

City of Melbourne submission to Infrastructure Victoria - Automated and zero emission vehicle infrastructure advice

7 March 2018

Background

Infrastructure Victoria called for submissions from interested stakeholders on how the State can best prepare for the vehicles of the future. Infrastructure Victoria will utilise these submissions to provide advice to the Special Minister for the State in October 2018 on what infrastructure might be required to pave the way for automated and zero emission vehicles.

Infrastructure Victoria requested the following:

Feedback on the proposed Target Outcomes including priorities and gaps:

- Improve safety and public health
- Improve transport system performance and accessibility
- Improve mobility options
- Improve access to jobs and services
- Enable optimal land use
- Decrease carbon emissions
- Decrease air and noise pollution
- Improve reliability and sustainability of energy systems
- Support the productivity and growth of the Victorian economy

Feedback on the proposed Areas of Focus (below) including views/insights, missing focus areas and knowledge of related local or international research.

- Technology development
- Levels of sharing and ownership
- Interface with physical infrastructure
- Digital infrastructure
- Changes to travel and land use patterns
- Energy supply and charging capacity
- Public acceptance and government policy
- Environmental and human health impacts
- Economic impacts
- Social consequences and opportunities

City of Melbourne welcomes the opportunity to provide comment and insight to the advice Infrastructure Victoria is preparing for the State around infrastructure requirements for autonomous and zero emission vehicles. The key focus areas and target outcomes have been reviewed and responses are attached.

Context

When considering responses to the potential benefits and challenges of Automated Vehicles

(AVs) and Zero Emission Vehicles (ZEVs), City of Melbourne has drawn on the following goals and strategies;

A city for people

A city for people is equitably accessible, affordable, inclusive, safe and engaging. It promotes health and wellbeing, participation and social justice. AVs and ZEVs have significant potential to dramatically improve our city, however we must ensure that they are adopted in a way that is safe for all and doesn't introduce further negative impacts. City of Melbourne's priority is to keep people safe and adopt the first principle to 'do no harm'.

A connected city

A connected city allows for people of all abilities to move freely, safely and sustainably around the city. People and goods are able to move sustainably in and out of the city and Melbourne's street network is optimised for current and future travel modes. City of Melbourne's Transport Strategy supports a declining role for private motor vehicles with future growth in mobility to be supported by an expansion of space-efficient transport such as public transport, walking and cycling.

A smart city

City of Melbourne believes that a smart city should adopt useful innovation that folds seamlessly into how we live our lives to improve our day-to-day experiences. The Knowledge City Strategy established the City of Melbourne as a leader and promoter of efforts to enable new technologies and support innovation.

A city that cares for its environment

Melbourne is taking action to meet its pledge to help deliver the Paris Agreement to limit global temperature rise. City of Melbourne's Zero Net Emissions Strategy supports sourcing electricity from renewable sources and recognises that ZEVs could assist in our goal to reduce emissions.

This submission is also supported by endorsed council policy and strategies including:

- [Future Melbourne 2026](#)
- [Last Kilometre Freight Plan](#)
- [Road Management Plan](#)
- [Road Safety Plan](#)
- [Knowledge City Strategy](#)
- [Zero Net Emissions Strategy](#)
- [Municipal Health and Wellbeing Plan](#)
- [Walking Plan](#)
- [Places for People 2015](#)
- [Transport Strategy](#) (currently being refreshed)

AVs and ZEVs are set to have a profoundly transformative effect on cities, transport behaviour and urban life. For the City of Melbourne, these technologies offer the opportunity to support the strategic directions of Council, potentially helping to create a greener, more prosperous city that better manages the demands of a growing city with the need to maintain and enhance liveability. These desirable outcomes are unlikely to occur without the creation of the right set of policy signals. The City of Melbourne, as the cultural and economic centre of Victoria, is ideally positioned to take a leadership role that embraces new transport technologies and influences government to create the connected, creative, eco-city that it aspires to be.

