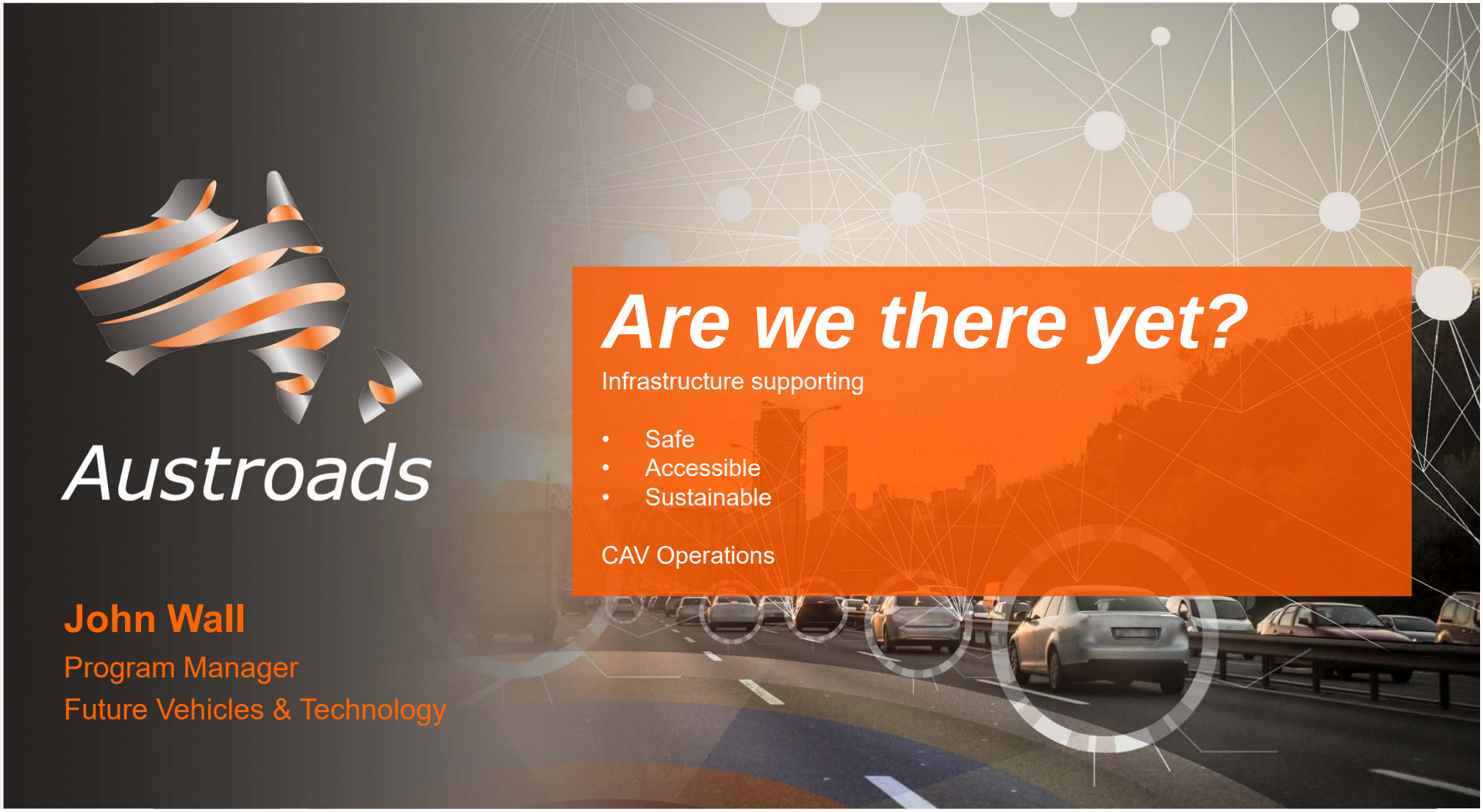
Austroads
Are we there yet?
Infrastructure supporting
• Safe
• Accessible
• Sustainable
CAV Operations
John Wall
Program Manager
Future Vehicles & Technology

Who is Austroads?

- Peak organisation of Australasian road transport and traffic agencies.
- 900,000 kilometres of roads valued at more than $250 billion
- The single largest community asset in Australia and New Zealand.

Future Vehicles & Technology Program

Austroads

Vision

All employees of our members have an understanding of how future vehicles can be used to improve the capacity of their organisation to deliver services that improve the lives of the communities they serve.

Driverless cars – Are we there yet?

https://youtu.be/KEk4sXUsjj8

Driverless cars – Are we there yet?

