

Webinar
1 of 6



ADVI Hypothetical Webinar Series

Infrastructure Preparedness for Connected and Automated Vehicles and Electric Vehicles

15 June 2018 11:30am

[CLICK HERE TO BOOK YOUR SEAT](#)

Panelists



Infrastructure & Construction

Michael Caltabiano
ARRB



Regulatory Infrastructure

Brian Haratsis
MacroPlan Dimasi



Electrical Infrastructure

Carola Jonas
Every Pty Ltd



Connected Infrastructure

Dean Economou
Telstra



Source: Cities must adapt to autonomous Vehicles, GCN

This document provides an overview of the topic to be discussed with the ADVI Hypothetical Webinar on Infrastructure Preparedness for Connected and Automated Vehicles and Electric Vehicles. This forms part of a series of hypothetical webinars which ADVI are developing.

Objective

To challenge the status quo of infrastructure planning by providing thought leadership around how infrastructure must be considered and planned to be most productive as part of the Connected and Automated Vehicle (CAV) future. New objectives for transport infrastructure are:



Reduce costs of mobility



Increase productivity



Increase equitable access to employment

Source: Cities must adapt to autonomous Vehicles, GCN

Key questions which need to be asked to answer these concerns are: are we building the right infrastructure? Are we allowing for, and thinking of, our future demands? How will the broader system will be entwined? Can governments keep up? Should they try to keep up? What guidance will be provided for infrastructure planners and builders?

Overview

Whether wide-spread adoption of self-driving vehicles is two years or 20 years, there is a critical need to start preparing for them to be on our roads. Because transport infrastructure generally has a long lifespan it is important to take the anticipated future needs of self-driving vehicles cars into consideration. Change is currently underway across three key areas of transport, namely: electrification of cars, automation of vehicles,

and mobility sharing, and while CAV's are the focus of this discussion, the progression of these three revolutions are tightly linked. Communications networks, recharging stations, pick up and drop off points will all play into our evolving expectations of transport infrastructure.

This paper refers to CAVs and Electric Vehicles (EVs). When referring to EVs, this is the current market electric vehicles, which may include autonomous features, but still require the full attention of a human driver.

CAV infrastructure extends beyond traditional roads and transport infrastructure because it requires connectivity and redundancy, and can also complement Mobility as a Service (MaaS). There are several regulatory elements which underpin infrastructure, and inform how all infrastructure interacts with each other and land use, how it interacts with people and the environment. Consideration also needs to be given to what adjustments need to be made to infrastructure regulatory regimes to ensure a smooth transition to CAVs. CAV infrastructure also impacts the energy sector, potentially increasing Australia's dependence on fossil fuel energy or encouraging the wide-spread adoption of renewable energies.

Australia is predicted to be a fast adopter of autonomous vehicle related technology due to its cultural reliance of private motor vehicles, particularly in capital cities. This means that there is potential to build Australia-specific infrastructure and maximise the benefits of emerging technology.

Government agencies, as the key builders of our road networks, have perhaps the most important role in this planning, and must engage with stakeholders at all levels. These issues need to be explored through the lens of all levels of government, Local, State, Territory and Commonwealth, as well as regulatory bodies and relevant agencies.

As we head towards the introduction of CAVs on the road network, the question needs to be asked which agency will regulate, control and ultimately be responsible for operations and maintenance of all eventual infrastructures?

Core Questions

Are our current infrastructure plans considering impending technology and mobility changes?

There are four main categories into which technologies required for CAVs loosely fit, these are: Physical, Digital, Operational and Regulatory.

Physical refers to the basic infrastructure required for the operation of CAVS, this includes well-maintained line-markings, curb-side line-markings, consistent and clear signage, wireless communication of signage and conditions, and power generation and dissemination. Power generation, and how this power is disseminated to the public (i.e. through power lines) is of key importance in the introduction of CAVs, high quality 5G, GIS and ‘canyon effect’ etc. This is because the ability to power the supporting infrastructure will be the first step in implementing it. If CAVs are electric, infrastructure to support charging them will also be needed, so consideration will need to be made about whether wired or wireless charging stations are utilised, and the equitable dissemination of these charging stations for the public.