The focus of this submission reflects considerations of a dense urban environment as exists within our municipality. While City of Melbourne believes there are a number of issues that must be addressed before we see the successful rollout of AVs and ZEVs, we are already leading and supporting modelling, pilots and trials to help gain greater understanding for the various scenarios that might play out in different environments. In order to capture the potential benefits of AVs, infrastructure requirements must consider alternate future scenarios, and be structured to support an optimal outcome. City of Melbourne is prepared to be at the forefront of further investigation in all of the key focus areas listed and are already incorporating these themes into the 2018 refresh of the City of Melbourne Transport Strategy. Similarly, the refresh of City of Melbourne Zero Net Emissions Strategy will address the issue of transport and greenhouse gas emissions.

Please note that this feedback is provided on behalf of the management of the City of Melbourne and does not represent the views of the Council.

Submission

Target Outcomes: City of Melbourne views and prioritisation

City of Melbourne supports the list of identified target outcomes for the State that AVs and ZEV's could contribute to achieving in Victoria. All of these target outcomes are in line with various goals, strategies and plans at City of Melbourne.

City of Melbourne considers all of the target outcomes important but places particular emphasis on improving safety and public health in line with being a city for people, improving transport system performance and accessibility in line with being a connected city and decreasing carbon emissions in line with being a city that cares for its environment.

Key Focus Areas: City of Melbourne views and insights

1. *Technology Development*

Automated and zero emission vehicle technologies are advancing rapidly, but exactly how rapidly – and in what direction – will have a significant impact on the infrastructure required to support its roll-out. We will also need to look at what might be needed to allow automated and human drivers to exist together on the road, any opportunities or drawbacks to particular technologies, and the specific opportunities for freight.

The City of Melbourne is committed to leading and providing pathways for innovation to pilot transport technology which supports a smart, global, connected city as well as ensures our city remains a place for people. Equally, the City of Melbourne expects that new regulations will be needed to capture the benefits of new technologies and to mitigate possible negative outcomes.

To understand how our city may be affected by emerging technologies, we commissioned the [Emerging transport technologies: Assessing the impact and implications for the City of Melbourne](#) prepared by Dr Elliot Fishman from the Institute for Sensible Transport in 2016. This was the first report of its kind to be commissioned by any local government in Australia. Much of the information in this report is still relevant and has been used as a source of information for this submission.

AVs, communications technology, ubiquitous data, new energy sources and new types of vehicles such as drones are expected to have the biggest impact on the city. These

technologies present opportunities for new start-ups and innovative solutions to urban problems. At the same time, all new technologies need to meet the social, environmental and economic goals of the city.

There are a variety of new technologies under development to support growing freight demand and to better serve dense urban environments. These include delivery robots travelling on footpaths and other parcel carrying drones. Whether these devices can integrate safely on streets and footpath needs to be considered.

City of Melbourne is preparing for the rapid advancement of AVs and ZEVs. We are supporting research, trials and technology development in this space. For example, City of Melbourne has partnered with University of Melbourne and others to implement the Australian Integrated Multimodal EcoSystem (AIMES) which is a world-first living laboratory based in the streets of Melbourne. AIMES has been established to test highly integrated transport technology and its ability to deliver safer, cleaner and more sustainable urban transport outcomes. A productive transport system is essential to the livability of cities and for industries to remain competitive in the global marketplace. With current transport infrastructure under stress, the AIMES street-based ecosystem provides a unique platform for collaborative trials of transport technology that connect the movement of people and goods with transport infrastructure options. Central to AIMES is a network of smart sensors designed to connect all parts of the transport environment within a segment of Melbourne streets. The focus is on 'multimodal' transport – connected vehicles, connected public transport, connected pedestrians and cyclists, and smart public transport stations.