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The Automated Vehicle Promise

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Automated Vehicles

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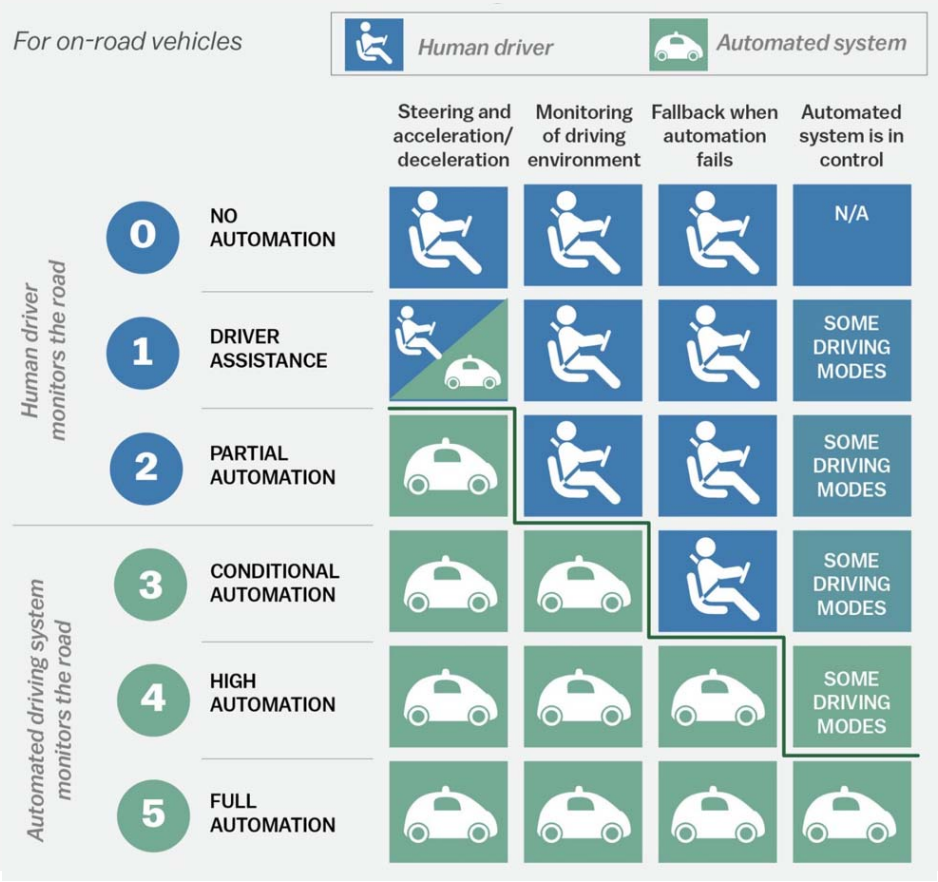

Automated Vehicles – SAE Level 0

Automated Vehicles – SAE Level 1

Automated Vehicles – SAE Level 2

Automated Vehicles – SAE Level 3

Automated Vehicles – SAE Level 4

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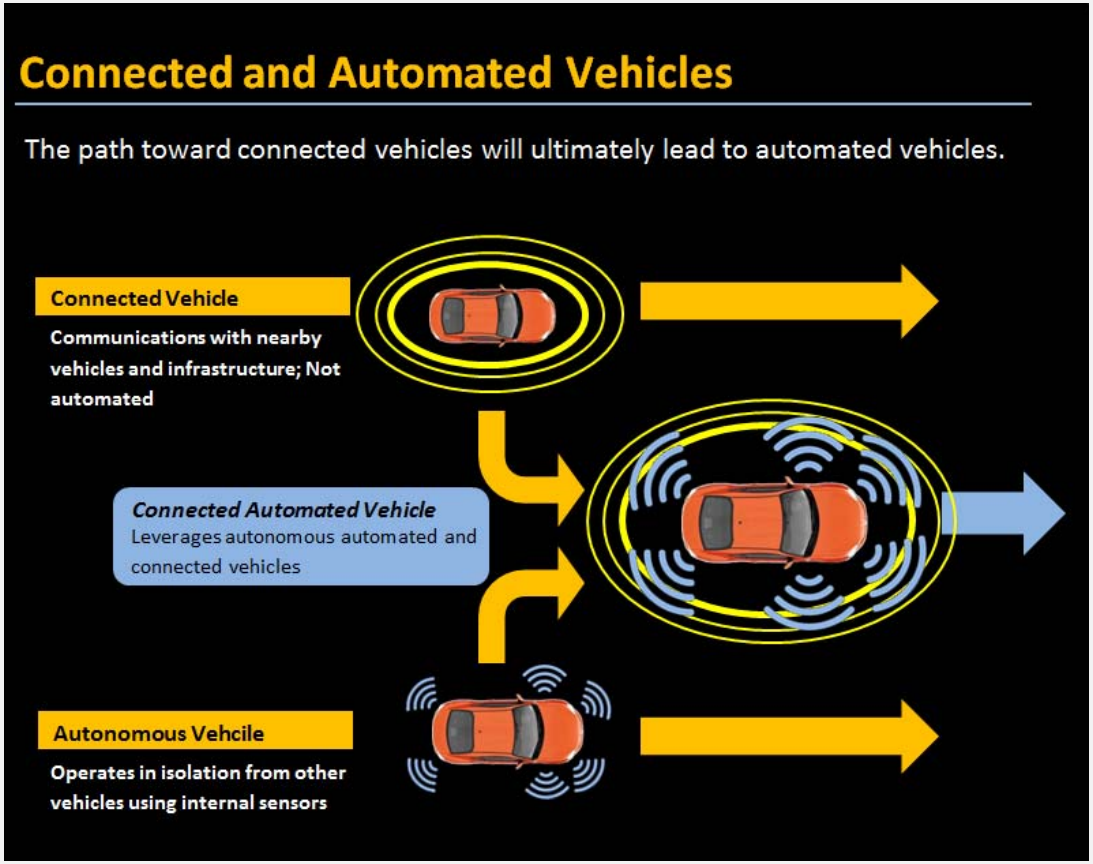
What is a CAV?



