Scenario planning: AEV and Urban Consolidation

Planners need to take account of a wide range of factors and possible outcomes as they think about the future. These factors can be affected by prevailing and emerging technology, political environment, planning constraints, community and societal needs as well as guidelines that inform the urban plan.

We have applied a simple scenario planning technique to develop four possible futures based on prevailing urban development trends. These possible futures can be used to develop plausible stories which address key policy issues around emerging technology and to test how different strategies and policy sets can deal with these possible futures.

We have developed these possible futures based on two strong urban development trends:

- the introduction of autonomous electric vehicles (AEVs); and
- the push for urban consolidation in the face of seemingly relentless urban expansion.
Trend 1 – Electric Vehicles and Vehicle Automation

Two trends in vehicle operation and control are evolving rapidly – autonomous control and electric propulsion. We anticipate that these two trends will come together over the coming decade and that Automated Electric Vehicles (AEVs) will become pervasive in our vehicle fleet.

Conservative forecasts show about half the vehicle fleet will be AEVs by 2040; more aggressive forecasts suggest that AEV take up will be much quicker. Within 15 years it is likely that all the fleet will have some autonomous features and most will have the capability to act fully autonomously.

For this discussion, we see two possible futures for AEVs based on different ownership models.

In the first model, cars are still owned by individuals and autonomous driving and electric power are treated as ‘features’ of the AEV in the same way as safety features like blind spot assist, assisted braking, and warning drivers when they are straying out of lanes.

The other is a shared-use future where AEVs are owned by a fleet operator, and users ‘pay-per-trip’ or subscribe to a travel service rather than owning a car.

Trend 2 – Urban Consolidation models

Recent forecasts by the Australian Bureau of Statistics (ABS) show Australia growing by 60% from today’s 23.3 million to 37 million in 2050. And most of that growth is slated for urban areas with Melbourne and Sydney predicted to reach 8 million by 2050.

Our cities are bulging as they accept new residents at an unprecedented rate. Whether they should continue to expand as they grow or instead densify within their existing footprints will increasingly define whether they are places where daily life requires significant travel or not.

The idea that people might be able to live their lives without routinely having to travel long distances aligns with a push for 10, 20 or 30-minute cities. Underpinning this approach is the idea that we could manage and develop our cities so that everyone can satisfy their basic daily needs close to where they live.

For the purposes of this discussion, we define two possible futures. The first is one wherein our cities continue to expand and new residents and people buying their first homes will find themselves on our urban peripheries, where long-distance travel, generally by car, is central to their life. The other future involves an active programme of densification within established areas, and development of our cities so that people can choose to undertake most of their daily activities close to where they live.
Scenario Development

Plotting these two trends gives us the following scenarios based in 2038.

**Scenario Descriptions**

Given the technology under consideration, the shift to AEVs will have significant **impacts** irrespective of the scenario.

**Individual ownership + urban expansion – the congested city**

This is the closest scenario to the world we are used to. In 2038, people will still own cars individually. Our metropolitan areas will have continued to develop along their historical trajectories and trip making will be largely as at present. Cities will have continued to expand and their centres and inner urban surrounds will continue to exert their magnetic attraction. AEVs will have been gradual substituting for our current vehicle fleets. The drivers behind the change will be simple – AEVs will be safer, cheaper and with lower emissions.

The minimum change case will see people continue to use their vehicles for the trips they make now. So, in the absence of regulatory choices to the contrary many people will continue to commute to central areas in their own vehicles, which will park themselves. Similarly, trips to activity centres will be effectively the same, except that vehicles will park themselves.

Conversely it is possible that after drop-off vehicles may return home, park themselves remotely, or circulate awaiting their occupant’s return trip. In this case, the presence of empty vehicles on roads has the potential to create significant congestion. Alternatively, existing carparks may be able to be re-purposed for higher value economic activity. The balance we choose will be an interesting one.

**Individual ownership + urban consolidation – the better city**

By 2038, substantial areas of our cities will have been redeveloped more intensively. This intensification will have followed defined public transport corridors, creating a network of community spines throughout the city that act as the focus of public life for people, as well as provide local services, shops, and other facilities for the community.