An example initiative of City of Melbourne is the Open Innovation Competitions which directly draw from local and world-wide talent to solve city challenges together with data and technology. Unlike other 'hackathon' style events, these competitions provide a longer more sustained approach to developing technology solutions for city challenges. City of Melbourne is currently using this competition to engage the community to solve city accessibility issues. This type of competition also unlocks the value of related city data so that competitors have well defined problem statements, the required data and prize incentives to be involved.

2. Levels of sharing and ownership

Whether the introduction of automated vehicles leads to no one owning their own vehicle – or to everyone having their own, fully automated car – will have significant implications for what and when infrastructure is needed. We will also be looking to understand the potential market and commercial models for fleets, and how these might impact on how we are likely to use our transport infrastructure in the future.

City of Melbourne believes that a car-sharing model is integral to the introduction of AV and ZEVs.

One way in which AVs could significantly improve the space efficiency of car travel would be through car-pooling to increase the occupancy of vehicles. Research commissioned by City of Melbourne indicates that shared AVs could reduce car parking demand by up to 58 per cent. Currently occupancy rates for private vehicle journeys to work in the City of Melbourne are around 1.1 people per vehicle and have been consistently decreasing. With the possibility of AVs dropping off passengers and circulating our streets empty, already low vehicle occupancy could fall below one in the future. By contrast, car-pooling reduces the footprint of each commuter. If AVs were to be used by multiple commuters from different pick up points, the space efficiency of vehicles could be improved, although not to the efficiency of walking, cycling and public transport. A situation where multiple users can share a single vehicle should be encouraged. This should seek to reduce the total vehicle fleet and reduce individual car ownership. A fleet of small, on demand autonomous buses could amplify this

effect. By contrast, Dr Fishman's Emerging transport technologies report prepared for City of Melbourne in 2016 states that some leaders in emerging transport technologies caution that on demand, small scale motorised transport services are unlikely to be an effective replacement for heavy rail in the dense central core of the city during peak times, due to space efficiency reasons.

The Transport Strategy 2012 prioritises space efficient transport modes to facilitate access to and around the central city. Transport by private vehicles (including privately owned AVs) cannot cater to situations where large numbers of people wish to reach the same destination at the same time. A combination of train, tram, walking, cycling and reducing the overall need for travel through land use policies will remain intrinsically more efficient for the city's core transport tasks.

3. Interface with physical infrastructure

What might the roads of the future look like without drivers or emissions? That is a question we will be asking through this advice. We will consider issues such as road markings, signage, road quality, drop-off and pick-up areas, dedicated lanes, charging and fuelling infrastructure, and parking. We will also look at how the infrastructure needs for automated vehicles could change over time, from introduction to full roll-out, and what the implications could be for future infrastructure projects.

Over the last three decades, the City of Melbourne has elevated the quality of our city's streets creating vibrant, productive, inclusive and enjoyable places which are critical to the city's liveability, environmental sustainability, economic prosperity and international reputation. More space in the city has been given to people for walking, shopping, sitting, connections for business and dining through the reallocation of space from less productive uses such as on-street parking.

As the city's population grows, demands on our public spaces and streets will increase.

Bold decisions will need to be made about how space and physical infrastructure is allocated, designed and used in the future. Pedestrian overcrowding is a growing issue in the central city and is now a road safety risk in some locations. Pedestrian delay in the city is the result of policies that prioritise vehicles over people and is a major risk to our economic prosperity and reputation. The introduction of AVs may accelerate these demands or potentially could provide more space if less parking is required. Policies which aim to promote AVs or to adapt the city to support the early adoption of AVs must consider the impacts of an increase in vehicles on the liveability and walkability of Melbourne.

Of serious concern is the threat of attacks on pedestrians by hostile vehicles. More time and space for people must be a priority and the role of private vehicles in our city must be questioned.

Greater allocation of space for separated bike lanes will be required to increase cycling mode share having impacts upon street design and the need for the separation of different transport modes including AVs.

