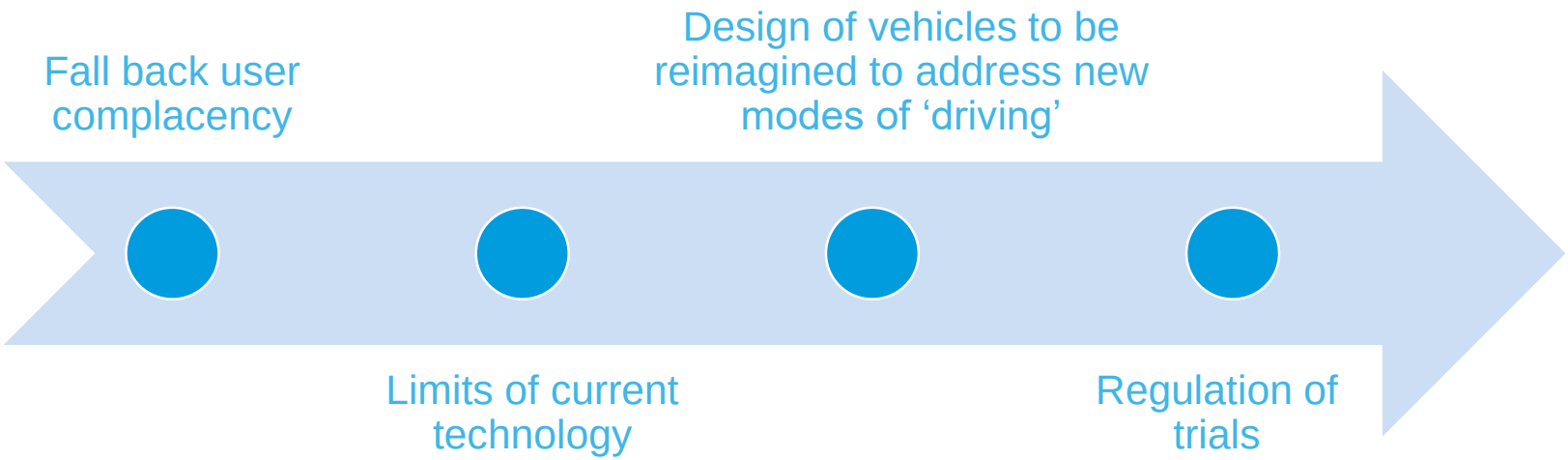
NTC recommends the ADS is in control

But, carve outs / apportionment is required. For example:

- third party modifications;
- communication failures (i.e. sensors); and
- hacking or disruption by a third party.