Source: TfNSW

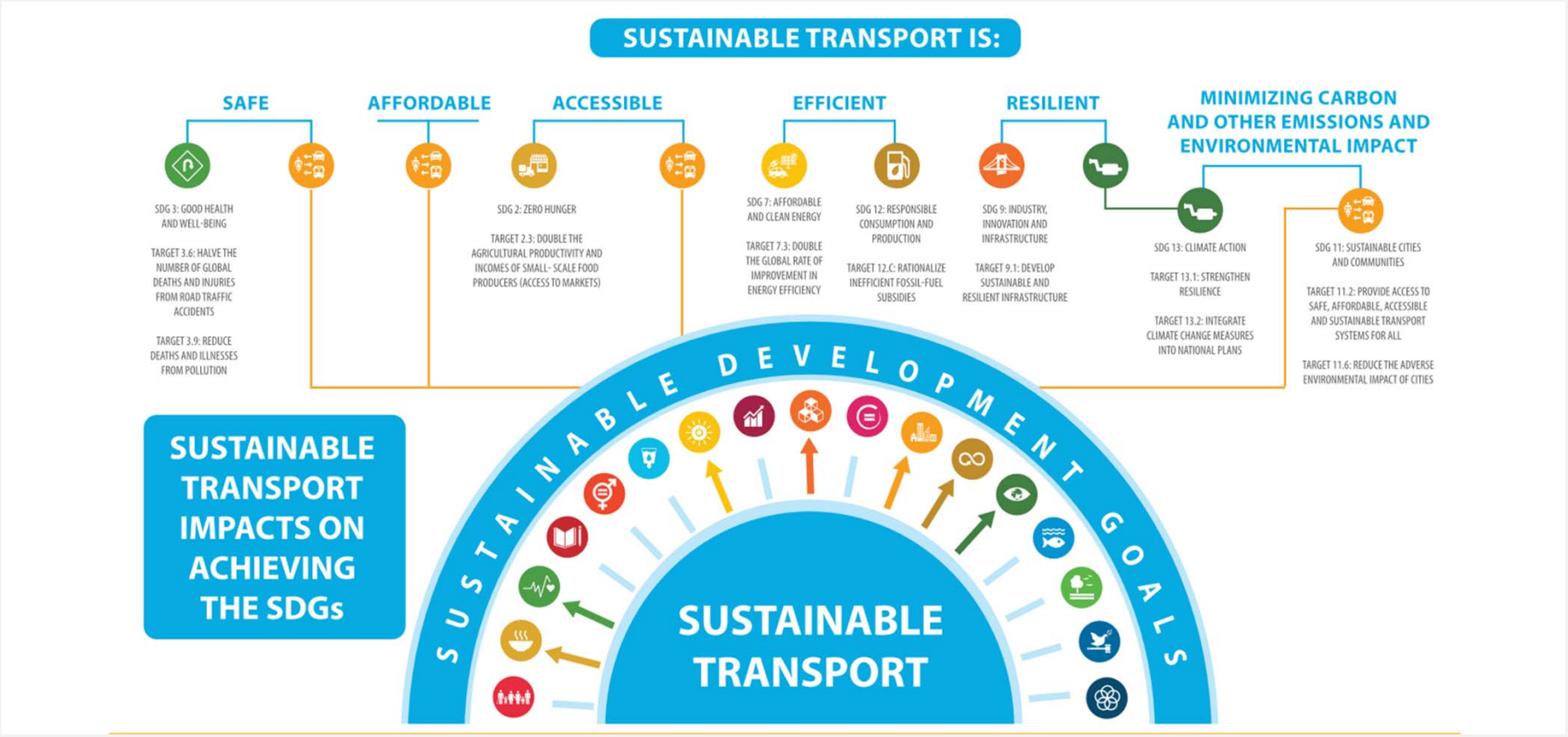
United Nations Sustainability Goals

Austroads

Source: www.un.org

Sustainable transport

Austroads



Infrastructure supporting safety

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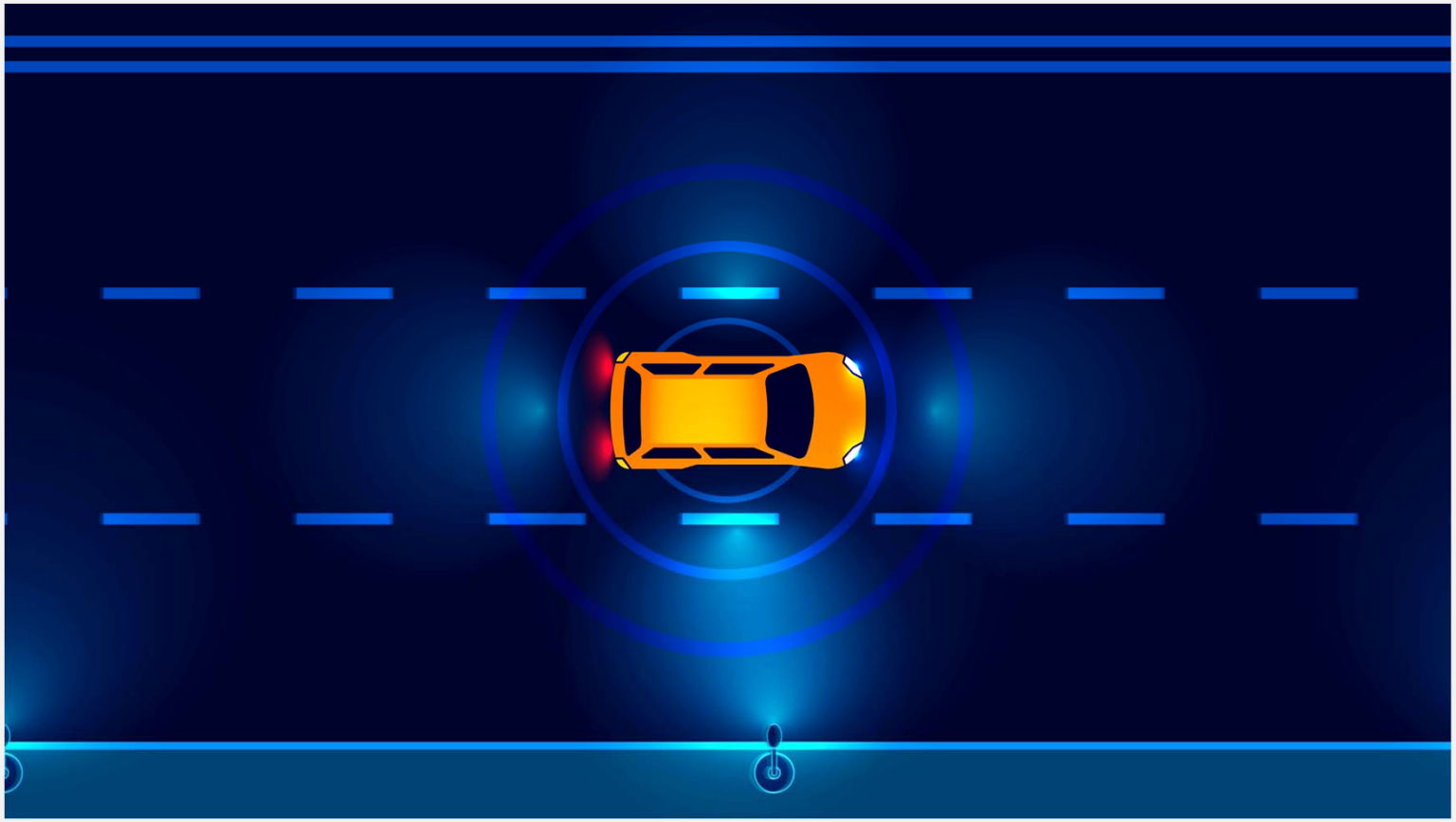

How safe is safe enough?