Making the city safer and more accessible for pedestrians and bike riders is supported by council policy including the Transport Strategy, Road Safety Plan, Walking Plan, and Bicycle Plan.

Further research, testing and trials are required to better understand how AVs will interact with high quality pedestrian environments. In low speed environments and shared spaces, the behavioural response of pedestrians will need to be considered. The creation of more mid-block crossings is likely to be required to ensure safe crossing opportunities and optimise pedestrian connectivity.

Approximately 903,000 people travelled to, or were present in, our municipality on an average weekday in 2016. This number is projected to reach 1.4 million by 2036. This means more people will be in the same amount of space. Concurrently, more space will be required for pedestrians as well as more trees and urban greening to mitigate the effects of climate change. Cars are inefficient users of space and require lots of it. In the City of Melbourne, roads occupy 48 per cent of all the “transport” space while footpaths have just 22 per cent - despite 66 per cent of trips within the city being on foot.

City of Melbourne anticipates there will need to be changes to parking spaces to accommodate for increased pick up/drop off points by AVs. This conversion needs to align with accessibility for people with a disability. City of Melbourne also submits that charging and fuelling infrastructure will need to be carefully planned and considered and more detailed investigation in to this area is supported. As acknowledged in the report *Emerging Transport Technologies* prepared by Dr Elliot Fishman for City of Melbourne in 2016, in order to increase the availability of electric vehicles, there is a need to investigate the suitability of voluntary or mandatory installation of electric charging facilities for new residential and commercial developments with onsite car parking facilities. This is consistent with Strategy 1.3 of Clause 21.09-05 of the Melbourne Planning Scheme: ‘Support provision of re-charging facilities powered by renewable sources of energy for electric powered vehicles’ <http://planningschemes.dpcd.vic.gov.au/schemes/melbourne>

4. Digital Infrastructure

To fully reap the benefits of automation, driverless cars will need to be connected. But how connected do they need to be and to what? Their exact communication and data needs, including mapping accuracy, will determine what digital infrastructure might be needed to support their operation. Cybersecurity also needs to be addressed to build confidence and protect consumer privacy.

City of Melbourne supports having policies around cybersecurity that align with Australian and International standards. We’re committed to improving the public services we provide, as well as supporting new economic and social initiatives.

Looking to the future, cities around the world are preparing to face accelerated changes in how people travel. Open data driven apps connect us to real time travel information, car sharing and city bike programs are common place, AVs are already being tested on city streets and the hyperloop is moving into prototyping.

Melbourne must determine how it will engage with these changes, and seeks to do so in ways that will improve the social connectivity of our communities in the process.

City of Melbourne is committed to improving the public services we provide, as well as supporting new economic and social initiatives. One of the ways we do this is by council’s [Open Data](#) program which makes over 180 high quality city datasets available through an online platform to the community through a Creative Commons license.

The Open Data platform utilizes the latest scalable cloud infrastructure to provide real-time access to council information. This includes a large number of transport related datasets that have been used for urban transport analytics projects. City of Melbourne has also made real-time parking sensor data available, which involved the roll-out of sensor technology and relay networks. This infrastructure has utilized secure wireless technology to improve organisational efficiency but has also allowed external businesses to also harness this information and infrastructure through established digital standards. The value of this data has been highly leveraged by making it accessible through digital infrastructure.

The introduction of AVs and digital sensor networks also presents a unique opportunity to reinvent the experience of locating and utilising car parking. City of Melbourne has already

established a large car parking sensor network, which has the potential to create a two-way digital interaction for AVs to instantly locate or reserve car parking bays. This could also be important for AVs to analyse and drive to parking bays with the required charging infrastructure. This interaction could be done seamlessly through developed digital API endpoints and wireless technology to perform a transaction securely and instantly.