**Difficulties with conditional automation (SAE level 3) – control by 'fall back' user.**

# Lessons learnt from Uber fatality



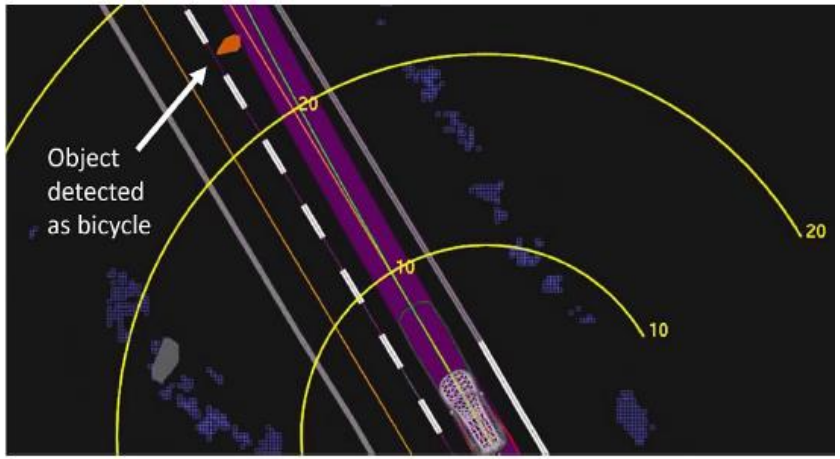
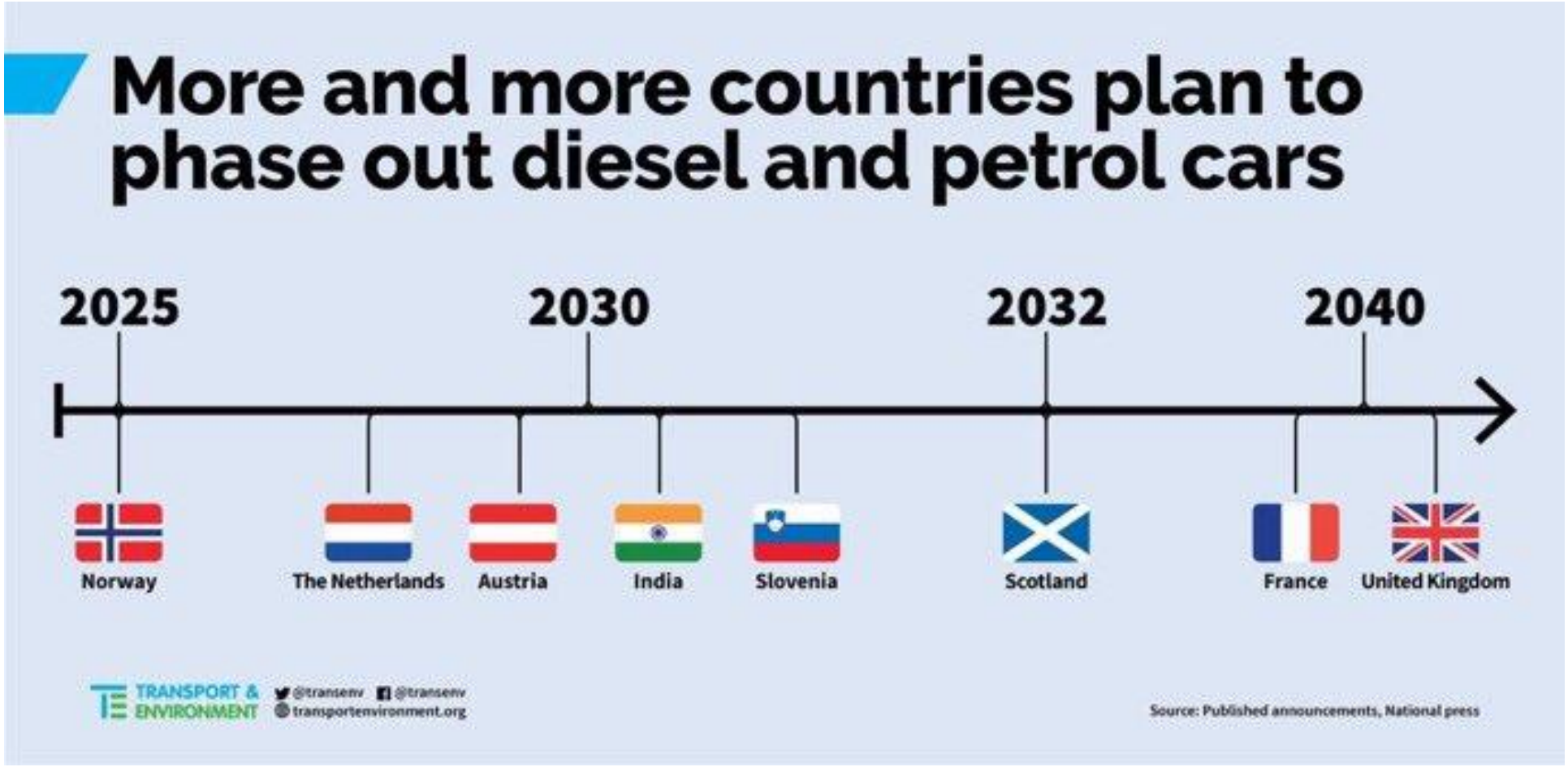




*Figure from the US National Transportation Safety Board Preliminary Report (May 2018) showing the video of the self-driving system data playback approx. 1.3 seconds before impact.*

# Changing legal and regulatory environment

# What’s happening with vehicle manufacturers?



# On demand private and public transport services

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# Vancouver – Car sharing

Zipcar is the world's leading car-sharing network

on-demand access to drive cars by the hour or the day in cities, airports, and campuses around the globe


# NSW on demand trials

On Demand is a flexible public transport service designed to improve connections to transport hubs and popular destinations like shopping centres or hospitals.