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As safe as a human driver?

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Safer than a human driver?

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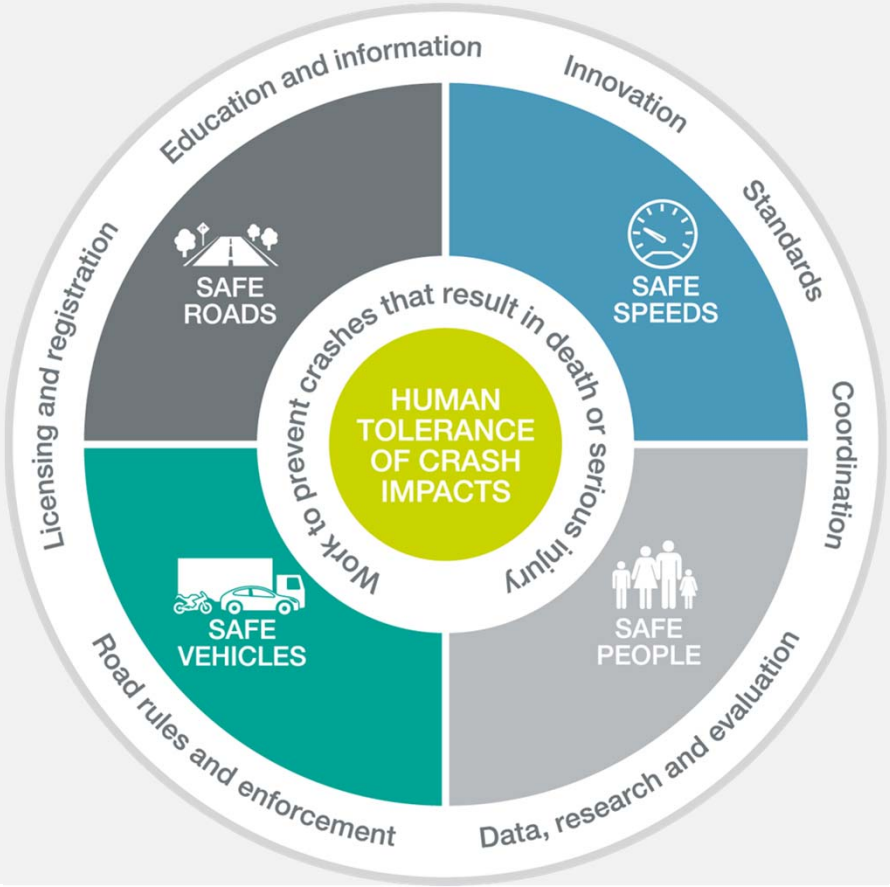
Must operate within a safe system