Wired Charging Station



Source: thereminder.com/localnews/

Wireless Charging Station



Source: news.com.au/technology/electric-car-is-going-wireless

Another key issue in regards to physical infrastructure is aesthetics. There are a number of cases where the community has seen the erection of large network towers as being visual pollution, this can be combated through the use of re-classifying and re-purposing existing infrastructure to enable multi-functional use.

Digital refers to the behind the scenes requirements for CAVS, and the supporting infrastructure needed for them to operate effectively. This includes rapid V2I and V2V connections, high-definition digital maps, dynamic information availability (such as speed, roadworks/accidents, lane closures) available to vehicles, digital implementation of road rules and cross-border differences, encrypted connections, and data collection.

Operational refers to the way infrastructure needs to be operated in order to make the implementation of CAVs successful. This can include reserving lanes, roads or even periods of time for self-driving cars, adjustment of road rules to fit CAV quirks, changes to driver training programs, and provision of safe-stop zones for system failures due to weather, unexpected events, and human interaction. ‘Operational’ also refers to the operations of support power generation infrastructure, such as ensuring charging stations are well-maintained.

Urban and rural areas will have different infrastructure requirements and operations of infrastructure. Vehicle usage, turnover, and communications network coverage varies greatly between urban and rural areas – so how will rural areas be considered with the introduction of CAVs? In addition, well-maintained, self-healing or segmented networks will be vital in rural areas to ensure constant connectivity.

Regulatory refers to the government elements that tie everything together to ensure a mobility user enjoys a seamless journey. The community want confidence that everything is interlinked, safe and there is accountability should any issues arise. The role of government is providing that confidence.

Are there any other physical, digital, operational or regulatory aspects of infrastructure that need to be considered? For example, is it possible to have a device retrofitted to current vehicles in order to provide automation?

Transport plans for urban and rural areas developed over the past decade will be redundant based on their lack of consideration for CAVs.

Should these plans start to consider the impact of AVs now – even if wide-spread introduction is still several years away?

Impending changes to mobility and technology will either hinder or assist the introduction of CAVS. There are currently undeveloped technologies which will require consideration, such as 5G connectivity and V2V connectivity, to allow for CAVs to operate successfully and efficiently. Changes to mobility including increased



use of ride-sharing, car-sharing, and shuttle busses, as well as an overall shift towards Mobility-as-a-Service platforms, rather than personal ownership of a vehicle, will impact the public use of CAVs.

Current infrastructure plans in Australia, which may be affected by, or may affect the introduction of CAVs include:

- Infrastructure Australia’s Australian Infrastructure Plan;
- State government plans such as Infrastructure Victoria’s 30 Year Plan, Infrastructure NSW’s 2018 Strategy, and Transport NSW’s Future Transport Strategy 2056; and
- Plans for current or planned infrastructure projects.

International experience also suggests that an unmanaged introduction of carshare and rideshare transport options can significantly reduce public transport patronage and increasing traffic congestion.

Is this a future we want? Is there community acceptance of networks as infrastructure? Is it a user pays model? Join our third webinar to engage in detail around what will mobility pricing in the future look like.

Should infrastructure be upgraded to suit AV technology, or should we wait and have the technology adapt to the infrastructure? Should we sweat the current infrastructure more before we invest again?

There are several considerations that need to be made for each piece of infrastructure. These include: absolute age, magnitude of investment, alignment with CAV requirements, consequences of inaction, cost to upgrade/modify without replacement, and the current outcome/success of the infrastructure. A retro-fitting option for current vehicle stock could enable a more equitable scenario. This means those from lower socio-economic areas or from rural communities will not be isolated from the influx of the new technology.