As in Congested City above, people will still largely own their own vehicles and drive them when required. However, the urban consolidation programme will have changed the travel dynamic and many people will able to satisfy their daily needs without needing to drive long distances or even drive at all.

The cost of the infill development that has driven this intensification may be lower than at present if parking policy changes to take advantage of AEVs being able to store remotely. Of course, policy may continue to point to the need for minimum parking provision, given the adverse traffic impacts of empty AEVs either travelling home to store or circulating awaiting the return trip of their occupants.
Intensification of land use along defined corridors will have supported the viability of the public transport services that run along them. While the way our cities will have developed will support shorter trips, line haul public transport will remain central to the health of our cities.

Local councils will have taken advantage of the substantially lower cost of driverless buses to provide local AEV public transport. Fleets of AEVs carrying one to 10 people will operate an Uber-like model within a defined local area. This will further reduce the need for people to drive their own cars.

Without careful management, the roads around the community spines may experience substantial traffic congestion.

**MaaS + urban expansion – the Legacy city**

By 2038, Mobility as a Service (MaaS) and other vehicle sharing models will have become established and will have overtaken individual car ownership as the dominant mobility model in our cities. Most travellers will either have a transport subscription or ‘buy’ transport as they need it, using an app which will provide trip options, across different modes with variable travel times and costs.

Almost all vehicle trips in this city will be made using shared-use vehicles; either serving single passengers or groups. Overall, whether this scenario results in more road-based travel than currently will depend on road user charging policy coming into action. What is clear, is that problems of empty AEVs clogging up streets will be mitigated by AEVs moving on to the next trip rather than circulating empty or travelling unoccupied to a storage location.

An effective and comprehensive transport pricing regime may have been used to tackle a whole range of urban policy issues as well as supplement revenue lost from disappearing fuel excise. In an environment in which travel is cheap and accessible for all, new community-wide opportunities will emerge. For example, post morning commute, AEVs may be able to be used for school runs, or taking older citizens to medical centres, or community outreach.

At minimum, price signalling could be used to encourage car-pooling during peak period commutes, or to take advantage of pre/post commuter peak road capacity by ‘rewarding’ staggered start/end times for schools. Optimising effective usage of AEVs and using a considered pricing scheme gives us the best chance to overcome congestion and inefficiencies in the system.

**MaaS + urban consolidation – the Efficient city**

By 2038, substantial areas of our cities will have been developed more intensively, with the benefits of access to local facilities clustered along a network of community spines. For many people, many daily activities will lie within reach without needing access to a motorised vehicle; for those trips do, options will revolve around the purchase of travel in a shared-use vehicle, either on a trip-by-trip basis or as a subscription.

The problems of localised traffic congestion around the activity spines identified in the Better City will be mitigated by greater utilisation of individual AEVs in a MaaS environment, potentially aided by a pricing regime which increases network efficiencies and yields other traffic management benefits. For example, pricing would be set to encourage car-pooling across certain origin destinations, or for people travelling at different times of the day and so on.

As in the Legacy City, potential exists to tackle a variety of urban policy issues. This will be easier to implement in an urban consolidation environment. For example, changing car-parking regulations to look at numbers of spaces within an area, rather than an individual building would make more sense in a shared-use environment. Businesses would share delivery vehicles, which would be scheduled to run optimised delivery routes. Start times at kinder/primary/secondary schools would be staggered to allow for optimised use of a virtual school fleet.

These opportunities and many others would be possible in this environment. It could be expected that as local alternatives open for a variety of activities, it will be easier to justify them and they will be less costly to implement.
Public transport operators will move quickly to a fully autonomous fleet, given the significant operating cost savings and flexibility that it provides. It is likely that public transport operators will continue to provide major line haul capacity, as well as ‘last mile’ feeder services to rail stations and tram and bus stops from our homes using on-demand public transport vehicles. More fine-grained and responsive local transport options will quickly emerge.