Infrastructure supporting lower carbon emissions

Infrastructure supporting affordability & accessibility

Austroads

Infrastructure supporting affordability & accessibility

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Current Research Projects

Austroads Project	Number
Automated vehicle / infrastructure requirements on rural and metropolitan freeways and highways	FSP6088
Automated steering functions	FPI6119
Assessment of Key Road Operator Actions to Support Electric Vehicles	FLI6171
Road Authority Data for Connected & Automated Vehicles	FDI6216
Vehicles and Technology Future State 2030	FCA6239

Dxvwudgv

FSP 6088

Infrastructure changes to support Avs on rural & metropolitan highways & freeways

Infrastructure requirements for a highway or freeway to be ready for AVs

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- For *active safety systems* key infrastructure attributes included:
  - Line marking – including interest in line types, line quality, curve radius
  - Traffic signs – position as well as types
- For *automated driving* the key attributes include those for *active safety systems* plus additionally:
  - Availability of high definition mapping;
  - Availability of continuous data connectivity (particularly cellular networks)

Classifying Infrastructure Suitability

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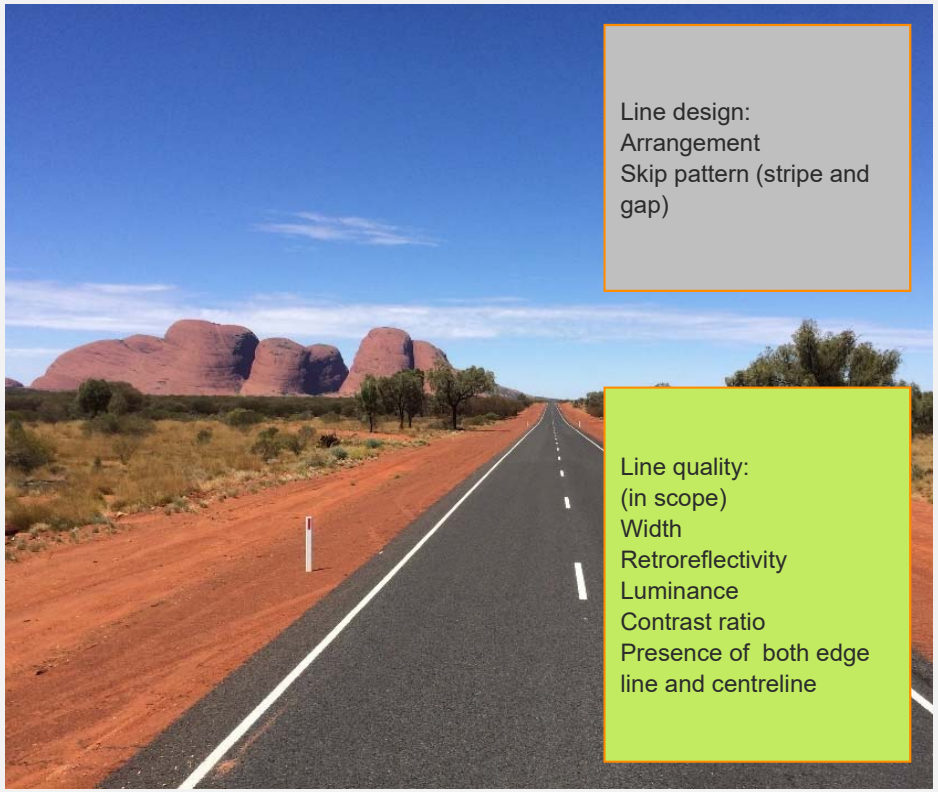
Unlikely to be suitable	Lower threshold value	May be suitable	Upper threshold value	Very likely to be suitable

Focus on quality not design

Sign design:
Layout
Content
Placement (relative to road)

Sign quality:
(in scope)
Retroreflectivity
Degradation
Obscuration
Size



Line design:
Arrangement
Skip pattern (stripe and gap)

Line quality:
(in scope)
Width
Retroreflectivity
Luminance
Contrast ratio
Presence of both edge line and centreline

How ready are Australian and NZ roads?