On Demand services operating around NSW as part of a trial

NSW trials are in regional areas as well as metro


# Autonomous and on demand Bus Trials

The City of Newcastle on the NSW automated shuttle bus | Similar to those in Sydney Olympic Park

Cooee and Metro Connected Bus Trials in Regional NSW


# AI and big data technology to support mobility

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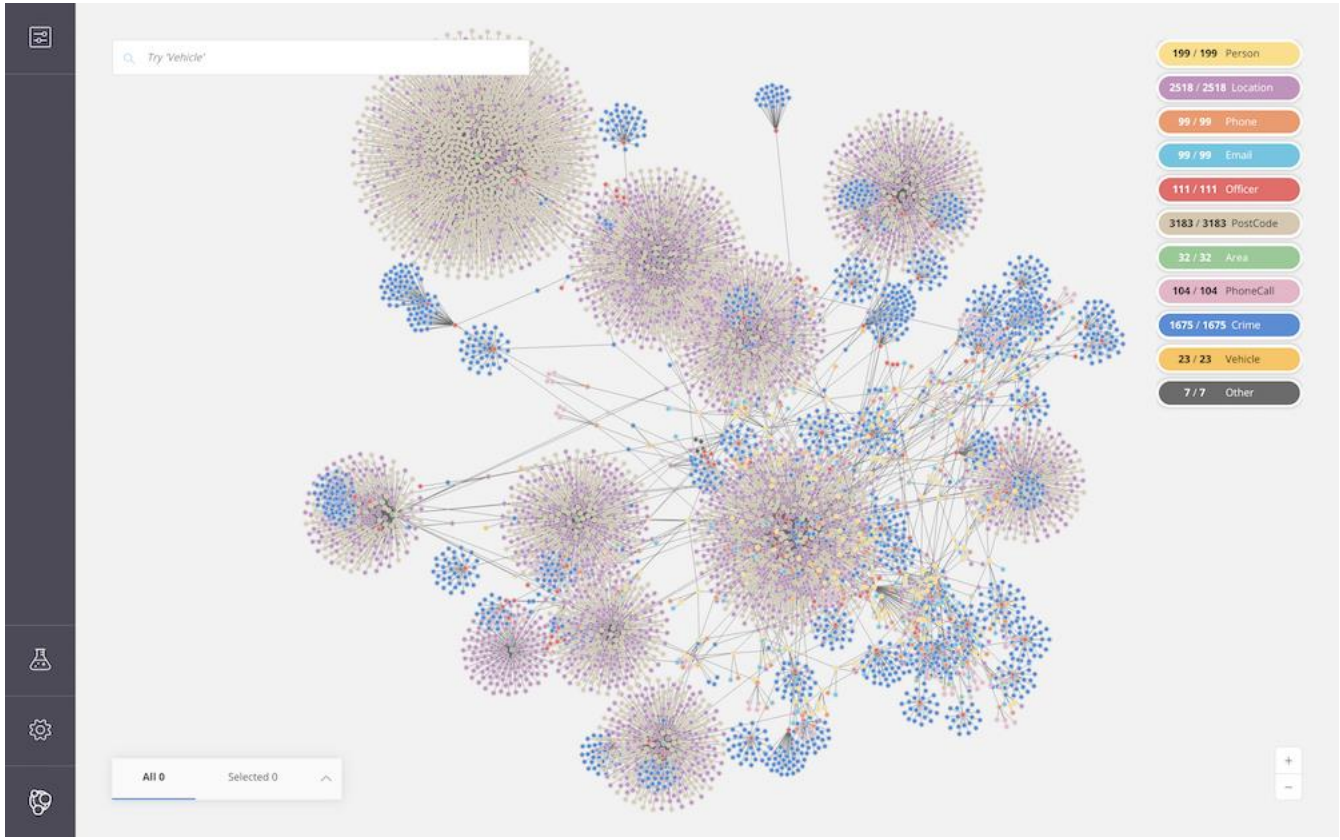
FUTURE
OF
WORK