How will new infrastructure be funded, and what are the contrasting implications of more public or private funding?

Public funding could be achieved through a variety of options. A switch to a driving-based tax model, rather than a petrol-consumption model will be necessary to accommodate the increased percentage of non-CAV vehicles on the market, but also provides potential for increased funding by bringing those vehicles into the taxable pool. Another benefit beyond the scope of this

discussion is more efficient pricing of driving which could more clearly incentivise drivers to avoid peak hour traffic, switch to alternative transport modes, and provide a platform for incentivising safer CAVs over human-driven vehicles, again providing funding.

Private funding is likely to come from two key actors: private road operators and vehicle operators. Private road operators will want to facilitate increased usage, and generate increased toll revenue, will implement the infrastructure regardless of whether policy-makers get involved. Vehicle operators can be expected to set up proprietary infrastructure for their own vehicle ecosystems, much like Tesla's electric vehicle charging network in the EV market, or private shuttle bus operators and Uber in the mobility market.

Is a pay for what you use model the best option for Australia once CAVs are introduced?

Should platform infrastructure be unregulated?

Concerns

Community acceptance and public opinion are major barriers to the successful implementation of CAVs and their supporting infrastructure.

One core issue to be addressed is how the infrastructure needed is to be funded. While this could be through a change in the taxing model, going from a fuel excise tax to a per kilometre charge would generate much debate. Australians may have to pay more, especially those who regularly commute long distances. There is the potential for lower socio-economic Australians to be paying more if petrol vehicles or non-CAVs are taxed at a higher rate to disincentivise them, likely to result in a declined value of used non-CAVs due to their outdated technology. If fuel excise needs to be replaced or roads need to be rationed what is the best and most equitable policy framework?

Another issue likely to spark community interest is the reserving of roads, lanes or times exclusively for CAVs. This could generate a perception in the community that there is a system where the wealthy, who can afford self-driving cars, operate in a 'fast-lane' through traffic, and subsequent relegation of normal people to second-class 'regular' lanes. Kerb space and road space will become highly sought after competitive and contested spaces. How will this be managed to ensure ongoing community harmony?

In addition, a key user of road infrastructure, and likely CAVs, is the freight industry. Will the introduction of CAVs increase the cost of goods, due to the cost of the technology and supporting infrastructure?

There will be a need to regulate new technologies, but, which national standard will the new technologies sit

within? For example, State-Based regulations, such as registration, may stifle national efforts towards road safety.

Lastly, it is reasonable to expect the public to be concerned about how CAVs will interact with other road users. The public may perceive CAVs as less safe than having a human driver, amid concerns that they may not be able to respond to situational changes if they aren't programmed for them. CAVs could be viewed as being unpredictable and unable to communicate with human drivers when there is still a mix of both on the roads. Infrastructure - such as smart roads - will need to be in place to assess surrounding conditions and relay that information back to the vehicle. Where would such a national standard exist that encompass these new technologies and how will the state-based systems impact on them?

Vision for Resolution

The introduction of motor vehicles has led to increasing complex road and traffic control infrastructure over the course of time. CAVs will cross over with public transport in functionality, with low levels of bus efficiency and effectiveness in Australia impacting public transport networks.

There can be no doubt that CAVs require a new approach to infrastructure. It is logical to assume that the first step is to begin to specify infrastructure requirements needed to make that happen safely.

Call for Action

ADVI aims to accelerate the safe and successful introduction of driverless vehicles to Australia. This is a call for action if this is an issue you are passionate about. Join us for our webinar, and get involved.

This is the first in a series leading up to the ADVI Summit in November.

Upcoming webinars

Implications for urban/ land-use planning, city building...	July
Economic: changing revenue streams for govt & mobility pricing	August
Insurance implications	August
Barriers to take-up and the benefits	September
Mobility as a Service (MaaS)	October



advi.org.au

Follow us

