

## *Hypothetical Thought Starter:* **Urban Planning and Land Use for Connected and Automated Vehicles**

### **Objective**

The objective of this paper is to raise public awareness and engage thought leaders to identify paths forward and potential barriers/risks, and to encourage discussion on a new policy mix to reshape cities.



Source:

[urbds.com](http://urbds.com)

### **Overview**

To set the scene, imagine a future where:

- By 2023, we have achieved Level 4 vehicle autonomy;
- By 2025, Level 5 taxibots will be operational on a limited basis;
- By 2025, online/on-demand activity will account for 25% of retail 'sales + last mile', delivery will be cost free;
- By 2030, Mobility as a Service (MaaS) will dominate personal travel choices; and
- By 2030, Level 5 vehicle autonomy will have radically changed journey to work patterns and car parking.

The key objective for city planning should be diverse mobility. This is defined as access to mobility options that maximise effectiveness in terms of cost, time, network impacts, social (health) outcomes and environmental outcomes.

How will cities need to change and adapt to support this future? When you imagine this future, what does the city look like?

The first step in ensuring that cities adapt to the introduction of Connected and Automated Vehicles (CAVs) is for government to develop and adopt strategies for urban planning and mobility planning that includes CAVs, bearing in mind that roads will be important real estate for many businesses.

Urban planning, much like infrastructure, is often a permanent investment in the life of our cities' urban fabric. As a profession it has a history of generally assuming that the technology of tomorrow (5, 10 or 20 years from now) will be much the same as that of today, and throughout the 20<sup>th</sup> and early 21<sup>st</sup> centuries this has been true. Consideration was given to changing land use patterns, growth in demand, and increasing costs of transport, but now we are on the cusp of the introduction of a paradigm shifting technology: CAVs.

With CAVs and their obvious benefits (work while you commute, improved commute times etc.) the threat of thousands more commuters choosing to drive/be driven to work is a realistic future. In parallel, designing to incentivise active transport in response to the case of AV use becomes critical. Ensuring that our urban design facilitates mobility solutions for all people, rather than just ownership for the elite few who can afford it, must be a priority. From a design perspective, what happens to carparks if vehicles are constantly in motion and not parking? Should retail centre carparks be repurposed? How does design facilitate integration of AV and public transport use? Does more street parking need to be reserved for drop offs? Much of our public space - as much as 80% - is currently dedicated to roads, and perhaps this needs to be reconsidered if a mix of transport options, as in Mobility as a Service (MaaS), becomes the dominant option.

## **Core Questions**

***How do we ensure that the transport focus is on mobility (efficient movement of people + freight), rather than private vehicles?***

It is critical for the discussion about urban design considerations for CAVs to focus on mobility rather than cars and acknowledge concepts such as car-sharing, ride-sharing, fractional ownership, MaaS, and last-mile connections. Current preoccupations with 100% ownership of vehicles will lead to an unsustainable demand for CAVs, due to their inherent advantages in mitigating the unpleasant side of traffic and driving. The mobility platforms, systems, and use-cases must be developed and marketed to the public as the technology is introduced because it will influence current vehicle ownership and private motor vehicle transport behaviours in Australia. Disincentives may need to be applied to 100% car ownership, and/or incentives for mobility-focused solutions. Integration of CAVs and Public Transport (PT) will enable PT to be

a significantly more efficient and reduce demand for private ownership of cars. This will also alleviate concerns about CAVs contributing to higher levels of congestion.

***Should land use shape transport / mobility options or is it the other way around?***

Some analysts argue that land-use is currently the dominant force influencing Australian cities such as Melbourne and Sydney, where mobility at the fringes is limited to private vehicles due to the inability of infrastructure development to keep up with the rapid geographic expansion.

Can CAVs dictate land-use by providing a mobility solution that can be applied throughout all regions and our current urban environments?

CAVs might encourage cross-town mobility that was previously discouraged due to ‘hub and spoke-style’ or radial transport systems (roads, trains, trams etc.) that focus mobility to city centres. This could influence land use to shift from residential to commercial in new outer-city business and industrial hubs. Road duplications and expansions may not be necessary if CAVs are able to travel closer together and in synchronicity – especially if sharing becomes a dominant trend. However, for 2020 to 2030 a mixed fleet is likely to predominate, potentially with 20% more vehicles on the road above trend congestion forecasts. Technology can drive a reduction in land use for roads, but when does design begin to influence urban outcomes?

In addition, CAVs will provide a safer environment for active transport (cycling, walking) due to reduced crash risk. The outcome of that mobility shift could see increased demand for supporting infrastructure such as bike lanes, bike paths and secure bike storage.

***Will cities spatial structure or urban design fundamentally alter?***

The common structure of cities in Australia is to have a central CBD, with uniformly decreasing density outwards. With the introduction of CAVs this may be altered through the emergence of satellite business, freight and logistics and industrial hubs, suburban activity centres, or the development of ‘edge’ or ‘inside out cities’ because commuting can occur from peri-urban locations up to twice the current commuting distance.