# Big Data : AI, Relational and Graph Databases

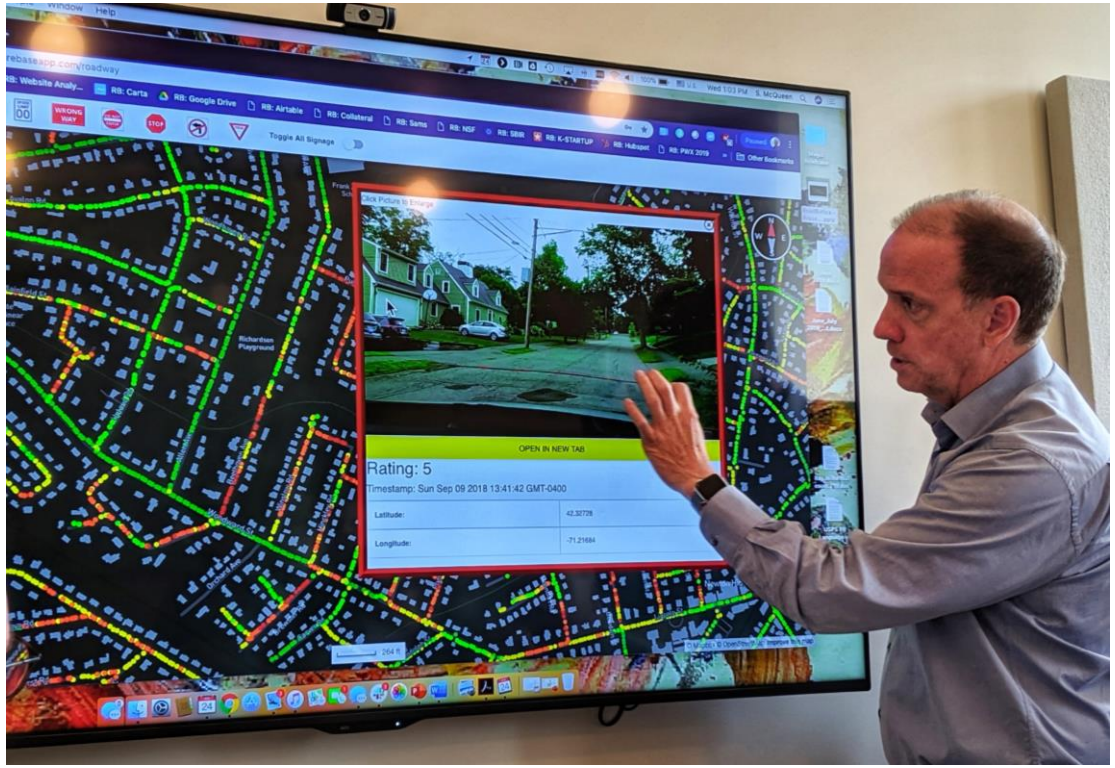
If the autonomous vehicle's AI needs to see every possible combination of light and weather conditions, it would be impossible to train it for all possible situations

But if the AI is supplied with connected, contextual information (rain *and* night, night *and* temperature), it is possible to combine information from multiple contexts and infer the next action to take (like slowing down or turning on headlights).

Graph technology connects data and defines relationships. By enhancing AI with related context, graph technology offers an effective means to empower the development of sophisticated AI applications.