City of Melbourne recognises the importance of data to help AVs navigate efficiently, accurately and safely. Consideration will need to be given to the level of data publically available, where the data is stored and who has ownership of the data. City of Melbourne submit that further investigation needs to be undertaken in to whether government has a role to play in stipulating where data can be stored (location wise) to ensure that data collected is in line with Australia's Privacy Laws. Interoperability of the data is important. City of Melbourne supports further investigation and scenario modelling in this area.

5. Changes to travel and land use patterns

The introduction of automated vehicles could dramatically change the way we interact with all forms of transport, particularly if the potential of 'Mobility as a Service' is fully realised – or not. The potential impacts that these changes could have on how and where we want to travel will have implications for the infrastructure that we need as a state, in both urban and regional areas. Active transport and how this will be integrated with new types of vehicles is also an important area for us to investigate. Urban planning and infrastructure requirements may change if people live and work in different places or ways due to use of automated vehicles.

Based on 2009 data, 46 per cent of City of Melbourne arrivals are by public transport, 47 per cent by private car, four per cent on bike and three per cent on foot (City of Melbourne, 2012, citing VISTA, 2009 data). Once in the municipality, only 15 per cent of trips are by car and a much larger share of trips are conducted on foot (66 per cent). AVs have the potential to alter travel patterns and mode choice.

If shared ownership of AVs is successful it is anticipated there will be implications for on-street and off-street car-parking requirements.

Parking which is free for the user disguises the real demand for parking and its true costs. Travel patterns would change substantially if parking charges reflected the true cost of providing the infrastructure. City of Melbourne research indicates that there is already a downward trend for needing to supply car parking in central Melbourne. City of Melbourne has been investigating introducing changes to car parks for future development to consider their potential reuse in the future.

As outlined in the *Emerging Transport Technologies* report, there is a perception that parking supports retail performance however this relationship in the central city is unclear. Car access plays a niche role in accessing retail in the municipality. Only 17 per cent of shopping visits are by car (VISTA 2016).

Car parking is typically 'bundled' with dwellings when sold and this contributes to the cost of housing and undermines the quality of the public realm. Meanwhile, many car parking spaces in central city buildings are not used and are significantly oversupplied. There is almost 40 per cent more residential apartment parking in the City of Melbourne than there are cars and surveys in Southbank and West Melbourne have revealed that between 26 and 41 per cent of private parking spaces are unoccupied overnight.

There is the potential that AVs could result in an increase in private vehicles being utilised in the central city by workers or visitors who seek to avoid parking fees by putting their car in a

driving loop while they are at work or visiting, sending their car home or sending it to a free parking area until they are finished their activity.

City of Melbourne currently receives significant revenue from on-street parking fees. Between 2012 and 2017 the City of Melbourne reduced paid parking spaces in the Hoddle Grid by 19.3 per cent, from 2917 to 2354 spaces. This figure continues to decrease as street improvements such as trees, wider footpaths, bike lanes and tram stop upgrades are implemented.

City of Melbourne must balance competing goals with its parking policy including managing traffic, generating revenue for vital city services, providing space for service vehicles, allocating public space appropriately and making the city accessible and attractive to visitors.

6. Energy supply and charging capacity

The type of zero emission technologies that fuel our future vehicles will have specific infrastructure requirements and impacts across the state's energy network. If all vehicles are electric, the implications for the grid, the need for charging stations and how batteries engage with the network all have flow-on effects for infrastructure. Hydrogen fuel cell vehicles, on the other hand, could have a different set of implications. We also need to consider when and how our behaviour might change as a result of the introduction of these vehicles. Will we still charge or fuel up at stations, or will this be done at home or work? And can our cars act as batteries to provide energy for our homes? The implications of these decisions will help to determine what infrastructure we need to build or change to accommodate a future with zero emissions vehicles.