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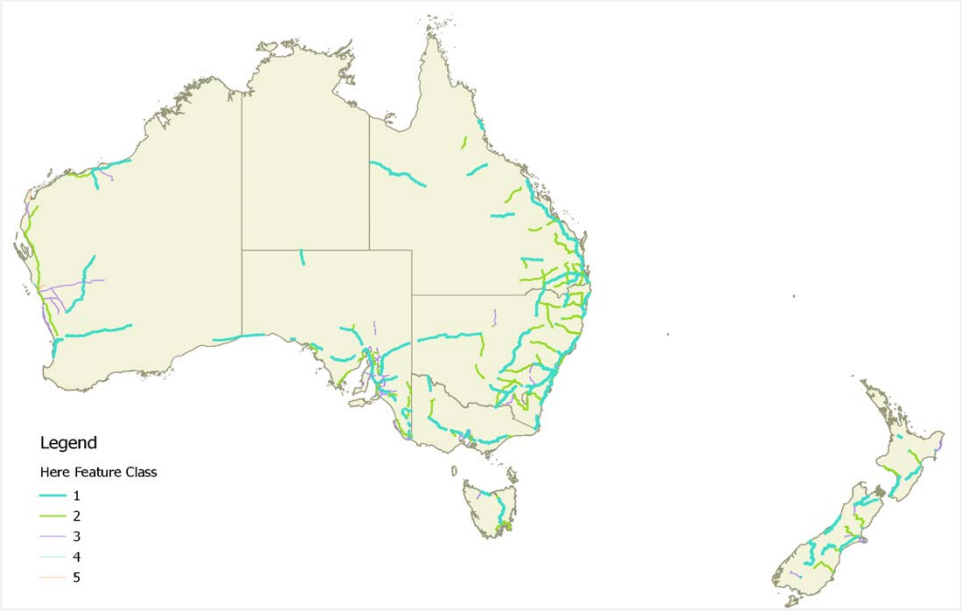
Field Audit

Map links (lines)	Total lines assessed	Total signs assessed	Total survey (km)
90,216	8,442,006	8,354	25,106



Line marking results (post processing)

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Jurisdiction	No. links	Length (km)	No. lines	Percentage of lines					
				High contrast	Medium contrast	Low contrast	High width	Medium width	Low width
Australian Capital Territory	231	31	11,640	2%	81%	17%	58%	42%	0%
New South Wales	27,633	6,591	1,924,377	2%	18%	80%	61%	39%	0%
Queensland	21,484	4,854	1,478,899	0%	14%	86%	67%	33%	0%
South Australia	14,457	4,379	2,388,082	7%	88%	5%	67%	33%	0%
Tasmania	3,703	561	165,276	0%	9%	91%	64%	36%	0%
Victoria	10,730	1,584	506,998	2%	86%	12%	59%	41%	0%
Western Australia	5,853	4,920	1,349,483	0%	51%	49%	67%	34%	0%
NZ	8,074	2,313	696,210	0%	6%	94%	61%	39%	0%

Line marking results (real time processing)

Austroads

Functional class	No. links	Length (km)	No. lines	Percentage of lines						
				High quality	Medium quality	Low quality	High width	Medium width	Low width	Missing lines
1 (high)	2,853	580	1,057,637	97%	3%	0%	28%	69%	3%	1%
2	1,957	207	411,668	88%	11%	1%	25%	67%	8%	7%
3	3,371	352	690,616	78%	20%	2%	9%	71%	20%	15%
4	385	28	72,897	73%	25%	2%	9%	73%	19%	23%
5 (low)	180	18	20,454	48%	45%	7%	24%	40%	39%	76%

Operability of lane departure warning

Austroads

Functional class	No. links	Length (km)	Lane Departure Warning (LDW) function was available
1 (high)	2,853	580	98% of the distance surveyed
2	1,957	207	90%
3	3,371	352	77%
4	385	28	66%
5 (low)	180	18	12%

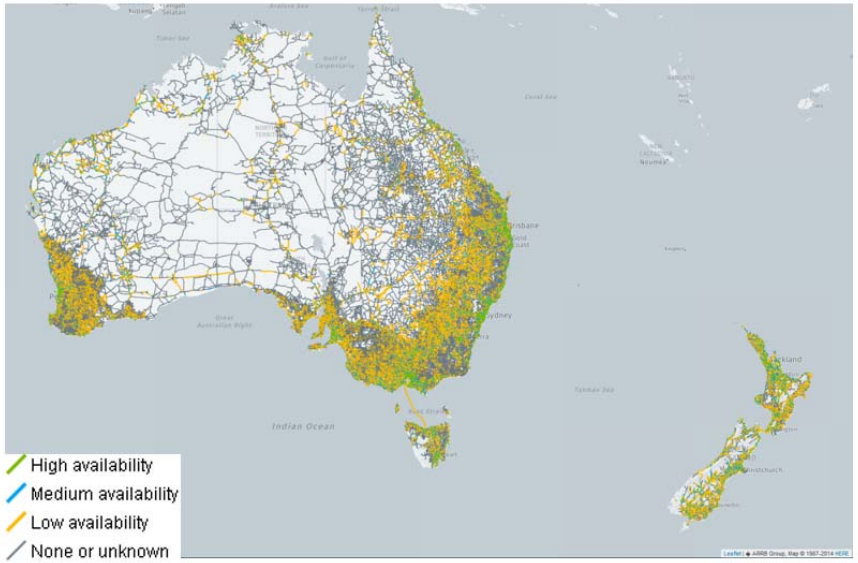
Audit findings for road signs (manual survey)