Automation will eventually overtake operator driving for cars, trains, buses, and trucks. This will affect the mobility patterns of not only passenger transport, but also freight movement. This is a major driver for new intermodal terminals – particularly on the fringe of Sydney, Brisbane and Melbourne.

At a local level when we move into a ride-sharing or car-sharing model, rather than private vehicle ownership, supply of on-street and off-street car parking could exceed demand. Therefore, these spaces will need to be reconsidered as drop-off zones, gardens or social spaces. Dwellings can be designed without garages and driveways.

### ***Will individuals live, work, and socialise differently?***

Residential housing locational decisions will alter as more people opt to live further from the CBD and other work locations due to vastly improved mobility from CAVs. Work commutes may become part of work time. Commutes across cities to reach non-CBD business and industrial hubs may also become more likely, allowing denser housing to develop around those areas. Living in the CBD may become less attractive, as commuting becomes more palatable and people seek the space and privacy of lower density living.

Social hubs may also begin to engage outside the CBD, as the entertainment precincts follow the flow of professional precincts towards satellite industrial and business hubs. Collective socialising at large events such as sports and music festivals won't be restricted by parking space and traffic, allowing larger attendances at many locations.

Access to trunk infrastructure such as airports, ports and major railway stations will need to be replanned.

### ***How do we incentivise walking, active transport and fitness?***

Walking and active transport options provide a sustainable alternative to using private transportation. Networked, Copenhagen-style bicycle paths will be essential to counterbalance increased demand for AV work trips and the limited potential for modal shift to public transport due to capacity constraints. In addition, walking and active transport encourages improvement in fitness and overall health of the population. Increasing health of the population also improves productivity, social interaction and supports overall economic growth. Motivation for the use of alternate active transportation methods can be achieved through promotion and education programs (such as media advertisements), or through price incentives (such as putting a cost on parking to encourage people to walk to the railway station).

## **Concerns**

There are several areas within the interaction of CAVs with urban planning that are likely to require management of public opinion, particularly the interaction between CAVs and the road, encouraging people to rely on public transport systems, and encouraging people to engage in active transport.

The interaction between CAVs and all types of roads has the potential to cause public concerns based on the fear that CAVs may not be as safe as human drivers on the belief that they cannot predict human behaviour as well as a fellow human can. People understand that CAVs will interact with human drivers and each other, but how will it work when there is a mix of both on the roads?

As urban growth continues, people live further away from the city - and rely on private transport options to access employment, goods and services at the city centre (largely due to lack of public transport infrastructure). In order to adapt urban design to a CAV future there is a need to move away from a demand-based model and provide appropriate urban planning and supporting infrastructure to these areas before people settle into a preferred transport option and lifestyle.

Lastly, discouraging private multiple car ownership will be a difficult barrier to overcome when integrating CAVs and MaaS into the future of cities. Owning a car is a socially-engrained value in Australia, it signifies personal independence and agency. Many Australian families own multiple cars because this is their only transport option for family members, goods and services. Any incentive and services offered as alternatives to owning a car must be attractive and palatable to car owners to reduce personal autonomous vehicle ownership and encourage diverse mobility outcomes.

## ***Vision for Resolution***

There are several key benefits to addressing urban planning challenges arising from the introduction of CAVs because it will lead to a more accessible, connected and liveable city. These include:

- Urban Planning – The need to start planning for the integration of AVs with public transport and active transport at a metropolitan level.
- Local government – In an era where connectivity equals opportunity, planning to promote and accommodate maximum mobility generates social and economic benefits for the local community.
- Special needs: Level 5 AVs (driverless vehicles) can assist in servicing the needs of the disabled and elderly.
- Access to opportunity – AVs will provide access to facilities in areas that are not covered adequately to the public transport networks.
- Productivity – AVs will allow workers to commute longer distances and continue to work while on the road.
- Fighting Congestion and increasing infrastructure efficiency – level 5 AV networks will be able to make more efficient use of current infrastructure than current and mixed AV fleets, increasing capacity on the road.

Moving from vehicle ownership to a diverse mobility ride-sharing or car-sharing model will require a new urban planning paradigm for Australian cities. This vision should evolve on a national basis to maximise innovation and creativity rather than for individual cities and regions which defeats the goal of widespread introduction of AVs

*'Vertical' Integration in city Design*



*Pedestrian Only Zones, New York City*



CAVs can lead to increased mobility for everyone in the community, particularly those at the lower socio-economic end who currently largely lack meaningful transport options due to low PT density, low net worth to afford a car, and lengthy driving or PT commute times. Outside of cities and towns much work needs to be done to include remote areas in a new vision for mobility and connectedness in city and regional planning.