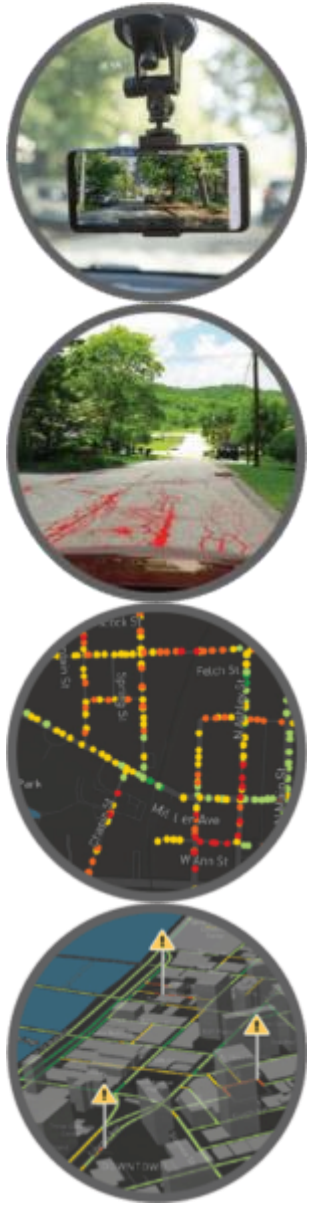


# Big Data – RoadBotics & On demand maintenance




Governments and councils manually inspect their roads or use van-based services to prioritize maintenance needs

RoadBotics is providing timely, data-driven results that are objective, cost-efficient, and easy to visualize



# Big Data : Connected vehicles and Insurance

Usage-based insurance policies use the vehicle's built-in modem to track your driving habits and adjust your rates accordingly with each renewal

The technology tracks distance, your aggressiveness with pedals, idle time and night driving. The companies are promising discounts of up to 40 percent, The insurance is available now in 39 states This is more convenient than other forms of usage-based insurance

You don't need to buy a separate dongle, and you can sign up through the Ford or Lincoln apps with some of the details already filled in

# Australia's AI Ethics Framework

1. AI should generate net benefits
2. AI should do no harm
3. AI should comply with the law
4. AI should ensure personal information is protected
5. AI's development and use must be fair
6. AI should be transparent and explainable
7. AI processes should allow for contestability
8. Those creating and implementing AI should be accountable

# How do we regulate AI?

- Suggested approaches
- Australian recommendations
- Overseas developments

# Emerging best practice

| Planning | Implementing |
| --- | --- |
| • What is the purpose of the system?<br>• Which principles will guide development and use of the system?<br>• How will you demonstrate that the principles have been met? | • Impact and risk assessments<br>• Ethical review<br>• Continuous monitoring<br>• Review mechanism |

# Micro mobility

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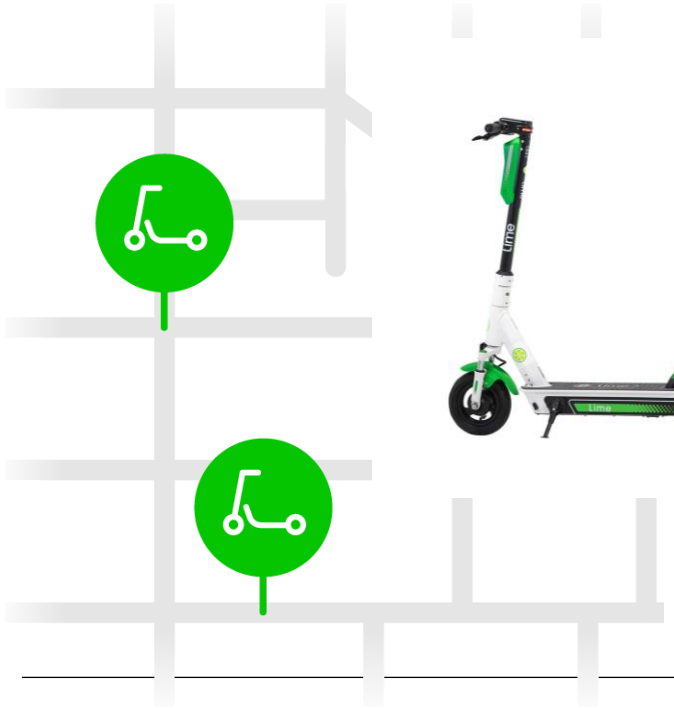
# Micro and Big Data : AI Suitcase