Austroads

	Percentage of signs					
Jurisdiction	**Readable**	**Not obstructed**	**Expected position**	**High condition**	**Medium condition**	**Low condition**
Australian Capital Territory	100%	84%	100.0%	95%	5%	0%
New South Wales	99%	98%	99.9%	98%	1%	1%
Queensland	97%	93%	99.9%	93%	1%	6%
South Australia	100%	99%	99.7%	99%	1%	0%
Tasmania	96%	94%	99.5%	94%	1%	6%
Victoria	100%	98%	99.9%	98%	2%	0%
Western Australia	100%	98%	100%	99%	0%	1%
NZ	95%	97%	100%	97%	3%	0%

Other attributes investigated

- Availability of High Definition Maps
- Availability of mobile data networks
- Frequency of temporary condition
  - Accidents and disabled vehicles
  - Construction (and maintenance) road works
  - Planned events and other disruptions
  - Road hazards and lane and road closures



Note: grey lines represent both where there is no recorded signal and where roads were not surveyed.

- Opportunities for new data sources for asset management

Preliminary findings

- There is a reasonable but not universal level of readiness for *active safety systems*
- It is more challenging to achieve readiness for *automated driving* and fewer roads are fully suitable for this.

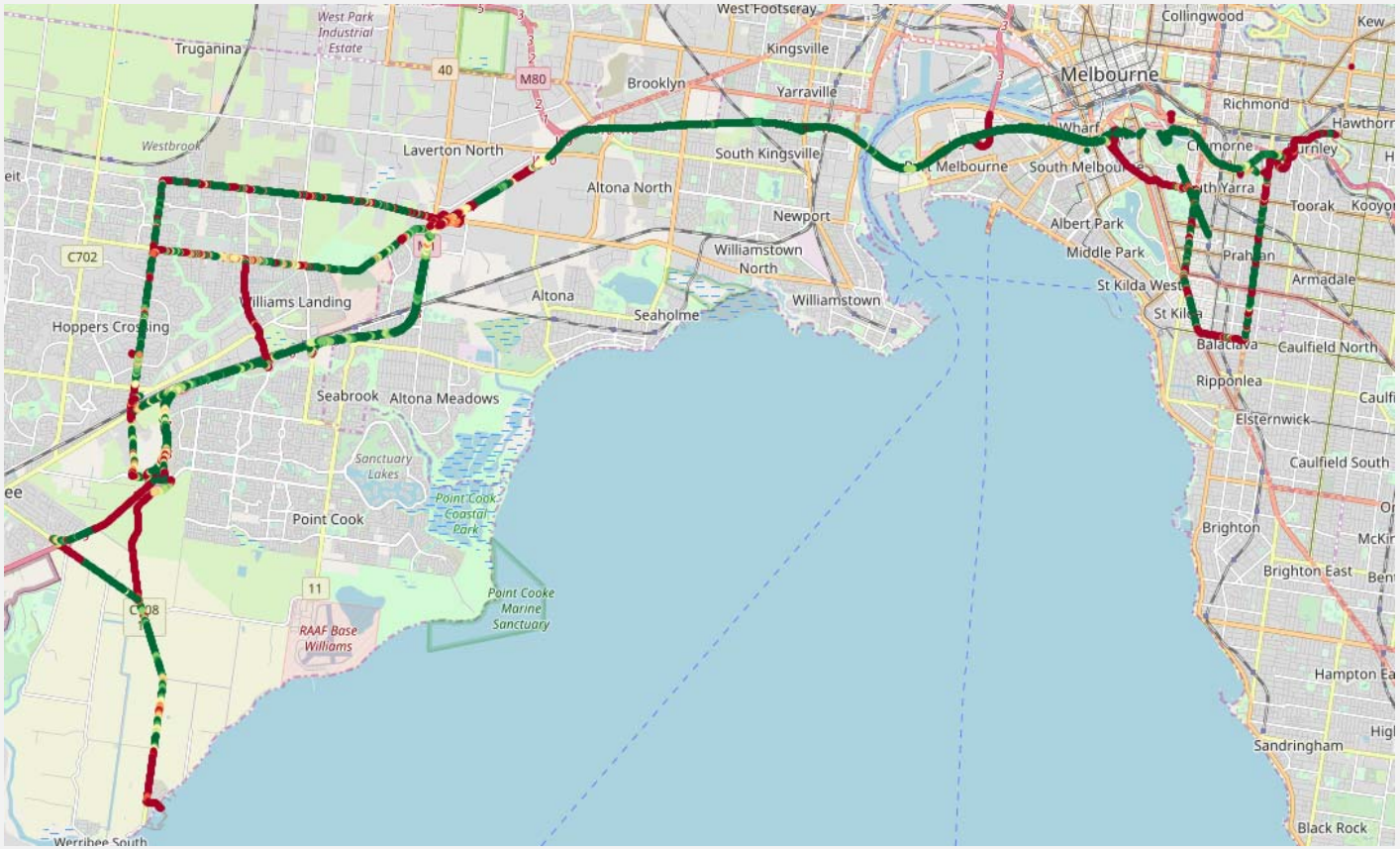
Dxvwudgv

FSP 6119

Automated Steering Functions

Automated Steering Functions

Austroads



Sample video representation

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New projects underway

1. RADCAV – Road Operator Data for CAVs
2. Future State 2030
3. Connected Vehicle Data Sandbox

Providing Dynamic Road Agency Data to CAVs

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The Research question:

- How should we provide road agency-owned data to map makers, CAVs and C-ITS devices?