Residential streets will be redesigned to take advantage of the opportunity to give priority to other street users over cars. AEVs will be speed-constrained, and local roads will operate as shared-use rather than solely vehicle-centric. This will allow residents to reclaim their streets and we will no longer be surprised by the sight of kids playing in the street, as they used to.

Pedestrians and Cyclists. The impact of AEVs on other road users is not so clear, given the advanced ability of AEVs to avoid collisions, etc. Once the safety of AEVs is established, there is the potential for pedestrians and bike riders to upset road operations by using roads in ways that would currently be regarded as risky but which in an AEV future would be quite safe.

Commercial Operators. Across all scenarios, commercial operators will quickly embrace the cost savings of vehicle autonomy, and in some cases, could develop mixed use AEVs which could carry either passengers or goods depending on need. As noted above it, there is substantial possibility for businesses to pool their needs, which can be satisfied with a shared fleet.
Policy Settings

We believe that the Efficient City scenario (MaaS and urban consolidation) represents the best outcomes with respect to the use of scarce resources, utility, access, and fairness. AEVs have the potential to considerably affect the way cities are planned and how they operate.

However, adoption of AEVs will not be without its challenges, especially in the public policy sphere. Some of the public policy challenges that we will need to confront include:

- The need to plan for the possibly early arrival of autonomous vehicles and to keep up with the rest of the world in terms of street design and transport regulations. Failure to do so could see us become the last dumping ground of internal combustion engine vehicles and their related emission issues.

- The loss of revenue from the fuel excise. This will happen regardless of scenario, with the reduction in revenue reflecting the speed with which electric vehicles replace internal combustion vehicles. We may choose to replace this revenue from other sources, but it is more likely that we find some other mechanism to raise revenue from travel. Any revenue raising scheme, such as Road User Charging, has to be fair, transparent and must drive desirable outcomes for all users of the network.

- Ensuring we foster an effective MaaS regulatory environment. This may not be as easy as it seems. The platform nature of MaaS confers significant advantages to first movers and creates significant hurdles for new entrants creating market inefficiencies the difficulties that regulators around the world have had in dealing with Uber illustrates the problem of dealing with entirely new business models. Regulators in Australia are doing a good job in getting ahead of the challenges relating to vehicle autonomy and they need to work hard to maintain this position.

- The impact of MaaS for our public transport services and operators. The distinction between a traditional PT operator, and a fleet operator of AEVs will become a blurry one – especially in a MaaS environment. The long-term contracts we strike with public transport operators will need to reflect the coming reality of MaaS as an option in the transport mix.

- Zombie cars. AEVs circulating without passengers may have significant knock-on effects on congestion, etc. Working out what to do with empty AEVs, even in a MaaS environment will need careful planning, and may require specific policy sets and regulations.

- Car-parking and infrastructure. We should take an early view on the need for car parking in high-value commercial locations to avoid wasted expenditure and opportunity. Similarly, we need to understand the impact of AEVs on new roads and infrastructure business cases, as they could considerably affect utility of any new builds, and increase the risk of stranded assets.

- Delivering an urban consolidation agenda. This may involve enabling commercially important local activity, through encouraging and supporting appropriate residential intensification around activity nodes, to supporting local travel options for all residents.

- Likewise, in a MaaS environment we should look to relax parking requirements for developments. We need to move beyond a recent planning decision in Melbourne to overturn an approval allowing an apartment development close to public transport to proceed without providing any on-site parking.

- Planning of local activity centres. Our local authorities should look afresh at their local activity centres and consider how they could be made ‘AEV compliant’ by considering options for ‘drop offs’ and ‘pick-ups’, interchanges to public transport and the extent of attendant carparking.
Conclusion

The future is not always predictable, but preparing for it is critical. Using scenario planning, we can use a different approach from forecasting, imagining plausible stories about how the world might develop given established trends. By identifying policy issues, we can then deliver holistic responses to the changes in technology rather than simply waiting for the future to unfold and missing out on opportunities to build more efficient and resilient cities.

By testing scenarios against these policies we can get down to the task of developing strategic responses to plausible futures. This process uncovers the uncertain and often surprising nature of the future as it unfolds.