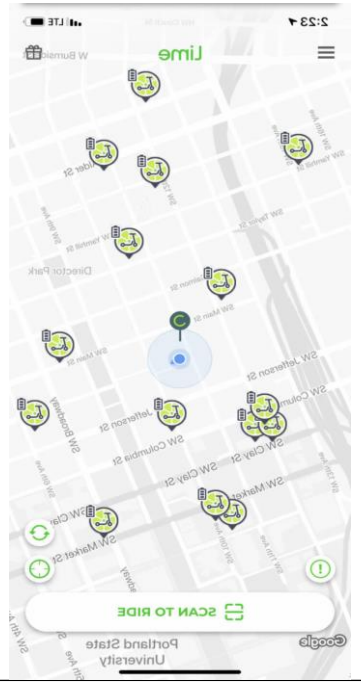
Big Data Establishment of the Consortium for Advanced Assistive Mobility Platform, Aiming to Improve Accessibility and Quality of Life for the Visually Impaired, Through AI Suitcase Development

| | |
|---|---|
| **Basic Functions: Navigation** | |
| 1. | Optimal route planning to a destination based on location and map information |
| 2. | Navigation through voice and haptic devices |
| 3. | Obstacle avoidance by analyzing data from video cameras and distance sensors |
| **Original Functions: Social Behavior and Communication** | |
| 4. | Voice to provide information on shops nearby and guide a user for shopping based on location information and other information on cloud |
| 5. | Communication assistance by recognizing registered faces and detecting the situation surrounding them based on facial expressions |
| 6. | Social-behavior assistance by recognizing the situation surrounding a user through video cameras and sensors e.g. stand in line |

# Micro mobility – new options everyday



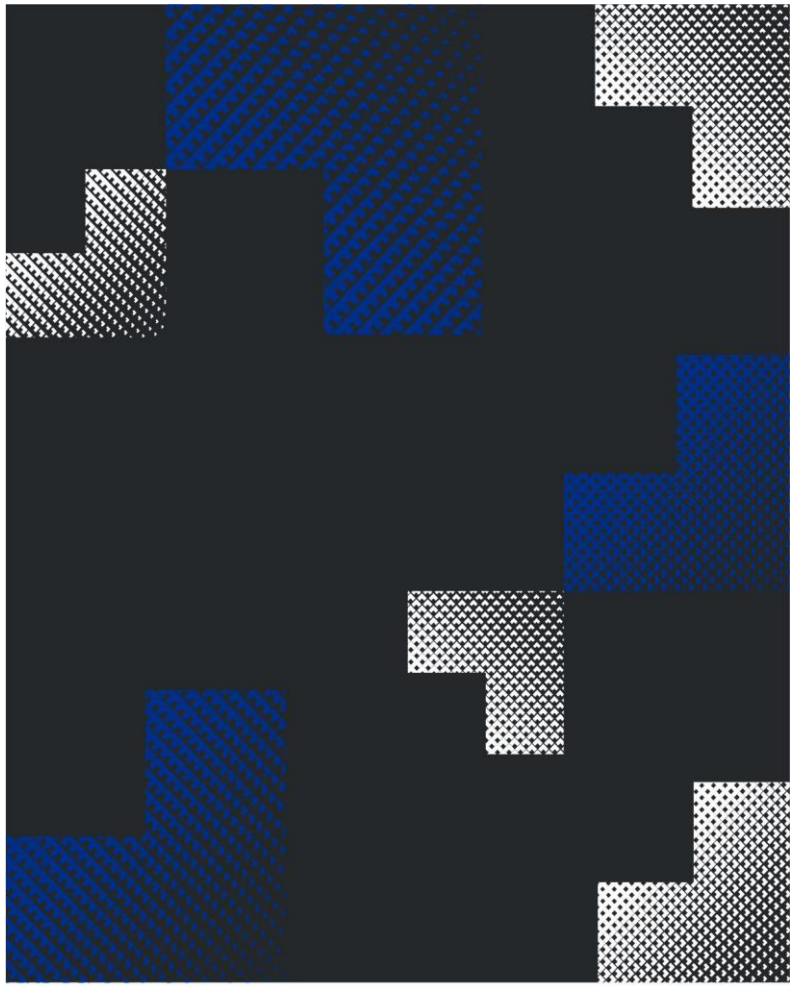



# Regulatory Issues

NTC has developed a framework

Australian Design Rule exemptions

Australian Consumer protection



National Transport Commission

# Shaping the Future of Mobility

# Questions

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