Electric vehicles must be powered with renewable energy for them to be considered zero emission. City of Melbourne has undertaken research to explore issues around transport and greenhouse gas emissions, and found that due to the carbon intensity of the Victorian electricity grid, some models of electric vehicles powered by Victorian electricity produce more emissions than many of the most popular petrol cars today. This finding underlines the key issue that for electric vehicles to be able to operate as zero emissions vehicles, increasing the renewable energy mix in the Victorian and National electricity network must be an infrastructure priority.

City of Melbourne considers a renewably powered electricity grid to be a fundamental prerequisite for a transition to electric vehicles. For electric vehicles to genuinely lower Victoria's carbon emissions there must be an increase in renewable energy in our electricity supply. As a minimum, renewable energy infrastructure will need to be deployed at rates in line with electric vehicle uptake and electricity demand.

7. Public acceptance and government policy

Drivers today are wary of travelling in a fully automated vehicle, car or ride sharing in Victoria is not very common, and we are lagging behind some other countries in adopting zero emissions vehicles. Public attitudes could affect uptake levels, so it is important that we consider how behaviour might change – and when. Whether the government has a role in encouraging the use of automated or zero emission vehicles could have implications for infrastructure, particularly if it affects adoption rates. The rate of uptake also has implications for how the government funds future infrastructure maintenance and investments, and how the economy reacts to these technologies more broadly.

Government policy is required to ensure the potential benefits of AVs and ZEVs are captured, and negative impacts mitigated where possible. City of Melbourne are committed

to being a leader in this space and working at the forefront of investigating scenarios that ensure government policy guides a safe and accessible future where AVs and ZEVs contribute positively to our city.

8. Environmental and human health impacts

Zero emission vehicles can make a contribution to achieving carbon emission reduction targets. But what will be the extent of this contribution, what will be the source of the generated electricity and will it be stored in batteries or hydrogen fuel cells? The environmental impacts of automated and zero emission vehicles over their entire lifecycle, with different possible uses and technologies, requires consideration. Automated vehicles have the potential to reduce road injuries and deaths. But to what level and what transitional safety issues might we face with a mixed fleet of vehicles? As air and noise pollution from vehicles have effects on human health, the contribution that zero emission vehicles can make to improving health may be important.

City of Melbourne has a role to play in creating a healthy environment for healthy people. The Municipal Health and Wellbeing Plan and key strategies including the Transport Strategy and Zero Net Emissions Strategy all recognise the importance that active and low emission transport have in contributing to improved environmental and human health outcomes.

While ZEVs have the potential to reduce emissions, old batteries from electric AVs could create a further waste source that will need to be managed. A whole of lifecycle assessment will need to be considered from manufacturing to retirement of vehicles to ensure we have adequate infrastructure, systems and end-markets in place to utilise recycled materials from vehicles. As the recent recycling restrictions in China have demonstrated, there are serious environmental and social implications to relying on other countries to dispose or recycle our own waste. There needs to be infrastructure that manages waste streams that occur from electric AVs.

The major unintended consequence AVs may have on human health is that people are less active. City of Melbourne has a strong position on active transport for health and wellbeing. Physical activity and diet are proven to be central to improving chronic health conditions that also reduces costs to our public health system.

Autonomous vehicles are better able to drive within the speed limit, have faster reaction time for braking in the presence of an obstacle (for example, a pedestrian), eliminate distracted driving and impaired driving caused by alcohol or other drugs. The City of Melbourne is committed to reducing road injury and fatality. Currently, a person is killed or injured while walking in the City of Melbourne every two days, with 956 pedestrians killed or injured in 2006–2011. The municipality records the highest number of people killed and injured while walking of any local government area in Victoria.

The City of Melbourne is also committed to reduce death and injury to people cycling within their municipality and for the same reasons identified previously, AVs may offer reduced levels of road trauma to people on bicycles. In addition to the factors offered in relation to pedestrians, it is possible the incidents of car-dooring may reduce, as AVs may include sensors capable of detecting cyclists in the path of an opened door and delay opening until the cyclist has passed.