Focus on dynamic data needs

Signal phase and timing

Incidents

Roadworks

Variable speed limits
&
lane use signals

Issues to investigate

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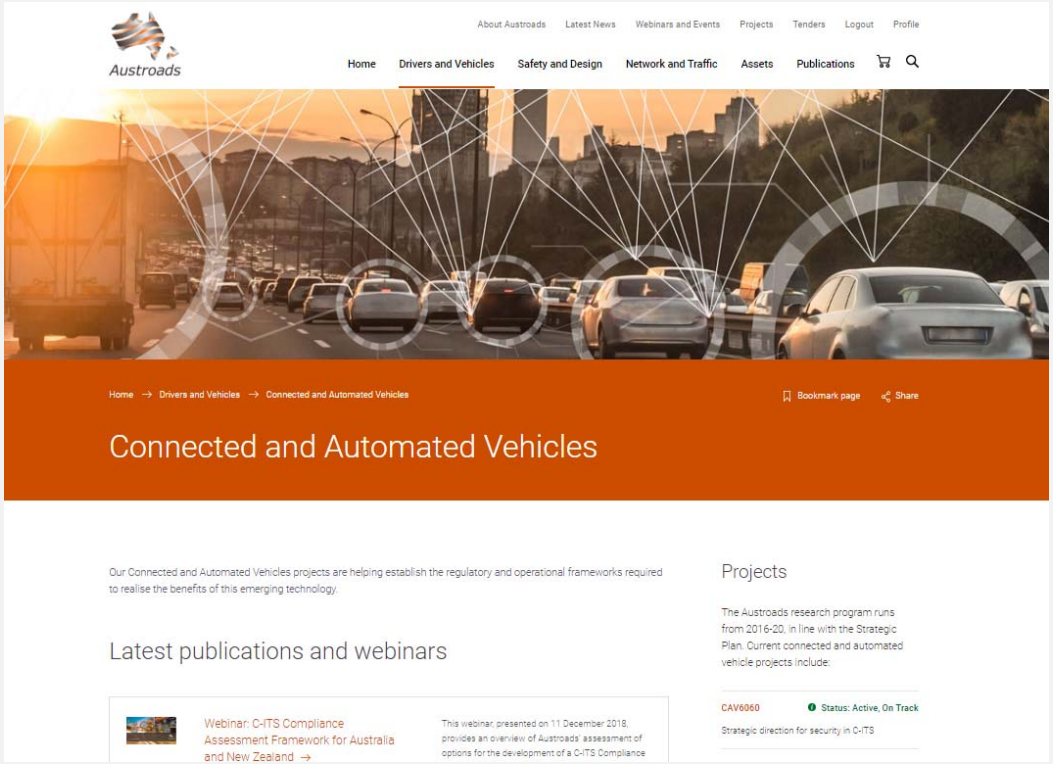
- Business perspectives:
  - Providing awareness of events and devices (incidents and roadworks)
  - Road work practice standards
  - Jurisdictional consistency across Australia
  - Organisation capabilities
- Technical perspectives:
  - Data quality (availability, completeness and consistency)
  - Technical standards
  - Systems architecture
  - Sharing across Australia
- **Cost impacts of implementation**

Australian FVaT activities and research at austroads.com.au



Program Overview →

Austroads' Connected and Automated Vehicles program is working closely with key government and industry stakeholders to establish the frameworks to support the introduction of vehicles with increased level of wireless connectivity and automated driving capability .

Trials →

This map indicates where connected and automated vehicle trials are taking place and are planned in Australia and New Zealand.

Projects →

Link to Austroads' Connected and Automated Vehicle projects.

The map above indicates where connected and automated vehicle trials are taking place and are planned in Australia and New Zealand.

Thank you

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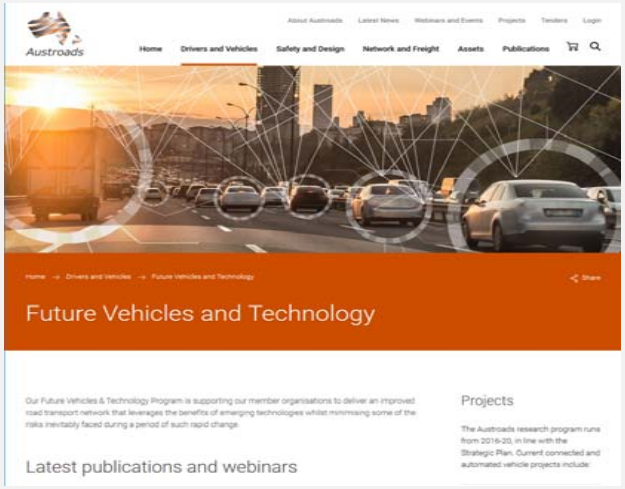

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