The transition period when the vehicle fleet is partly autonomous and sharing the road with 'conventional' vehicles, presents a range of road traffic safety issues.

9. Economic impacts

Automated and zero emission vehicles, and the infrastructure provided to support their deployment, are likely to have different economic impacts depending on how and when they are rolled out and used. We will seek to understand these economic impacts to inform investment choices and other policy decisions.

Alternative revenue models will need to be created to account for the likely decline in the requirements for car-parking spaces if there is strong uptake of AVs. City of Melbourne currently receives significant revenue from on-street parking fees however we continue to reduce paid parking spaces in the Hoddle Grid as street improvements such as trees, wider footpaths, bike lanes and tram stop upgrades are implemented.

A key consideration for City of Melbourne is ensuring that transport is equitable for all road users. This includes ensuring we have an infrastructure network that supports all road users adequately so they have equal access to all transport options available.

City of Melbourne existing policy on road pricing is contained in the Transport Strategy 2012 (see page 55). Key parts of this policy are:

- Maintaining and enhancing access to the city for a wide variety of trip purposes is a key issue for the City of Melbourne.
- Council will only consider a congestion levy or 'City Access' charge to manage demand for private vehicle access to the Central City during peak periods once capacity issues on public transport have been addressed.
- There are a number of price levers in the transport sector which send mixed messages to users. These include tollway charges, on and off-street parking charges, registration fees, petrol levies and public transport fares. Most of these charges have been separately established to raise revenue or recover infrastructure investment. There is an opportunity to look at these in a more integrated way and consider how they can work together to achieve a more balanced transport system.

The Transport Strategy 2012 contains a vision of a connected city linked by a well-designed and efficient transport system. The strategy emphasises that future growth in transport in the City of Melbourne should largely be provided for by enhancing public transport, cycling and walking networks and transitioning away from motor vehicles as the dominant mode. The 2018 refresh of the City of Melbourne Transport Strategy is considering this key focus area.

We currently charge road users tolls to use most of the freeway network which reduces traffic demand. In contrast, there are no fees applied to sensitive residential streets where traffic impacts local amenity or to streets where cars delay public transport.

While Council does not have a specific view on the use of incentives or user charging, there are options which have been implemented in other jurisdictions and the costs and benefits of these for the greater Melbourne context should be considered as part of the scope of the advice to the State.

10. Key Focus Area 10: Social consequences and opportunities

Victoria's ageing population and those living with a disability are potentially beneficiaries of automated vehicles, which promise increased access to mobility, services and employment. Our work will consider how infrastructure investments and policies can help harness these opportunities while mitigating potential negative consequences.

In Melbourne, the visiting experience for people with disability remains demanding. Some emerging technologies are beginning to lessen the burden of preparing and undertaking journeys to and within the city, but we think that more can be done to make Melbourne – and cities generally – more accessible.

For AVs to be accessible and equitable for all there needs to be appropriate infrastructure at departure and arrival points so that the elderly and those with disabilities are able to get in and out of the vehicles independently and safely.

With almost one in five Australians experiencing some form of disability, a large proportion of our community face challenges to actively participate in city life.

City of Melbourne is currently running an open innovation competition that aims to make cities more accessible for people with a disability. <http://www.melbourne.vic.gov.au/about-melbourne/melbourne-profile/smart-city/pages/innovation-competition-city-accessibility.aspx>

The issue of minimum and maximum age for people using AV independently needs to be addressed. Can adults order AV for minors and let them travel independently? How can we control this to ensure the rules are enforced? Similarly, how would this apply to the elderly, particularly those with dementia who might become disoriented when using AV? There needs to be consideration about how AV can be inclusive for all users while maintaining optimal levels of safety.

City of Melbourne also submit that further investigation should explore how data will be collected about people who are not able to consent to its collection and a position be developed on how or if data can be used to target more vulnerable people in the community, for example toys advertising in AVs while a child is travelling and data about a person being used to predict travel patterns.

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